FINAL ENVIRONMENTAL ASSESSMENT AND FINDING OF NO SIGNIFICANT IMPACT / RECORD OF DECISION

PROPOSED AIRPORT IMPROVEMENTS
AT

BALTIMORE/WASHINGTON INTERNATIONAL THURGOOD MARSHALL AIRPORT
LINTHICUM, MARYLAND

PREPARED FOR:
MARYLAND AVIATION ADMINISTRATION

MAA-AE-11-004
MAA-AE-05-003

APRIL 2012

PREPARED BY:

URS

4 NORTH PARK DRIVE, SUITE 300
HUNT VALLEY, MARYLAND 21030

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This Environmental Assessment becomes a Federal document when evaluated and signed by the responsible Federal Aviation Administration official.

Thomas Tilley

Responsible Federal Aviation Administration Official
Federal Aviation Administration – Washington Airports District Office

4/23/12

Date

PREPARED BY:

URS

4 NORTH PARK DRIVE, SUITE 300
HUNT VALLEY, MARYLAND 21030

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
EASTERN REGION

FINDING OF NO SIGNIFICANT IMPACT
RECORD OF DECISION

Proposed Airport Improvements at Baltimore/Washington International Thurgood Marshall Airport, Linthicum, Maryland

April 23, 2012

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINSTRATION

FINDING OF NO SIGNICANT IMPACT/ RECORD OF DECISION

Proposed Airport Improvements

Baltimore/Washington International Thurgood Marshall Airport
Anne Arundel County, Maryland

Introduction: This Finding of No Significant Impact (FONSI)/ Record of Decision (ROD) sets forth the Federal Aviation Administration's (FAA) final determinations and environmental approvals for the federal actions necessary to implement the Proposed Airport Improvements at Baltimore/Washington International Thurgood Marshall Airport (BWI Marshall). The Maryland Aviation Administration (MAA) is the sponsor of BWI Marshall.

The purpose of the Proposed Airport Improvements at BWI Marshall (the proposed action) is to allow BWI Marshall to continue to operate in a safe and efficient manner, to meet FAA design criteria, and to accommodate the Airport's current and future needs. Each of the proposed improvements is needed for one of the following reasons:

- To bring BWI Marshall into compliance with FAA design standards for Runway Safety Area (RSA) improvements for Runways 15R-33L, 10-28, and 15L-33R;
- To bring BWI Marshall into compliance with FAA design standards for Navigational Aid (NAVAID) installation, runway to taxiway separations, perimeter roadways, taxiway configurations, line-of-sight clearance, and Runway Protection Zones (RPZs);
- To improve Airport egress through Terminal Exit Roadway Improvements;
- To improve heating, ventilation, and air conditioning (HVAC) capacity;
- To improve existing pavement conditions through pavement rehabilitations and construction of new pavement; and
- To meet 14 C.F.R. Part 77 requirements for obstruction removal; ATCT line of sight; PAPI obstacle clearance surface.

The components of the proposed action include:

- RSA Improvements
  - Runway 15R-33L
  - Runway 10-28
  - Runway 15L-33R
- FAA Design Standard Improvements

    - Runway to Taxiway Separation Deficiency
        - Runway 15R-33L- taxiway "P"
        - Runway 15R/33L – taxiway "D"
    - Glide Slope Relocations
        - Runway 15R and 33L ends (including service roads)
        - Runway 10 and 28 ends (including service roads)
    - Runway 10-28 Mid-Point Runway Visual Range (RVR) Relocation
    - Runway 10 Approach Lighting System Modification
    - Taxiway Reconfigurations for Taxiways C, D, E, P1, R, U, U1, and Y in accordance with Engineering Brief No. 75
- Runway 10-28 Precision Approach Path Indicator (PAPI) Installation
- Airport Roadway Improvements
    - Perimeter Roadway Improvements (Runway 10 end)
    - Perimeter Roadway Improvements / (Runway 15R, 33L and 15L ends)
- Runway 4-22 Improvements – Conversion to a Taxiway
- Terminal Exit Roadway Improvements
- Central Utility Plant Improvements
- Airfield Pavement Improvements
    - Airside
        - Rehabilitate Runways 10-28, 15R-33L, and 4-22 and Associated Taxiways
        - 35-foot Shoulders on Runway 15R-33L
        - Reconfigure Taxiway T
        - Proposed Taxiway Segments and Pavement Removal
        - Miscellaneous Pavement Fillets
        - Aircraft Rescue and Fire Fighting (ARFF) Access Roadway Improvements (new fillets and terminal access roadway)
        - Various Rehabilitations
    - Landside
        - Various Rehabilitations
- Obstruction Removal and ATCT Line-of-Sight Clearance
- Compliance with RPZ Requirements

This ROD completes a thorough and careful environmental decision making process. This includes public disclosure and review by the FAA decision maker of the analysis of alternatives and their potential impacts that are described in the April 2011 Final Environmental Assessment (FEA). This ROD has been prepared and issued by FAA in compliance with the National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. § 4321, et seq.), its implementing regulations (40 CFR Parts 1500-1508), and FAA directives (Orders 5050.4B, *Airport Environmental Handbook* and 1050.1E, *Environmental Impacts: Policies and Procedures).*

This FONSI/ROD demonstrates and documents FAA's compliance with the procedural requirements for safety projects and other airport development. FAA arrived at these determinations by considering public and agency comments and reviewing the environmental analysis in the FEA and all other relevant documents that comprise the EA record.

Agency Actions: The federal actions required by the FAA are:

1. The determinations necessary to proceed with considering and processing an application for federal funding of those development items qualifying under the Airport Improvement Program, 49 U.S.C. § 47101, et seq., as well as Passenger Facility Charges, 49 U.S.C. §40117.
2. The approval of the portions of the ALP that depicts the project. See Appendix A .
3. The approval for relocation, installation and/or upgrade of various navigational aids.
4. Determination of effects upon the safe and efficient use of airspace (49 U.S.C. Section 40103(b)).
5. Establish conformance with FAA design criteria, federal regulations, and grant agreements (14 C.F.R. Parts 77, 139, 150, 152, 157, and 169)
6. Determination of compliance with Council on Environmental Quality (CEQ) regulations (40 C.F.R. Parts 1500-1508), and other applicable federal environmental requirements and approvals under various EOs and statutes discussed in this ROD;

Project Purpose and Need (Section 1 of the EA): The purpose of the proposed action is to enhance safety at the airport by meeting FAA design and safety standards and accommodating the Airport's current and future needs. The FAA has determined that the RSAs for Runways 15R-33L, 10-28, 15L-33R, and 4-22 do not meet FAA design standards. Pursuant to the 2006 U.S. Department of Transportation (DOT) Appropriations Act, the RSAs at BWI Marshall are required to comply with FAA design standards by December 31, 2015.

Implementing the proposed RSA improvements would enable the Maryland Aviation Administration to bring the Runway 15R-33L, 10-28, and 15L-33R RSAs at BWI Marshall into compliance with FAA design standards. MAA is proposing to meet the Runway 4-22 Safety Area requirements by converting the runway to a taxiway.

In addition, several other airport improvements are proposed to meet FAA Design Standards including: runway to taxiway separation for Runway 15R-33L and several parallel taxiways; Glide Slope relocations for the ends of Runways 15R-33L and 10-28; Mid-point Runway Visual Range relocation for Runway 10-28; Runway 10 approach lighting system modifications; and Engineering Brief No. 75 taxiway reconfigurations. Additionally, in order to meet FAA Design Standards for the Runway Protection Zones for the Runway 15R end, 33L end, and 10 end, acquisition of property interests will take place. Precision Approach Path Indicators will be installed on Runway 10-28 in accordance with FAA design standards.

There are also several roadway improvements that would allow MAA to perform necessary pavement rehabilitations and construct roadway segments to access NAVAIDs as well as move closer to having a complete perimeter roadway system around the airport. The proposed terminal exit roadway improvements would ease the traffic leaving

the terminal and ease traffic congestion. Additionally, the Central Utility Plant would be expanded to accommodate future HVAC needs for vertical expansion of the terminal. Also, multiple areas of pavement would be rehabilitated, the roadway located in between the ARFF facility and Taxiway E would be expanded and 35 foot wide shoulders on Runway 15R-33L would be added. Finally, obstruction removal would be undertaken to meet FAR Part 77 requirements and to assure adequate line of sight clearance for personnel at the ATCT for the areas between the Runway 33L end hold pad and Taxiway D.

Reasonable Alternatives Considered (Section 2 of the EA). As described in detail in Section 2 of the FEA, various alternatives were developed, evaluated, and screened for their ability to meet the project purpose and need. Alternatives also had to comply with FAA Design Standards, avoid potentially significant environmental impacts, and not adversely impact current or future operational standards. Furthermore, additional RSA compliance alternatives were evaluated in the RSA Study and the Master Plan.

The following component projects of the proposed action only have one Build Alternative considered in detail in the EA and each of these Build Alternatives is MAA's preferred alternative:

- Runway 15R-33L Safety Area
- Runway 15L-33R Safety Area
- Runway 10 Glide Slope Relocation
- Runway 28 Glide Slope Relocation
- Runway 10-28 Mid-Point RVR Relocation
- Runway 10 ALS Modification
- Taxiway reconfiguration in accordance with Engineering Brief No. 75
- Runway 10 End Perimeter Roadway Improvements
- Runway 15L End Perimeter Roadway Improvements
- Runway 4-22 Improvements
- Terminal Exit Roadway Improvements
- Central Utility Plan Improvements
- Airfield Pavement Management Improvements
- Runway Protection Zone Compliance (Runways 15R, 33L, and 10 ends)
- Obstruction Removal and Line-of-Sight Clearance

The components of the proposed action that have more than one Build Alternative identified and discussed in detail in the EA included:

- Two Build Alternatives for Runway 10-28 Safety Area (Build Alternative 1 is MAA's Preferred Alternative)
- Two Build Alternatives for Runway to Taxiway Separation Deficiency (Build Alternative 1 is MAA's Preferred Alternative)
- Three Build Alternatives for Runway 15R Glide Slope Relocation (Build Alternative 2 is MAA's Preferred Alternative)
- Two Build Alternatives for Runway 33L Glide Slope Relocation (Build Alternative 1 is MAA's Preferred Alternative)

- Three Build Alternatives for Runway 15R End Perimeter Roadway Improvements (Build Alternative 2 is MAA's Preferred Alternative)
- Two Build Alternatives for Runway 33L End Perimeter Roadway Improvements (Build Alternative 1 is MAA's Preferred Alternative)

The No Build Alternative was considered for each of the component projects of the proposed action listed above. These alternatives are described in detail in Section 2.

The No Build alternative would not meet the project purpose and need, but was carried forward as a baseline for comparison of impacts, pursuant to Council of Environmental Quality regulations and FAA Orders 1050.1E and 5050.4B.

Analysis Of The Component Projects of the Proposed Action For Which Only One Build Alternative Was Analyzed

The following component projects of the proposed action would have no impact on the environment except, in some instances, for temporary ground disturbance and negligible air quality and noise impacts: the Runway 15L-33R Safety Area Build Alternative; the Runway 10 End Glide Slope Relocation Build Alternative; the Runway 28 End Glide Slope Relocation Build Alternative; the Runway 10-28 Mid-Point RVR Relocation Build Alternative; the Runway 10 Approach Lighting System Modification Build Alternative; the Engineering Brief No. 75 Build Alternative; the Runway 15L End Perimeter Roadway Build Alternative; the Runway 10 End Perimeter Roadway Build Alternative; the Runway 4-22 Improvements-Conversion to a Taxiway Build Alternative; the Terminal Exit Roadway Improvements Build Alternative; the Central Utility Plant Improvements Build Alternative; and the Airfield Pavement Management Improvements Build Alternative.

Runway 15R-33L Safety Area Build Alternative

The Runway 15R-33L Safety Area Build Alternative would impact 50 linear feet of Kitten Branch and create 4,000 square feet of temporary wetland buffer impacts and 900 square feet of permanent wetland buffer impacts. This Build Alternative would create far less environmental impacts than the alternative considered but not studied in detail of providing full RSA dimensions using the currently established runway thresholds. Specifically, the latter alternative would involve relocation of portions of Dorsey Road and the I-195/Aviation Boulevard intersection which would be disruptive to the community and would negatively impact the operation of the airport. Additionally, it would not be possible to complete this alternative prior to 2015.

Another alternative studied but not considered in detail was displacing the Runway 15R threshold by 400 feet and the Runway 33L threshold by 600 feet as compared to the 300 and 500 foot displacements contemplated in the preferred Build Alternative. The advantage of the former alternative would be that most of the existing MALSR towers could be reused rather than relocating the entire system. The disadvantage of this alternative, however, is that it would reduce the usable runway length by an additional 200 feet which would impact the current fleet of aircraft. Also, the environmental impacts of this alternative would be the same as the environmental impacts of the

preferred alternative. As the FEA's preferred alternative is the only alternative that meets the purpose and need of the project the FEA's Build Alternative for the Runway 15R-33L Safety Area is the FAA's preferred alternative.

Runway Protection Zone Compliance Requirements Build Alternatives

The Runway Protection Zone Compliance Requirements Build Alternatives involve acquisition of property interests within the RPZ to Runway 15R, totaling 3.3 acres, acquisition of an avigation easement for the proposed Runway 33L safety area improvements totaling .1 acres, and acquisition of 8.1 acres of property to accommodate the Runway 10 RPZ. Concerning the Runway 15R RPZ, three of the four parcels at issue contain automobile parking that could remain in use if an avigation easement is obtained for them. The fourth parcel contains a portion of the Flight Kitchen which would need to be demolished, however, the loss of the space demolished would be replaced outside of the RPZ. Concerning the Runway 10 RPZ the 8.1 acres to be acquired consists of undeveloped grass and forest. With respect to each acquisition, except regarding the Flight Kitchen, the land usage would not change. Each of the acquisitions discussed above is required due to either the Runway 15R-33L safety area improvements or the Runway 10-28 safety area improvements. As discussed in the preceding paragraph the Build Alternative for the Runway 15R-33L Safety Area is the only practicable alternative that meets the purpose and need of the project. Additionally, both the preferred Build Alternative for the Runway 15R-33L Safety Area and the Runway 10-28 Safety Area are associated with only minor impacts to water quality and wetlands. Therefore, the Runway Protection Zone Compliance Requirements Alternatives as described above are the FAA preferred alternatives.

Obstruction Removal And Line Of Sight Clearance Build Alternatives

To meet Part 77 requirements it is necessary to remove 507 trees. In addition, to allow for line of sight clearance for personnel at the ATCT to see the areas between the Runway 33L end hold pad and Taxiway D it is necessary to remove 2.35 acres of forest stand. These projects will also necessitate 315 square feet of temporary wetland impacts and 945 square feet of temporary wetland buffer impacts. These projects are necessary for safety purposes and there are no practicable alternatives for these projects that would avoid impacts to wetlands and forests in order to satisfactorily complete them. Therefore, the Obstruction Removal and Line of Sight Clearance Build Alternative herein described is the FAA's preferred alternative.

Analysis Of The Proposed Action For Which More Than One Build Alternative Studied Was Considered In Detail

Runway 10-28 Safety Area Alternative Discussion

For the Runway 10-28 Safety Area Build Alternatives, both alternatives meet the purpose and need for the project. Build Alternative 1 is identified as the FAA's preferred alternative. As compared with Build Alternative 2, Build Alternative 1 would require fewer cubic yards of fill, a lower retaining wall, and less environmental impacts. Although Build Alternative 1 would create 60 linear feet of permanent impacts to Kitten Branch, 2000 square feet of temporary wetland buffer impacts, and 1000 square feet of

permanent wetland buffer impacts there are no practicable alternatives that would avoid these minor impacts.

Runway To Taxiway Separation Deficiency Alternative Discussion

The Runway to Taxiway Separation Deficiency project included two Build Alternatives that would both meet the project purpose and need. Build Alternative 1 included a culvert that allows Fork Branch to go under the proposed Taxiway D hold pad with a majority of the culvert not being located beneath the proposed pavement. Build Alternative 1 is identified as the FAA's preferred alternative. Although Build Alternative 2 is superior to Build Alternative 1 in that the former would eliminate placement of any part of the culvert under the proposed hold pad pavement Build Alternative 1 is the preferred alternative because it 1) contemplates a smaller culvert and thus lesser impacts to Fork Branch than Build Alternative 2; 2) it has a smaller limit of disturbance than Build Alternative 2; and 3) under Build Alternative 2 there would be an increased likelihood of the collection of debris at each turn of the culvert that would pose additional maintenance concerns. Impacts to wetlands under Build Alternative 1 are the same as under Build Alternative 2. Build Alternative 1 would create 2,400 square feet of temporary wetland impacts, 2,600 square feet of permanent wetland impacts, 8,100 square feet of temporary wetland impacts, and 8,100 square feet of permanent wetland impacts in addition to impacts to Fork Branch and 3.5 acres of forest stand removal and .28 acres of afforestation removal. There are no practicable alternatives that would avoid these minor impacts to these resources.

Runway 15R Glide Slope Relocation/Runway 15R Perimeter Roadway Alternative Discussion

As the configuration of the Runway 15R Perimeter Roadway Improvement is contingent on which of the Runway 15R Glide Slope Relocation alternatives is selected the operational and environmental aspects of the roadway improvement and the glide slope relocation are discussed here in tandem. Three Build Alternatives were identified for the Runway 15R Glide Slope Relocation and Perimeter Roadway Improvements that all meet the purpose and need for the project. Each of the Build Alternatives would create 1) an encroachment on 100 year floodplains; 2) wetland impacts; 3) stream impacts to Kitten Branch; and 4) forest impacts. Due to the location of Runway 15R it is impractical to avoid encroaching on the floodplains or impacting wetlands due to the existing terrain and the close proximity of the runway to the floodplain associated with Kitten Branch and the wetlands. It is also not practical or environmentally prudent to move the runway in order to avoid the floodplain or wetland impacts. Build Alternative 2 is identified as the FAA's preferred alternative. Build Alternative 2 is preferred over Alternative 1 because Alternative 2 would: 1) not include Alternative 1's 30-foot retaining wall which would require fall protection devices that may affect the functionality of the glide slope antenna; 2) reduce the wildlife hazard potential of Kitten Branch as compared to Alternative 1; 3) have a shorter construction duration than Build Alternative 1; and 4) be less likely to interfere with future BWI Marshall development plans. While Alternative 2 has greater approximated impacts to Kitten Branch and the 100-year floodplain than Alternative 1, the differences are negligible. Specifically, Alternative 2 impacts 0.12 acres more of floodplains than Alternative 1 and has 60 more linear feet of temporary

impacts to Kitten Branch. Additionally, Alternative 2 is preferable to Alternative 3 because it creates fewer impacts to floodplains and Kitten Branch. In addition, the COE and MDE preferred the method of stream diversion and construction of the culvert "in-line" within the stream bed that is included as part of Build Alternative 2.

Runway 33L Glide Slope Relocation/Runway 331 Perimeter Roadway Alternative Discussion

As the configuration of the Runway 33L Perimeter Roadway Improvement is contingent on which of the Runway 33L Glide Slope Relocation alternatives is selected the operational and environmental aspects of the roadway improvement and the glide slope relocation are discussed here in tandem. For each of the two Runway 33L Glide Slope Relocation and Perimeter Roadway Improvements Build Alternatives, both meet the purpose and need for the project. Both of the alternatives contemplate culverting a portion of Fork Branch. Build Alternative 2 is selected as the preferred alternative because unlike Build Alternative 1, no portions of the culvert would be located underneath existing or proposed airfield pavement and thus aircraft would not operate above the culvert. Both Build Alternatives would create the same amount of stream impacts to Fork Branch. There are no practicable alternatives that would avoid impacts to Fork Branch.

IDENTIFICATION OF FAA'S PREFERRED ALTERNATIVE

The FAA's preferred alternative for each component of the project is the same as MAA's preferred alternative as identified in the FEA. The summary of the environmental impacts created by the Build Alternatives, also found on Page 2-32 of the FEA, is attached in the Appendices to this document.

Affected Environment (Section 3 of the EA):

Section 3, *Affected Environment*, of the EA discusses the surrounding area and environmental resources that could potentially be affected by the Proposed Project. Past, present, and future actions are also identified to determine any cumulative impacts of these actions.

Environmental Consequences

Section 4, *Environmental Consequences*, of the EA provides a detailed discussion on any reasonably foreseeable environmental consequences of the Proposed Project as compared to the No Build scenario. The following presents a summary of the study results. Details regarding the analysis and results can be found in Section 4 of the FEA released in March 2012.

Aircraft Noise (EA Section 4, 4.1): Under both future years considered in this EA, when compared to the No Build Alternative, the Build Alternatives would not cause sensitive areas located at or above 65 dB DNL to experience a noise increase of at least DNL 1.5 dB. Therefore, the proposed Build Alternatives would not result in a significant noise impact.

Compatible Land Use (EA Section 4, 4.2): No incompatible land uses have been identified under the proposed Build Alternatives. Therefore, no significant impacts are anticipated.

Air Quality (EA Section 4, 4.0.1): Because there are no anticipated changes to aircraft operations (e.g., number of operations, fleet mix, delay periods) or motor vehicle traffic attributable to the implementation of the proposed action, air emissions associated with the operation of the airport are expected to remain unchanged. However, air quality impacts from the proposed action would occur during construction of the improvements; therefore, the air quality analysis performed for construction related impacts is discussed in **Section 4.14.3**. Therefore, the proposed Build Alternatives would not result in a significant impact to Air Quality.

Water Quality (EA Section 4, 4.5): Several streams would be impacted by one or more of the proposed improvements. Construction at and around waterway crossings could cause permanent impacts if existing crossings are widened or reinforced. These impacts would occur through permanent alteration of the stream channel, resulting in alteration of hydrology at the site, as well as upstream and/or downstream locations. Such hydrological changes may destabilize the channel and stream banks, increase erosion and sediment loads in the stream, and affect water quality and aquatic habitats that support macroinvertebrates and fish. Additional stormwater considerations will need to be made to account for the approximately 275 acres of ground disturbance for all of the proposed project elements. Temporary impacts to water quality during construction may occur due to stream diversion, erosion, or vegetation removal.

Water quality impacts associated with the Build Alternatives would be expected due to runoff associated with the proposed areas of additional impervious surface. Based on preliminary plans, new impervious surfaces would total approximately 40 acres and pavement removal will be approximately 32 acres for a net increase in impervious surfaces of approximately 8 acres. Stormwater treatment will be required for the increased impervious area as well as to address project phasing and the TMDL requirements that will be imposed on the Airport. With respect to Fork Branch, the proposed action would create a total of 300 linear feet (intermittent), and 350 linear feet (perennial) of temporary impacts as well as 1550 linear feet (intermittent) and 700 linear feet (perennial) of permanent impacts. With respect to Kitten Branch 460 linear feet of temporary impacts would be created as well as 1310 linear feet of permanent impacts. The impacts to Fork Branch are due mainly to the preferred Runway to Taxiway Separation Deficiency Alternative and the preferred alternative for that project had less impacts to Fork Branch then the other Build Alternative studied in detail. The overwhelming majority of the impacts to Kitten Branch are due to the Runway 15R Glide Slope Relocation and selection of Build Alternative 1 instead of preferred Build Alternative 2 would only reduce the impacts by 60 linear feet. Based on the above analysis, the impacts to water quality associated with the proposed Build Alternatives are not considered significant.

Wetland and Waters of the United States (EA Section 4, 4.9): Several wetlands and wetland buffers would be unavoidably impacted as a result of the proposed improvements. Specifically, it is anticipated that the proposed action will create 13,828 square feet (.317 acres) of permanent wetland impacts; 2990 square feet (.069 acres) of temporary wetland impacts; 16,445 square feet (.355 acres) of temporary wetland buffer impacts; and 40,050 (.864 acres) of permanent wetland buffer impacts. For the purposes of this document, it is assumed that all wetlands located within the limits of disturbance (a worst case scenario) will be impacted by the proposed project; however, these impacts will be avoided or minimized to the extent practicable during final design There are no practicable alternatives that avoid impacting wetlands. The greatest source of impacts to wetlands and wetland buffers comes from the preferred Build Alternative for the Runway 15R glide slope relocation. It is impractical to avoid encroaching on the wetlands impacted by the 15R glide slope relocation project due to the existing terrain and the close proximity of the runway to the wetlands and wetland buffers. It is also not practical or environmentally prudent to move the runway in order to avoid the wetland impacts. Further, the other build alternatives studied for the 15R glide slope relocation create the same amount of wetland impacts as the preferred alternative. Therefore, there are no alternatives that meet the purpose and need of the Runway 15R Glide Slope Relocation project that would have less impacts on wetlands than the preferred alternative. Similarly, due to the proximity of wetlands to the runways and taxiways at issue in the runway to taxiway separation deficiency build alternative avoidance of wetlands for this project would not be practicable and there are no build alternatives that meet the purpose and need which would otherwise reduce the wetland impacts. Finally, there are no practicable alternatives to the Runway 15R-33L Safety Area Build Alternative, the preferred Runway 10-28 Safety Build Alternative, or the Obstruction removal/Line of Sight Clearance Alternative that would avoid or minimize impacts to wetlands while still meeting the purpose and need of these projects.

During the detailed design of the proposed action, MAA will apply for a Section 404 permit and will abide by the terms and accompanying water quality certifications. Based on coordination with the COE and MDE, MAA is proposing wetland mitigation on off-site MAA-owned property in conjunction with stream restoration activities to avoid creating potential wildlife hazard attractants. Compensatory mitigation would be required for unavoidable adverse impacts to wetland resources, in accordance with the *U.S. Army Corps of Engineers Compensatory Mitigation for Losses of Aquatic Resources* rule (33 CFR 325 and 332).

MAA has prepared a Preliminary Draft CMP in accordance with the Final Rule on Compensatory Mitigation for Losses of Aquatic Resources (see Appendix B of the FEA). In the CMP, MAA proposed to provide approximately 3,834 linear feet of stream restoration and 1,635 square feet of palustrine emergent wetland creation to compensate for unavoidable permanent impacts to federally jurisdictional resources. Additionally, 19,200 square feet of palustrine forested wetland creation will be incorporated into the restoration reach as mitigation for unavoidable impacts to state jurisdictional resources. Kitten Branch, downstream of the BWI Marshall campus, provides opportunities for both

stream restoration and wetland creation. It affords over 4,000 linear feet of stream restoration and numerous locations in which riparian planting, wetland enhancement, and control of invasive vegetation could be implemented. This portion of Kitten Branch is entirely on MAA-owned property. USDA Wildlife Services has provided concurrence that due to the proposed nature of the restoration activities, no increased risk to aviation will occur despite the proximity of the proposed mitigation areas to approach/departure airspace. Both USACE and MDE have provided concurrence that restoration of these areas would satisfy compensatory mitigation needs for the projects and replace lost functions and values associated with impacted areas.

Authorization of impacts would not be granted until the COE approves the Final CMP. Due to the small amount of wetland acreage impacted by the project the impacts are not deemed significant. Additionally, as all of the proposed impacts to wetlands and their associated buffers can be adequately mitigated to meet COE and MDE requirements, the wetland impact is negligible. The function and value lost as a result of the proposed impacts would be reclaimed through the proposed mitigation and would be accomplished under the supervision of the appropriate regulatory agencies (COE and MDE).

Floodplains (EA Section 4, 4.10): The only floodplain encroachment anticipated involves a portion of the Kitten Branch floodplain, where the proposed Runway 15R Glide Slope relocation alternatives (and associated roadway options) would encroach upon the existing 100-year floodplain. Build Alternative 2, the FAA's preferred alternative, would create 1.22 acres of temporary floodplain impacts and 5.33 acres of permanent floodplain impacts. It is impractical to avoid encroaching on the floodplains due to the existing terrain and the close proximity of the runway to the floodplain associated with Kitten Branch. It is also not practical or environmentally prudent to move the runway in order to avoid the floodplain impacts. The anticipated impacts to floodplains are not considered a significant encroachment as there is no likelihood of loss of human life, no adverse effect on the safe operation of the airport, and no notable adverse effect on the natural and beneficial value of the floodplain. In addition, any impacts to the floodplain would be confined to MAA-owned property.

The proposed action (Runway 15R Glide Slope and associated perimeter roadway) would occur within the floodplain of Kitten Branch. The level of impact would be finalized during the design phase of the project and coordination with appropriate Federal and state agencies would be required. Should a Letter of Map Revision (LOMR) be required for alteration of the floodplain, necessary coordination with FEMA would occur as part of the final design. All encroachment within the floodplain and any associated variations will be evaluated to minimize potential impacts to the airport and airport facilities. If mitigation is required, priority will be given to feasible options that maintain impacts on MAA-owned airport property.

Based on initial modeling, the proposed Runway 15R Glide Slope Critical Area grading and construction of the perimeter roadway would likely raise flood elevations more than one foot in only that portion of Kitten Branch immediately above the perimeter roadway

bridge crossing, all of which is on MAA property. In considering the proposed improvements (Runway 15R glide slope relocation and perimeter roadway) and associated floodplain modifications, the magnitude of impacts to Kitten Branch would be similar regardless of the alternative selected. Alternative 2 is preferred over Alternative 1 because Alternative 2 would: 1) not include not include Alternative 1's 30-foot retaining wall which would require fall protection devices that may affect the functionality of the glide slope antenna; 2) reduce the wildlife hazard potential of Kitten Branch as compared to Alternative 1; 3) have a shorter construction duration than Build Alternative 1; and 4) be less likely to interfere with future BWI Marshall development plans. While Alternative 2 has greater approximated impacts to Kitten Branch and the 100-year floodplain than Alternative 1, the differences are negligible. Specifically, Alternative 2 impacts 0.12 acres more of floodplains than Alternative 1 and has 60 more linear feet of temporary impacts to Kitten Branch. Additionally, Alternative 2 is preferable to Alternative 3 because it creates fewer impacts to floodplains and Kitten Branch. The COE and MDE have commented that they prefer the method of stream diversion and construction of the culvert "in-line" within the stream bed that is included as part of Build Alternative 2.

Final grades for the Glide Slope grading and associated roadway options within the floodplain will be maintained at existing elevations to the maximum extent practicable in order to minimize any potential for increasing the 100-year flood elevations. According to preliminary estimates of fill required, approximately 165,000 cubic yards of fill will be required within the 100-year floodplain.

All encroachment within the floodplain and any associated variations to the floodplain would be mitigated so as to not create future damage to the airport or any airport facilities or have a notable, adverse effect on the natural and beneficial value of the floodplain. All mitigation will occur on airport property so that no changes to the flood elevation will occur downstream of Kitten Branch or on property not owned by MAA. MAA has been coordinating with the COE and MDE regarding the complexity of the proposed action and seeking continued guidance and support through the Section 404 permitting process of the CWA (as amended) for unavoidable impacts to potentially jurisdictional wetlands and Waters of the U.S. Floodplain impacts are regulated by MDE and will be authorized in conjunction with stream impacts. Avoidance and minimization for floodplain impacts must be fully demonstrated prior to authorization being granted. Authorization for activities associated with floodplain impacts by COE is not required under Section 404 of the CWA, as amended.

Coastal Resources (EA Section 4, 4.11): The proposed airport improvement projects are located within the Maryland Coastal Zone. The Maryland Department of the Environment (MDE) is the Maryland State agency that manages the State's Coastal Zone Management Program (CZMP). MAA has certified that the proposed action is consistent with the policies of the State of Maryland's CZMP. ***See Appendix B*** attached. MDE is

implementing a phased Federal consistency review for the projects. MDE has indicated that based on their review of the Draft Environmental Assessment Phase I of this project is consistent with the State's CZMP ***See Appendix B attached.*** The phase II determination will be made will be made once specific projects undergo further analysis.

Fish, Wildlife, and Plants (EA Section 4, 4.8): The MDNR Wildlife and Heritage Service, MDNR Environmental Review Unit, and the FWS were contacted to determine if any rare, threatened or endangered species are located within the study area. Based on coordination with these agencies, the federally threatened swamp pink (*Helonias bullata*) has been documented to occur in the project area, within the Nontidal Wetlands of Special State Concern (WSSC) along Stony Run (see Appendix B of the FEA). However, MDNR determined that the proposed project will have no impacts to the swamp pink. There are other protected species located within the vicinity of the Airport (Giant Cane, Bog Fern, and Clammyweed), as discussed in Section 3.8.2, however, these species are not located within the proposed project areas and would not be impacted. Implementation of the preferred build alternatives would lead to 8.01 acres of forest stand removal, removal of 507 trees for Part 77 obstruction purposes, and .28 acres of afforestation.

Light Emission and Visual Impacts (EA Section 4, 4.12): The Airport is within an urban environment with high ambient light emissions. The emissions from the new airfield lighting will not be discernible against the background of existing airfield lighting.

Department of Transportation Act of 1966, Section 4(f) and Lands and Water Conservation Funds Section 6 (f) (EA Section 4, 4.6): BWI Marshall is bordered on all sides by the MAA-owned BWI Trail. In addition, the Thomas A. Dixon Observation Area is located south of the airport off of the Runway 33L end. There are no public lands that were purchased with Section 6 (f) Lands and Water Conservation Funds. The area that will be physically disturbed as a result of the proposed action does not contain any Section 4 (f) or Section 6 (f) protected resource, therefore the project will not result in a Section 4 (f) physical use. The Proposed Project will not result in increased aircraft activity or changes in flight patterns or procedures. Any shift in noise will be negligible and will not constitute a constructive use of any Section 4 (f) resource. Areas of obstruction removal are located near the BWI Trail as well as the Thomas A. Dixon Observation Area. While most of these trees are located on MAA-owned property, the tree removal would alter the viewshed of both the Observation Area and the BWI Trail. The change in the viewshed would not be a constructive use because the attributes of the Observation Area or use of the BWI Trail would not be impacted as the uses of these 4(f) resources are for viewing planes and recreation / exercise, respectively, and the trees are not an attribute of these 4(f) resources.

Historic, Archaeological, Architectural, and Cultural Resources (EA Section 4, 4.7): A review of the Maryland Historical Trust (MHT) files and reports revealed that there are no previously identified above-ground historic resources located within the APE. The APE was observed during reconnaissance surveys conducted in December 2008 and May 2011, during which these findings were confirmed. It was noted that there are no above-ground structures 50 years of age or older located within the APE. Two previously identified resources, the Benson-Hammond House (AA-118) and Friendship Cemetery are both located outside of the APE for the project. A Phase IB Archaeological Survey was performed in all moderate and high probability areas within the proposed limits of disturbance in April and May of 2009, and an addendum to the Phase IB Archeological Survey was prepared in February 2011. The methods used in this survey included documentary and map research, review of pertinent historic and archeological literature, visual inspection of the APE, and systematic subsurface investigation of undisturbed locations. A total of 291 shovel test pits (STPs) were excavated at various intervals in 16 distinct test areas according to their potential for the presence of cultural resources. In total, 71.9 acres were subjected to subsurface investigations.

The proposed airport improvement projects will not result in any adverse noise or visual effects on historic resources. The MHT has agreed with the EA's determination of "No Adverse Effect".

Natural Resources and Energy Supply (EA Section 4, 4.0.1): The Proposed Project will have only minor increases in energy consumption and will not require the use of any scarce or rare materials.

Hazardous Material, Pollution Prevention, and Solid Waste (EA Section 4, 4.13): Potential impacts could result from construction activities that disturb existing hazardous materials or contaminated soil, causing them to be released into the surrounding environment. Impacts could also occur by the introduction and use of hazardous materials, such as fuels, lubricants, solvents, degreasers, cleansers, hydraulic fluids, and deicing agents into the newly developed areas. The increased use and volume of these hazardous materials could increase the risk of accidental spills or leaks and result in the release of these products into the environment. Procedures such as ensuring proper equipment maintenance and functionality, best management practices, developing standardized operating procedures for material handling and storage, and providing spill prevention and control measures would greatly reduce the likelihood of any potential releases of these materials.

The Airport currently produces and collects solid waste. Additional waste produced by each proposed project (i.e. asphalt, concrete) could be re-used within the proposed action, stockpiled for future use, or disposed of in accordance with existing disposal methods developed by Maryland Environmental Service (MES).

Pollution prevention, in accordance with the Federal Pollution Prevention Act, for the proposed action, involves source reduction, recycling in an environmentally safe manner, treatment in an environmentally safe manner, and disposal in an environmentally safe

manner. Maryland regulations support reduction, recovery, and re-use practices to reduce the generation of hazardous materials [(COMAR 14.14.05B(1)]. Each proposed project within this EA will have its own requirements for the handling of hazardous wastes. Prevention methods may include, but not be limited to, oil spill prevention (40 CFR 112) and stormwater discharge (COMAR 26.08.04)

Construction activities will require documentation that all hazardous materials will be disposed of in accordance with Local, State and Federal requirements. In addition, construction contracts and plans will require appropriate measures that comply with the health and safety of all employees involved with the proposed improvements. Environmental hazards may require contractors to have additional training, certification, and/or equipment such as OSHA Hazardous Material Worker Training, Asbestos Abatement Worker Certification, and specialized personal protective equipment.

Construction Impacts (EA Section 4, 4.14): There will be temporary impacts to air quality, localized water quality, and noise. All impacts associated with construction of the proposed action will be below significant thresholds. Adherence to any permit requirements will minimize or mitigate for any potential construction impacts.

Socioeconomic Impacts (EA Section4, 4.3): All of the property acquisitions and avigation easements would be performed to ensure conformance with Public Law 91-646, the *Uniform Relocation Assistance and Real Property Acquisition Policy Act of 1970* (Uniform Act), and FAA Advisory Circular 150/5100-17, *Land Acquisition and Relocation Assistance for Airport Improvement Program Assisted Projects*. Before initiating negotiations, the property desired to be acquired would be appraised. The owner or owner's representative would be given the opportunity to accompany the appraiser during the appraiser's inspection of the property. A fair market price will then be established by the Airport, which it believes is adequate compensation for the property. The amount would not be less than the approved appraised value of the property. A written offer would then be presented to the owner to acquire the property for the full amount believed to be just compensation. The date that this written offer is presented is defined in the Uniform Act as the "initiation of negotiations." To comply with RPZ requirements the proposed action require avigation easements to be obtained for 3.4 acres of property and for 8.1 of acres of property to be acquired. The land uses of the properties at issue will not change, however, a portion of the flight kitchen will be demolished and replaced.

Environmental Justice (EA Section 4, 4.0.1): The proposed action would have no impact on the economic development or health and safety of the communities that exist in the vicinity of the Airport.

Children's Health and Safety Risks (EA Section 4, 4.0.1): The Proposed Project will not create any children's health or safety risks.

Secondary (Induced) Impacts (EA Section 4, 4.4): Implementing any of the Build Alternatives would lead to only minor impacts as discussed in these categories. None of

the Build Alternatives would increase the potential for shifts in patterns of population movement and growth, public service demands, or result in substantial changes in business and economic activity. However, a temporary increase in economic activity in both the construction and building material supply sectors of the local economy is anticipated with any of the Build Alternatives. These jobs generated by construction activities would be of a relatively short duration; however, the proposed action could potentially stimulate secondary economic impacts through increased aviation-related employment opportunities as the Airport continues to improve its facilities.

Cumulative Impacts (EA Section 4, 4.16): Past, present and reasonably foreseeable projects at the airport and surrounding community were considered and evaluated to see if the collective impacts from these projects or actions would result in significant impacts to any resource category. Even when impacts to resources were considered collectively, the proposed action will not result in any significant environmental impacts.

Public Participation (EA Appendix I): Opportunities for comment and consultation were provided during the project scoping of the EA. Notice of a November 18, 2010 public information workshop to explain the scoping process, the environmental resources that may be affected by the proposed airport improvements, and the EA timeframe was advertised in *The Baltimore Sun* on November 8 and 14, 2010. An agency scoping meeting was conducted on November 18, 2010. The public and relevant agencies were offered an opportunity to provide comments at the meetings and/or by mail or email. Copies of all agency scoping comments are provided in Appendix B of the EA.

A notice of public availability and workshop for the Draft EA was published in *The Baltimore Sun* on December 18 and 21, 2011. Additional notice of the workshop was also published in *The Baltimore Sun* on January 18 and 22, 2012. The public workshop was held on January 25, 2012. The EA was made available at four public locations and on the Maryland Aviation Administration's website. Copies of the Draft EA were provided directly to all relevant Federal, State and local agencies. The public and relevant agencies were offered an opportunity to provide comments at the meetings and/or by mail or email. All comments received and the responses to these comments are included in Appendix K of the FEA.

Mitigation Measures (EA Section 4) and Conditions of Approval: The FAA will require that the MAA implement the following mitigation measures should they decide to pursue the Proposed Action.

1. Develop and implement erosion and sediment control measures in accordance with the latest version of the Maryland Standards and Specifications for Erosion and Sediment Control Handbook and Maryland Stormwater Management Laws and Regulations.
2. Abide by the conditions of the Maryland Department of the Environment's concurrence with the Coastal Consistency Certification and apply for and receive a Phase II consistency certification.

3. Use best management practices to reduce air quality pollution during construction.
4. Disposal of any hazardous material in accordance with state and federal requirements.
5. Obtain a Section 404 Clean Water Act permit and submit a Joint Permit Application to the Maryland Department of the Environment for review.
6. Provide for the compensatory mitigation for wetlands impacts as described in the Preliminary Draft CMP and/or provide for mitigation through another method agreed upon by both the US Corps of Engineers, the FAA, and the MDE.
7. Coordinate the use of MAA-owned property for wetlands mitigation with the FAA.
8. Comply with the Uniform Relocation Assistance and Real Property Acquisition Policies Act concerning the proposed project's property acquisitions.
9. Comply with MDE regulations concerning impacts to floodplains and coordinate as appropriate with other Federal and State agencies.

AGENCY FINDINGS

A. **The Proposed Action is reasonably consistent with existing plans of public agencies for development of areas surrounding the airport. (49 U.S.C. § 47106(a)(1) and Executive Order 12372).** The FAA is satisfied that the Proposed Action is consistent with plans (existing at the time the Proposed Action is approved) of public agencies for development of areas surrounding the airport based on extensive coordination efforts with public agencies as indicated in Appendices of the FEA.

B. **The interest of the communities, in or near where the project may be located, were given fair consideration. (49 U.S.C. § 47106(b)(2)).** The FAA is satisfied that the interests of the communities, in or near where the Proposed Action is located, were given fair consideration as demonstrated by the FEA and its Appendices.

C. **The FAA has given this Proposed Action the independent and objective evaluation required by the Council on Environmental Quality (40 CFR Section 1506.5).** The FAA's environmental process included the FAA's rigorous exploration and objective evaluation of reasonable alternatives and probable environmental consequences, regulatory agency consultations, and public involvement. FAA furnished guidance and participated in the preparation of the FEA by providing input, advice, and expertise throughout the planning and technical analysis, along with administrative direction, and legal review. FAA has independently evaluated the FEA, and takes responsibility for its scope and content.

D. **For the Proposed action, which would directly affect wetlands, there is no practicable alternative to development of the proposed action. The Proposed action conform to the Avoidance, Minimization, and/or Compensation of Harm to Wetlands in Accordance with Executive Order 11990 and the Clean Water Act.**

Executive Order 11990 requires all federal agencies to avoid providing assistance for new construction located in wetlands, unless there is no practicable alternative to such construction, and all practicable measure to prevent harm to wetlands are included in the action. As described in the FEA development of the project would result in the unavoidable permanent loss of 13,828 square feet (.317 acres) of wetland impacts. In addition, there would be temporary impacts to 2990 square feet (.069 acres) of wetlands; 16,445 square feet (.355 acres) of temporary wetland buffer impacts; and 40,050 (.864 acres) of permanent wetland buffer impacts. As explained in the discussion of wetlands and waterways in the Environmental Consequences section of this document, as well as in Section 4.9 of the FEA, practicable means could not be found to avoid impacts to wetlands and waterways or to minimize the impacts further than that which is contemplated in the proposed action. Additionally, as outlined above, compensatory mitigation will be provided that will adequately replace the functions of wetlands lost.

E. For the Proposed Action, which involves encroachment on a floodplain, there is no practicable alternative to development of the Proposed Action. The Proposed Action conforms to all applicable state and/or local floodplain protection standards (Executive Order 11988).

Executive Order 11988 establishes a policy to avoid construction within a 100-year floodplain where practicable, and where avoidance is not practicable, to ensure that the construction design minimizes potential harm to or within the floodplain. U.S. Department of Transportation Order 5650.2 Floodplain Management and Protection, is the Department's implementing procedures to fulfill the requirements of the Executive Order. The proposed action will create 1.22 acres of temporary floodplain impacts and 5.33 acres of permanent floodplain impacts. The anticipated impacts to floodplains are not considered a significant encroachment as there is no likelihood of loss of human life, no adverse effect on the safe operation of the airport, and no notable adverse effect on the natural and beneficial value of the floodplain. The proposed encroachment is unavoidable because of the proximity of runway 15R to the floodplains and the impracticability of moving runway 15R. The proposed action will be designed and constructed to conform to all applicable state and local floodplain protection standards.

F. The implementation of the proposed action is consistent with the approved coastal zone management program and the Coastal Zone Management Act (16 U.S.C. 1451-1464).

The proposed airport improvement projects are located within the Maryland Coastal Zone. MAA has certified that the proposed action is consistent with the policies of the State of Maryland's CZMP. The Maryland Department of the Environment (MDE) is the Maryland State agency that manages the State's Coastal Zone Management Program (CZMP). MDE has indicated that based on their review of the Draft Environmental Assessment for this project the proposed action are consistent with the State's CZMP. MAA will continue to coordinate with MDE so as to assure compliance with the CZMA.

G. Relocation Assistance will be provided in accordance with 42 U.S.C. Section 4601 et seq., the Uniform Relocation Assistance and Real Property Acquisition Policies Act.

Title II of the Uniform Relocation Assistance and Real Property Acquisition Policies Act (42 U.S.C. Section 4601 et seq.), as implemented by the Secretary of Transportation under 49 C.F.R. Part 24, requires that state or local agencies that undertake federally-assisted projects, which cause an involuntary displacement of persons or businesses, to follow the prescribed procedures and provide relocation benefits to those displaced. The proposed action will require the acquisition of 8.01 acres of property, as well as the acquisition of avigation easements over 3.4 acres of property, and the demolition and replacement of part of the Flight Kitchen. As a condition of approval, RIAC is required to provide fair and reasonable relocation payments and assistance payments pursuant to the provisions of the aforementioned Act.

Decision and Order:

Decision: The FAA recognizes its responsibilities under NEPA and its implementing CEQ regulations, and its own directives. Recognizing these responsibilities, I have carefully considered the FAA's goals and objectives in relation to the various aeronautical aspects of the Proposed Airport Improvements at Baltimore / Washington International Thurgood Marshall Airport as discussed in the April 2012 FEA, and I have used the environmental process to make an informed decision. This review included the purposes and need that this project would serve; the alternative means of achieving the purpose and need; the environmental impacts of these alternatives; and the mitigation necessary to preserve and enhance the human environment.

After careful and thorough consideration of the facts contained herein, I find that the proposed Federal action is consistent with existing national environmental policies and objectives of Section 101(a) of the National Environmental Policy Act of 1969 (NEPA). I also find that the proposed Federal action will not significantly affect the quality of the human environment or otherwise include any condition requiring consultation pursuant to section 102(2)(C) of NEPA.

I therefore direct that action be taken to carry out the following agency actions discussed more fully in Section 2 of this FONSI/ROD, including:

1. The determinations necessary to proceed with considering and processing an application for federal funding of those development items qualifying under the Airport Improvement Program, 49 U.S.C. § 47101, et seq., as well as Passenger Facility Charges, 49 U.S.C. §40117;
2. The approval of the ALP that depicts the project, as shown on Figure 1, in this ROD;
3. The approval for relocation, installation and/or upgrade of various navigational aids;

4. Determination of effects upon the safe and efficient use of airspace (49 U.S.C. Section 40103(b));
5. Establish conformance with FAA design criteria, federal regulations, and grant agreements (14 C.F.R. Parts 77, 139, 150, 152, 157, and 169); and
6. Determination of compliance with Council on Environmental Quality (CEQ) regulations (40 C.F.R. Parts 1500-1508), and other applicable federal environmental requirements and approvals under various EOs and statutes discussed in this ROD;

Approved: Diane L Crean for Carmine Gallo
Regional Administrator
Eastern Region

25 April 2012
Date

Right of Appeal

This ROD presents the FAA's final decision and approvals for the actions identified, including those taken under the provisions of Title 49 of the United States Code, Subtitle VII, Parts A and B. This decision constitutes a final order of the Administrator. In accordance with the provisions of 49 U.S.C. Section 46110 it is subject to the review by the United States Court of Appeals for the District of Columbia or the U.S. Circuit Court of appeals for the circuit in which the person contesting the decision lives or has a principal place of business. Any party seeking to stay the implementation of this ROD must file an application with the FAA prior to seeking judicial relief, as provided in Rule 18(a) of the Federal Rules of Appellate Procedure.

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SECTION 1
PURPOSE AND NEED

The purpose of the projects is to implement proposed improvements to allow Baltimore/Washington International Thurgood Marshall Airport (BWI Marshall) to continue to operate in a safe and efficient manner while meeting Federal Aviation Administration (FAA) design criteria, and accommodating the Airport's current and future needs. The following subsections will detail the purpose and need for the proposed improvements to be discussed in this Environmental Assessment (EA). Each of the proposed improvements is needed for one of the following reasons:

- Meet FAA design standards for Runway Safety Area (RSA) improvements for Runways 15R-33L, 10-28, and 15L-33R;
- Meet FAA design standards for Navigational Aid (NAVAID) installation, runway to taxiway separations, perimeter roadways, taxiway configurations; line-of-sight clearance; and Runway Protection Zones (RPZs);
- Improve Airport egress through Terminal Exit Roadway improvements;
- Improve heating, ventilation, and air conditioning (HVAC) capacity;
- Improve existing pavement conditions through pavement rehabilitations and construction of new pavement; or
- Meet Part 77 of the Code of Federal Regulations (CFR) requirements for obstruction removal.

1.0 INTRODUCTION

The FAA develops design criteria and standards for public and commercial aviation facilities to provide a safe environment for the travelling public. FAA design criteria and standards address requirements for airfield facilities such as lengths, widths, grades and separation distances for runways, taxiways, associated safety areas, object free areas, and location and placement of navigational aids based on maximum aircraft size intended for the facility. CFR Part 77 further defines imaginary airspaces surrounding aircraft facilities that must be kept free and clear of any natural or man-made obstructions that could potentially cause damage to an aircraft, and/or decrease the safety, efficiency and utilization of an airport. In certain instances, FAA may issue a Modification of Standards (MOS); each time the sponsor requests Airport Improvement Program (AIP) funds or completes a planning study, MOSs must be reviewed and retired, if determined practicable.

Runway and Taxiway Safety Areas are integral components of airfields that provide a measure of safety in the event of an aircraft's excursion from pavement. In October 1999, FAA established Order 5200.8, *Runway Safety Area Program*, with an objective that "…RSAs at federally obligated airports and all RSAs at airports certificated under 14 Code of Federal Regulations (CFR) Part 139 shall conform to the standards contained in AC (Advisory Circular) 150/5300-13, *Airport Design*, to the extent practicable." The United States Congress has established a deadline of December 31, 2015 for all commercial airports to have compliant RSAs.

The Maryland Aviation Administration (MAA) owns and operates BWI Marshall, a Federal Aviation Regulation (FAR) Part 139-certificated facility located in Anne Arundel County, Maryland, approximately nine miles south of Baltimore City and approximately thirty miles northeast of Washington DC (see

Exhibit 1.0.1). Currently, the RSAs at BWI Marshall do not meet prescribed FAA standards and improvements must be implemented. In addition to the RSA improvements, MAA also proposes improvements to reconcile existing MOSs to the extent practicable and implement components of its Pavement Management Program (PMP) as that work is anticipated to occur during the same timeframe.

This EA has been prepared by MAA to provide FAA with sufficient information to support an environmental finding for Proposed Airport Improvements at BWI Marshall in compliance with the National Environmental Policy Act (NEPA) (42 United States Code [USC] 4321 et seq.) and the Council on Environmental Quality (CEQ) implementing regulations (40 CFR 1500-1508). This document follows guidelines for EA preparation contained in FAA Orders 1050.1E, Change 1, *Environmental Impacts: Policies and Procedures* (March 2006); and 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions* (April 2006) as supplemented by FAA's *Environmental Desk Reference for Airport Actions* (October 2007). The U.S. Army Corps of Engineers has agreed to participate throughout this EA process to provide guidance and support through the Section 404 permitting process of the Clean Water Act (as amended) for unavoidable impacts to potentially jurisdictional wetlands and Waters of the U.S. (see **Appendix B**).

Projects proposed in this EA each address specific existing deficiencies in the operation and maintenance of BWI Marshall (see **Exhibit 1.0-2**). All of the proposed projects are to be completed by 2015 as depicted on the current BWI Marshall Airport Layout Plan (ALP) approved by FAA in February 2011.

1.1 PROPOSED AIRPORT IMPROVEMENT PROJECTS

The following subsections describe various conditions associated with BWI Marshall that MAA proposes to address by 2015. Projects proposed for FAA review and approval include the following:

- RSA Improvements
    - Runway 15R-33L
    - Runway 10-28
    - Runway 15L-33R
- FAA Design Standard Improvements
    - Runway to Taxiway Separation Deficiency
        - Runway 15R-33L Three-Foot Shift to the West
        - Taxiway D Reconfiguration
    - Glide Slope Relocations
        - Runway 15R and 33L ends (including access roads)
        - Runway 10 and 28 ends (including new access road for the Runway 10 end)
    - Runway 10-28 Mid-Point Runway Visual Range (RVR) Relocation
    - Runway 10 Approach Lighting System Modification
    - Engineering Brief No. 75 Taxiway Reconfigurations for Taxiways C, D, E, P1, R, U, U1, and Y
- Runway 10-28 Precision Approach Path Indicator (PAPI) Installation
- Airport Roadway Improvements
    - Perimeter Roadway Improvements (Runway 10 end)
    - Perimeter Roadway Relocations (Runway 15R, 33L and 15L ends)
- Runway 4-22 Improvements – Conversion to a Taxiway

- Terminal Exit Roadway Improvements
- Central Utility Plant Improvements
- Airfield Pavement Improvements
    - Airside
        - Rehabilitate Runways 10-28, 15R-33L, and 4-22 and Associated Taxiways
        - 35-foot Shoulders on Runway 15R-33L
        - Reconfigure Taxiway T
        - Proposed Taxiway Segments and Pavement Removal
        - Miscellaneous Pavement Fillets
        - Aircraft Rescue and Fire Fighting (ARFF) Access Roadway Improvements (new fillets and terminal access roadway)
        - Various Rehabilitations
    - Landside
        - Various Rehabilitations
- Obstruction Removal and Line-of-Sight Clearance
- Compliance with RPZ Requirements

Note: While the RSA improvements for Runway 15L-33R are included in this EA, other FAA Design Standard Improvements for Runway 15L-33R will be studied under a separate environmental document and are noted in ***Section 4.16****, Cumulative Impacts.*

1.1.1 RSA IMPROVEMENTS

1.1.1.1 RSA Standards

A RSA, as defined by the FAA (FAA AC 150/5300-13, Change 17, *Airport Design* [January 2011]), shall be:

- "cleared and graded and have no potentially hazardous ruts, humps, depressions, or other surface variations;
- drained by grading or storm sewers to prevent water accumulation;
- capable, under dry conditions, of supporting snow removal equipment, aircraft rescue and firefighting equipment, and the occasional passage of aircraft without causing structural damage to the aircraft; and
- free of objects, except for objects that need to be located in the runway safety area because of their function. Objects higher than 3 inches (7.6 cm) above grade should be constructed, to the extent practicable, on low impact resistant supports (frangible mounted structures) of the lowest practical height with the frangible point no higher than 3 inches (7.6 cm) above grade. Other objects, such as manholes, should be constructed at grade. In no case should their height exceed 3 inches (7.6 cm) above grade."

RSAs provide a measure of safety to the sides and ends of runways by providing an area available to an aircraft should that aircraft leave the runway; RSAs extend off of the ends and sides of runway surfaces at dimensions designated by FAA guidelines according to the runway's Airport Reference Code (ARC). The ARC includes two components that relate to the airport (or a given runway's) design aircraft. The airport

approach category is designated by a letter and relates to the aircraft approach speed while the airplane design group is designated by a Roman numeral and relates to airplane wingspan. Runways 15R-33L and 10-28 have an ARC of D-V while Runway 15L-33R has an ARC of B-III and Runway 4-22 has an ARC of C-III.

At BWI Marshall, which currently operates four commercial service runways with non-standard RSAs, a phased program for compliance has been developed and accepted by FAA.

1.1.1.2 Existing RSA Deficiencies

The existing RSA deficiencies are shown on **Exhibit 1.1-1**. Runway 15R-33L does not meet RSA standards for both length and width. At the approach end of 15R, the RSA extends only 470 feet beyond the threshold due to the presence of the I-195 / MD 170 interchange. At the approach end of 33L, the RSA extends only 170 feet past the threshold due to the presence of Dorsey Road (MD 176). In both cases, the RSA should extend 1,000 feet past the threshold. In addition, there are areas along the runway where the RSA width is only 235 feet from the runway centerline instead of the required 250 feet. Also, several areas within the Runway 15R-33L RSA contain ditches and do not meet the current grading requirements.

Runway 10-28 does not meet current RSA width standards because of non-standard grading. RSA grading criteria limits the slope to between one and a half and five percent from the runway edge to the outside shoulder edge and from between one and a half percent to three percent for the remaining width of the RSA. For Runway 10, to the north near the threshold between Taxiway F and G, and to the south near the existing ARFF facility, portions of the RSA are 485 feet rather than the required 500 feet. The RSA on the Runway 10 end also does not meet the RSA standards for length due to non-standard grading and the presence of a service roadway and numerous ditches; the RSA only extends 803 feet beyond the end of the runway at full width rather than the 1,000-foot standard. Additionally, the Runway 28 Localizer, sited off the Runway 10 end, is located within the extended Runway 10 RSA. The localizer antenna array is used to establish and maintain an aircraft's horizontal position until the pilot makes visual contact with the runway. The localizer is typically sited on the extended runway centerline 600 to 2,000 feet from the stop end of usable runway and outside of the RSA.

The Runway 15L-33R RSA does not currently meet FAA standards as the 15L and 33R localizers are located within the extended RSAs.

1.1.2 FAA DESIGN STANDARD IMPROVEMENTS

FAA AC 150/5300-13, Change 17, contains FAA's standards and recommendations for airport design for use in the design of civil airports. For airport projects using Federal grant-in-aid assistance, the use of these standards is mandatory. At certificated airports, the standards and recommendations may be used to satisfy specific requirements of FAR Part 139, Certification and Operations.

1.1.2.1 Runway to Taxiway Separation Deficiency

FAA Design Standards – FAA AC 150/5300-13, Change 17, requires 400 feet of separation between runway and taxiway centerlines for Airplane Design Group V (ARC D-V) and also requires an additional one foot of runway to taxiway separation for every 100 feet of elevation above sea level for this design group. BWI Marshall is 140 feet above sea level, therefore, an additional two feet (rounded up from 1.4 feet) of separation is required, totaling 402 feet.

Existing Runway to Taxiway Separation Deficiencies – In 2001, the then newly-published end coordinates for Runway 15R-33L indicated that the separation distance between Runway 15R-33L and parallel Taxiway P from the 15R end to Taxiway R was 399 feet, three feet less than the standard separation of 402 feet for Airplane Design Group V (ARC D-V). The separation between the southern portion of the runway and parallel Taxiway D from Runway 10-28 to the Runway 33L end is also not within criteria. The realignment of Runway 15R-33L will require realignment of all navigational aids to locations consistent with FAA design standards and clearing of obstructions within realigned Runway Object Free Areas (ROFAs) and FAR Part 77 imaginary surfaces.

In order to maintain the current instrument approach "minimums" to Runway 33L, the FAA design standard is to have a minimum separation between the runway and parallel taxiway of 400 feet. Near the approach end of Runway 33L, Taxiway D tapers from 550 feet to less than the required 400-foot separation from Runway 33L and must be relocated to meet the FAA design standard. The taxiway would be relocated to a separation of 550 feet to join existing Taxiway D.

As a connected action to the relocation of Taxiway D, the Runway 33L Hold Pad would also need to be relocated and expanded to provide clearances identified in FAA design standards. The proposed hold apron provides an area that allows aircraft that are waiting for takeoff to be sequenced out of the "lineup" on the taxiway and "held" within the apron for a period of time before takeoff (see **Exhibit 1.1-2**). This operating situation regularly occurs when there are departure delays due to adverse weather or air traffic sequencing requirements. An area capable of "holding" two to three aircraft is necessary to support this operation in the peak hours at BWI Marshall. Most importantly, bypass Taxiway T in this location is considered less safe by the Air Traffic Control system, due to the potential of adding an "intersection departure" and possible runway incursion. In addition, there is not enough room for two to three aircraft to hold on the bypass taxiway.

1.1.2.2 Glide Slope Relocations

FAA Glide Slope Siting Criteria – A Glide Slope is the component of an Instrument Landing System (ILS) that provides vertical guidance to pilots indicating the proper glide path to touchdown for an aircraft on a runway. FAA Order 6750.16D, *Siting Criteria for Instrument Landing Systems,* requires a Glide Slope to be located ideally on smooth, uniformly graded ground surface. It should be located on the side of the runway that is free of taxiways, runways, holding aprons, helicopter pads, and other potential sources of interference. The Glide Slope antenna must be located outside the RSA and ROFA of the

runway in question. The dimensions of the RSA and ROFA for any given runway are determined by the runway ARC and approach minima. Runways 15R-33L and 10-28 have an ARC of D-V while Runway 15L-33R has an ARC of B-III and Runway 4-22 has an ARC of C-III.

RSA Dimensions

- ARC B-III – 400 feet wide by 800 feet long beyond the runway end
- ARC C-III – 500 feet wide by 1,000 feet long beyond the runway end
- ARC D-V – 500 feet wide by 1,000 feet long beyond the runway end

ROFA Dimension

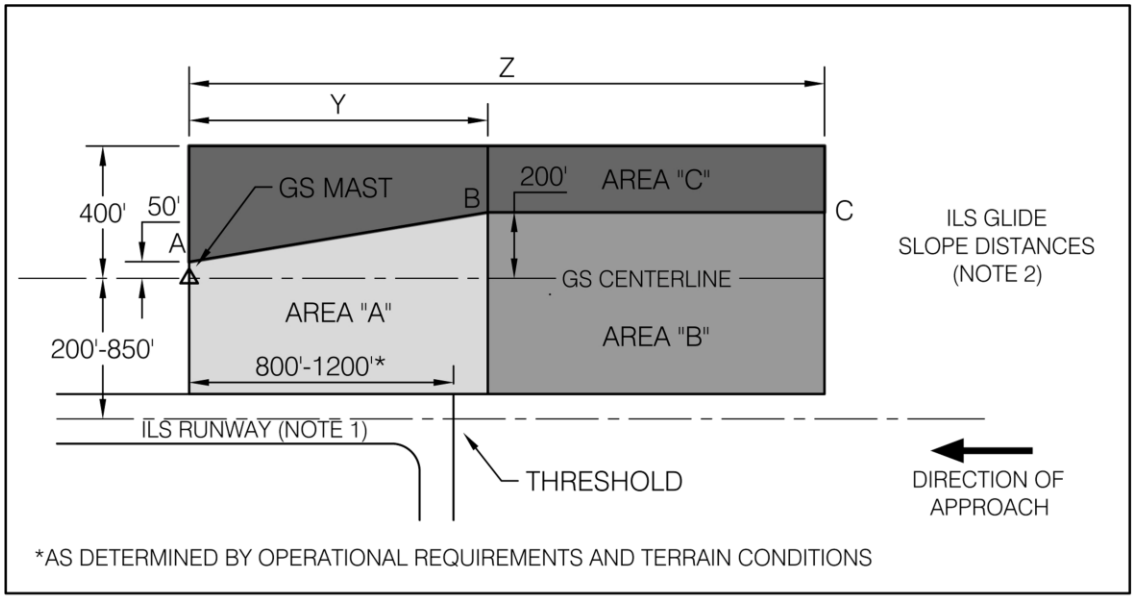
- ARC B-III – 800 feet wide by 600 feet long beyond the runway end
- ARC C-III – 800 feet wide by 1,000 feet long beyond the runway end
- ARC D-V – 800 feet wide by 1,000 feet long beyond the runway end

Each Glide Slope will have an associated Glide Slope Critical Area and terrain criteria within the grading plane that must be graded to comply with FAA design standards (FAA Order 6750.16D). The Glide Slope Critical Area must be kept clear of vehicles and aircraft when an aircraft is on approach. The grading plane is divided into sections with varying levels of grading requirements (see **Figure 1**). The section located in the directly in front of the Glide Slope (Section A) must be uniformly graded with the same longitudinal slope as the runway. The section in front of Section A (known as Section B), must be smoothly graded while Section C (located the entire length of Sections A and B opposite the runway) must only be graded to remove terrain that would cause adverse impacts to the Glide Slope signal.

Each Glide Slope is sited to accommodate their individual Threshold Crossing Heights (TCH). The TCH is the "theoretical height above the runway threshold at which the aircraft's glideslope antenna would be if the aircraft maintained the trajectory established by the mean ILS glide slope" (FAA). FAA's NAVAIDs, including Glide Slopes and localizers, are programmed to communicate with incoming aircraft to ensure they are at the appropriate TCH on approach.

Runway 15R and 33L Glide Slope Existing Deficiencies – Currently, the 15R and 33L Glides Slopes are located in the Runway 15R-33L ROFA and do not meet runway centerline separation or grading requirements. The Glide Slope antenna on the Runway 15R end is located 273 feet to the west of the runway centerline and the associated Glide Slope Critical Area is not properly graded (see **Exhibit 1.1-3**). The Glide Slope antenna on the Runway 33L end is located 270 feet to the east of the runway centerline and the associated Glide Slope Critical Area is impeded by Taxiway D and a portion of the hold pad. The 15R and 33L Glide Slopes need to be relocated to outside of the ROFA (a minimum of 400 feet of separation between the Glide Slope antenna and the runway centerline) to provide a properly graded and unobstructed Glide Slope Critical Area.

FIGURE 1: Glide Slope Grading Areas



NOTES:
1. LOCATED GLIDE SLOPE ON RUNWAY SIDE AWAY FROM TAXIWAYS, ROADS, ETC.
2. DISTANCES
   Y - THE GREATER OF 1200 FEET OR THE SETBACK OF THE GLIDE SLOPE FROM THRESHOLD
   Z - THE LEAST OF: (A) 3000 feet; (B) DISTANCE TO THE AIRPORT PROPERTY LINE; (C) DISTANCE TO WHERE SMOOTH TERRAIN TERMINATES.

Runway 10 and 28 Glide Slope Existing Deficiencies – Currently, the 10 and 28 Glides Slopes are located within the ROFA (see **Exhibit 1.1-3**). The Glide Slope antennas on the Runway 10 and 28 ends are 399 feet from the runway centerline and 375 feet, respectively, and must be relocated to a minimum of 400 feet of separation to be outside the ROFA.

1.1.2.3 Runway 10-28 Mid-Point RVR Relocation

FAA RVR Siting Criteria – The RVR is a NAVAID that derives a horizontal distance that a pilot would see down the runway from the approach end. In accordance with FAA Order 6560.10C, the RVR must be located no further than 1,000 feet from the center of the Glide Slope antenna toward the approach end of the runway and 1,500 feet from the center of the Glide Slope antenna down the runway. The RVR visibility sensor must be at least 25 feet from a fixed structure such as a Glide Slope shelter and should also be located outside of the RSA and ROFA.

Existing Deficiencies – The existing RVR at the mid-point of Runway 10-28 does not meet FAA design standards as it is located within the ROFA for both Runway 10-28 and Runway 15R-33L. The ROFA should be free of objects to the maximum extent practicable.

1.1.2.4 Runway 10 Approach Lighting System Modification

FAA Approach Lighting System Siting Criteria – The Runway 10 approach is currently equipped with an Approach Lighting System (ALS) with sequenced flashing lights (ALSF-II). The ALS is made up of a series of light bars extending along the runway centerline beginning at the runway threshold and extending towards the approach. The ALS is designed to aid an aircraft with their horizontal alignment to the runway centerline for approach Categories I thru III.

Existing Deficiencies – The existing ALSF-II on the Runway 10 end does not meet FAA design standards for vertical alignment due to more than one grade break in the light plane as well as penetrations to the light plane. Additionally, some components are obstructions to navigational airspace, which will be discussed in subsequent sections of this document.

1.1.2.5 Engineering Brief No. 75 Taxiway Reconfigurations

FAA Design Standards – FAA's Engineering Brief No. 75, *Incorporation of Runway Incursion Prevention into Taxiway and Apron Design,* has been incorporated into FAA AC 150/5300-13, Change 17, *Airport Design* [January 2011] and provides guidance on design strategies to help prevent runway incursions. A runway incursion is defined as "any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle, or person on the protected area of a surface designated for the landing and takeoff of aircraft." At BWI Marshall, runway incursions have occurred with aircraft straying onto runways from taxiways as well as confusion with exiting from runways onto the appropriate taxiways and direct access to runways from the terminal area. There have been three areas that have historically caused pilot confusion: Taxiway R at Runway 15R; Taxiway P1 at Runway 10-28; and Taxiway E at Runway 10-28. Taxiway reconfigurations to provide 90 degree intersections with runways eliminate direct access to runways and reduces the potential for runway incursions.

Existing Deficiencies – Taxiways C, D, E, P1, R, U, U1 and Y are all proposed for geometric reconfiguration (see **Exhibit 1.1-4**) based on guidance provided in Engineering Brief No. 75 to enhance runway safety by decreasing the potential for runway incursions by providing 90-degree intersections with the runway(s).

1.1.3 RUNWAY 10-28 PAPI INSTALLATION

Currently, Runway 10-28 does not have PAPIs on either end of the runway. However, there is a Visual Approach Slope Indicator (VASI) on the Runway 28 end. VASI facilities are considered obsolete as they are no longer manufactured or installed and are being replaced at airports around the country with PAPIs. As defined in FAA ACs 150/5300-13, Change 17 and 150/5345-28F, *Precision Approach Path Indicator (PAPI) Systems* (April 2005), the PAPI is a light array consisting of four identical light units that provides a pilot with an accurate vertical plane upon approach to a runway. The PAPI is typically located approximately 1,000 feet from the landing threshold on the left side of the runway (on approach).

1.1.4 AIRPORT ROADWAY IMPROVEMENTS

FAA Design Standards – FAA AC 150/5300-13, Change 17, stipulates that no objects, including vehicles on roadways, may exist within the RSA or ROFA at an elevation higher than the safety area edge of the runway and taxiway pavement.

Existing Deficiencies – Currently, segments of access roads are used by FAA, MAA (Operations, Maintenance and Security), Transportation Security Administration (TSA), wildlife hazard management, and Airport police are within existing RSAs and ROFAs for at the ends of Runways 15R, 33L, 10, and 15L (see **Exhibit 1.1-5**). The portions of these of the roadways within the RSAs and ROFAs must either be realigned or lowered in order to bring it into compliance with FAA design standards.

MAA proposes to realign portions of the airport perimeter service roadway for all vehicles requiring access around the perimeter of the airport. An airport perimeter service roadway would help to reduce the number of instances when vehicles need to cross active airfield pavements (runways and taxiways), and is thus considered an important airport safety improvement. The need for a perimeter road is to allow vehicles to travel around the ends of the runways and associated RSAs and ROFAs for Runways 15R-33L, 10-28, and 15L-33R. Ultimately, an airport perimeter service roadway would be completed around the entire airfield within the 3,200-acre main campus.

In addition to these perimeter roadway deficiencies, airfield service vehicles traveling to the Midfield Air Cargo Apron to the south of the Runway 10 end have caused vehicle tracks, ponding, and erosion due to lack of a paved service road, in essence, adding to the RSA grading deficiencies. In order to allow for access from the existing perimeter roadway off the Runway 10 end to the Midfield Air Cargo Apron, an appropriately located and graded perimeter road needs to be constructed.

1.1.5 RUNWAY 4-22 IMPROVEMENTS – CONVERSION TO TAXIWAY

Currently, Runway 4-22 is a non-precision instrument runway and has an ARC of C-III, which requires a safety area that extends 1,000 feet beyond the end of the runway with a width of 500 feet centered on the runway centerline. There is only 210 feet of safety area off the Runway 22 end because of Taxiway S and Runway 15L-33R. In order to create a standard RSA, the Runway 22 threshold would have to be displaced 790 feet, creating a 5,210-foot runway. The MAA proposes to convert Runway 4-22 into a Group V taxiway to serve the other commercial service runways at BWI Marshall. The closure of Runway 4-22 would not result in unacceptable delays. Runway 4-22 is 150 wide with no paved shoulders; requirements for Group V taxiways are 75 feet of width and 35-foot shoulders on either side, creating a width of 145 feet. Thus, this conversion is possible and would result in five feet of excess pavement. As a result, two-and-a-half feet of existing pavement on either side of the runway would be demolished (refer back to **Exhibit 1.0-2**).

1.1.6 TERMINAL EXIT ROADWAY IMPROVEMENTS

According to the *Feasibility Study for Arrivals Level Exit Road Improvements at BWI* (January 2007), the arrivals level exit ramp to I-195 currently experiences minor traffic congestion during peak traffic periods. The traffic volumes are expected to worsen as traffic volumes continue to grow from 20.3 million annual passengers to 30 million within the next 10 to 15 years. In addition to the volume congestion, the traffic pattern requires motorists to merge and weave into their desired lane within a short distance (approximately 450 feet), creating safety concerns. Traffic congestion and safety are further compromised by the following:

- absence of an acceleration lane for commercial vehicles entering the arrivals level general traffic roadway;
- arrivals level commercial vehicles needing to weave through traffic to reach westbound I-195;
- arrivals level exit ramp to westbound I-195 is also part of the acceleration ramp from the hourly garage exit;
- arrivals level exit ramp to I-195 geometry is a non-standard left hand exit which does not meet typical driver expectations;
- existing roadway geometry makes Elm Road appear to be the major traffic movement and the arrivals level roadway exit ramp to I-195 is visually blocked by the abutment of the departure levels exit bridge; and
- existing signage for traffic control and way finding is minimal due to the short distances between the entrances and exits.

To alleviate these concerns, additional capacity would be provided by widening the existing arrivals level exit ramp to I-195 from one to two lanes, adding a "choice lane" on westbound I-195 at the terminal return road exit ramp to reduce weaving, and adding a new arrivals level hourly garage exit ramp to provide direct access (see **Exhibit 1.1-6**). The improved sections of roadways and ramps would improve passenger safety by minimizing weaving and providing signage for better driver decision-making.

1.1.7 CENTRAL UTILITY PLANT IMPROVEMENTS

MAA studies indicate that additional office space may be accommodated in a vertical terminal expansion, which would add interior volume to the existing terminal and thereby increase the demand for adequate HVAC. As a result, the existing Central Utility Plant is proposed to be expanded to provide the required level of HVAC services (see **Exhibit 1.1-6**).

1.1.8 AIRFIELD PAVEMENT IMPROVEMENTS

The MAA has developed and maintains a comprehensive PMP for paved airfield areas at BWI Marshall. This PMP was prepared following a detailed inventory, condition survey, and testing program that established a prioritized schedule for pavement overlays, rehabilitation, and reconstruction, as appropriate, for all airfield pavements. The most recent output from the PMP has indicated multiple areas

which will require various pavement maintenance activities to be performed within the time frame addressed in this EA (see **Exhibit 1.1-7**). These projects include, but are not limited to the following:

- Rehabilitate Runways 10-28, 15R-33L, 15L-33R, and 4-22 and Associated Taxiways,
- 35-foot Shoulders on Runway 15R-33L,
- Reconfigure Taxiway T,
- Proposed Taxiway Segments and Pavement Removal,
- Miscellaneous Pavement Fillets,
- Aircraft Rescue and Fire Fighting (ARFF) Access Roadway Improvements (new fillets and terminal access roadway),
- Various Rehabilitations, and
- Taxiway Safety Area Grading, as appropriate.

The full-width rehabilitation and overlay of Runways 15R-33L and 10-28 is based on a study performed by Michael Baker Jr., Inc. as part of an on-call contract (Task 2365 Runways 15R-33L and 10-28 Pavement Evaluation) performed in the fall of 2006. The results of the study indicate the need to improve the pavement structure on Runway 15R-33L and a new surface on Runway 10-28. The improvements to Runway 15R-33L include shoulders on both sides of the runway. According to FAA A/C 150/5300-13, Change 17, runway shoulders provide resistance to blast erosion and accommodate the passage of maintenance and emergency equipment and the occasional passage of an airplane veering from the runway. Standard shoulders for D-V runways are 35 feet wide. Runway 15R-33L currently does not have paved shoulders.

In addition to the proposed PMP projects, an access ramp is proposed to be improved from the ARFF to Taxiway E (see **Exhibit 1.1-7**). At the entry and exit ramps for the ARFF facility leading to and from the existing parking bays, additional pavement is proposed to allow for emergency response vehicles to exit the facility more quickly and safely. Also, a high-speed exit taxiway connecting from Runway 10-28 to Runway 4-22 (future taxiway) and a taxiway from Runway 15R-33L to Taxiway D are proposed. Additional new pavement also includes straightening Taxiway D on the Runway 33L end as well as relocating and expanding the existing Runway 33L hold pad, as discussed previously in **Section 1.1.2.1**.

1.1.9 OBSTRUCTION REMOVAL AND LINE-OF-SIGHT CLEARANCE

1.1.9.1 OBSTRUCTION REMOVAL

CFR Title 14, Part 77 requires that the “imaginary surfaces” which extend above the ground around all sides of a runway be kept clear of all obstructions to air navigation. The upward slope of the imaginary surfaces as they rise above a point beginning 200 feet from the runway ends varies based on the type of approach (visual, non-precision, precision), while the “transitional” surface along the sides of the runway extends upward from the runway’s primary surface at a consistent 7:1 slope up to a height of 150 feet above the runway elevation.

1.1.9.2 EXISTING DEFICIENCIES

A recently completed evaluation of the imaginary surfaces around the two primary runways at BWI Marshall (Runways 10-28 and 15R-33L) and Runway 15L-33R has indicated several stands of trees as well as individual specimens that currently penetrate or are within 10 feet below the imaginary surface (see **Exhibit 1.1-8**). Obstructions to Runway 15L-33R within both approaches were evaluated based on a 34:1 slope for off-Airport property, and 50:1 for MAA-owned property. Several man-made obstructions will also need to be lowered or removed, including portions of the ALS for Runway 10.

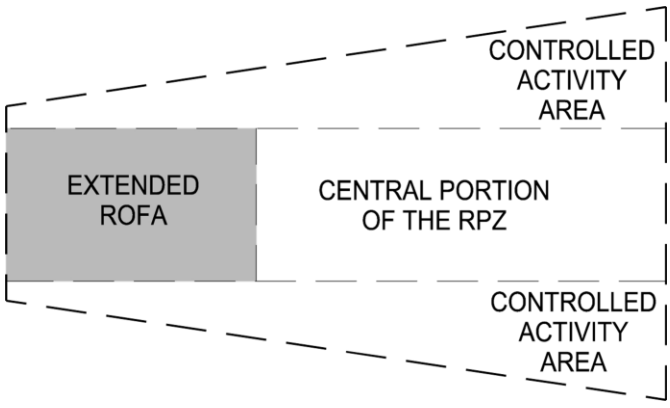
In addition to the tree removal to meet Part 77 requirements, a stand of trees obstructing the Airport Traffic Control Tower's (ATCT) view of the proposed Runway 33L hold pad would need to be removed. As stated in FAA Order 6480.4A *Airport Traffic Control Siting Process,* a clear line-of-sight must be maintained between the ATCT and all movement areas on the airfield. The trees identified as obstructions based on ATCT line-of-sight criteria have been delineated for removal and are depicted on **Exhibit 1.1-8**.

1.1.10 COMPLIANCE WITH RPZ REQUIREMENTS

1.1.10.1 RPZ REQUIREMENTS

As defined by FAA AC 150/5300-13, Change 17, a RPZ is a trapezoid centered about the extended runway centerline. A RPZ is divided into two sections, the central portion and the controlled activity areas (see **Figure 2**). The central portion of the RPZ extends from the beginning to the end of the RPZ, centered on the runway centerline. Its width is equal to that of the runway ROFA, which is 800 feet for Runways 15R-33L, 10-28, and15L-33R. The controlled activity area is the portion of the RPZ to the sides of the central portion and extends to the full width of the RPZ.

FIGURE 2: Typical Runway Protection Zone



The purpose of the RPZ is to enhance the protection of people and property on the ground by ensuring that only airport-compatible land uses are located within the limits of the RPZ. This can be achieved

through an airport sponsor's (MAA) control of the RPZ. When the airport sponsor owns the RPZ, it can ensure that it remains clear of incompatible objects and activities (i.e., congregations of people). Current FAA design standards prohibit automobile parking facilities within the central portion of a RPZ.

RPZ dimensions vary by the type of approach visibility minimums of a runway in conjunction with the expected aircraft a runway can serve (see **Table 1.1-1**).

TABLE 1.1-1
RUNWAY PROTECTION ZONE DIMENSIONS

Approach Visibility Minumums	Facilities Expected to Serve	Length (Feet)	Inner Width (Feet)	Outer Width (Feet)
Visual and Not Lower than 1-Mile	Small Aircraft Exclusively	1,000	250	450
	Aircraft Approach Categories A & B	1,000	500	700
	Aircraft Approach Categories C & D	1,700	500	1,010
Not Lower than ¾-Mile	All Aircraft	1,700	1,000	1,510[1]
Lower than ¾-Mile	All Aircraft	2,500	1,000	1,750[2]

Source: FAA AC 150/5300-13, Change 17 (September 2011)

Notes: 1. Runway 4-22 has approach visibility minimums of Not Lower than ¾-Mile

2. Runways 15R-33L, 10-28, and 15L-33R have approach visibility minimums of Lower than ¾-Mile

1.1.10.2 EXISTING DEFICIENCIES

In the case of Runway 15R-33L and 10-28, each runway end has two RPZs - an approach and departure RPZ - due to the existing and/or proposed displacement of landing thresholds and/or the use of declared distances. Declared distances are typically used on runways where it is impractical to provide full RSA, ROFA, or RPZ dimensions in accordance with FAA design standards. The dimensions of the approach RPZs for Runways 15R-33L and 10-28 at BWI Marshall are 1,000 feet by 1,750 feet by 2,500 feet. The dimensions of the departure RPZs for Runways 15R-33L and 10-28 are 500 feet by 1,010 feet by 1,700 feet. The approach and departure RPZs begin 200 feet beyond the area useable for landing and takeoff, respectively.

In July 2008, the FAA issued a RSA Determination Revalidation. This Revalidation evaluated RSA alternatives considered for implementation by the FAA and MAA at BWI Marshall, and in accordance with FAA Order 5200.8, calculated the maximum feasible RSA improvement cost for each runway at BWI Marshall and recommended an improvement alternative for each runway. The Runway 15R-33L RSA improvement alternative preferred by MAA requires the application of declared distances to comply with RSA standards, which will result in a loss of 1,200 feet to Runway 15R-33L. In the Revalidation, MAA determined, through modeling efforts, that the implementation of declared distances would have a negligible impact on operations.

As part of this proposed project, MAA proposes to acquire interests in parcels that it currently does not own within portions of the RPZs of both ends of Runway 15R-33L as well as the 10 end of Runway 10-28 (see **Exhibit 1.1-9**). Within a portion of the proposed approach RPZ to Runway 15R, a property interest is needed for three private parking lots (two associated with an employee lot for Northrop-Grumman, and the other associated with a private parking operator). It should be noted that each of the three private parking facilities are located outside of the central portion of the RPZ. Since vehicle parking can be permitted within areas outside of the central portion of the RPZ, MAA proposes to obtain an easement for these three parcels to ensure compatible land use.

Also within the proposed approach RPZ for Runway 15R, MAA owns a parcel that contains the LSG Sky Chef Flight Kitchen. This facility, comprised of two buildings, provides food services for the airlines at BWI Marshall. Neither building is open to the public. The administration building containing the Flight Kitchen employees does not lie within the RPZ. A small portion (less than 5,000 square feet) of the adjacent 30,000 square-foot food storage facility (consisting of a cold storage area and food warehouse) does lie within the RPZ. A portion of the building within the proposed Runway 15R RPZ requires demolition and an addition will be constructed on the east side of the building. On the Runway 33L end, MAA proposes to obtain an avigation easement on one subdivided parcel that is currently a vacant forested lot to ensure compatible land use.

For the Runway 10 end, an area is proposed for acquisition (within and outside of the RPZ) that contains several Airport improvements, including a portion of the security fence, RSA, ROFA, airport perimeter roadway, and approach lighting system. This area was included as part of perpetual easement and right-of-way purchases between the Maryland State Highway Administration, MAA, and Anne Arundel County in the 1980s for construction of the Stoney Run Road interchange with Aviation Boulevard. While the MAA was permitted to construct and maintain its perimeter service roadway, security fence, and other airport features, MAA proposes to acquire in fee simple the property interests to own the land that contains the Runway 10 Safety Area and other airport improvements.

1.2 SUMMARY

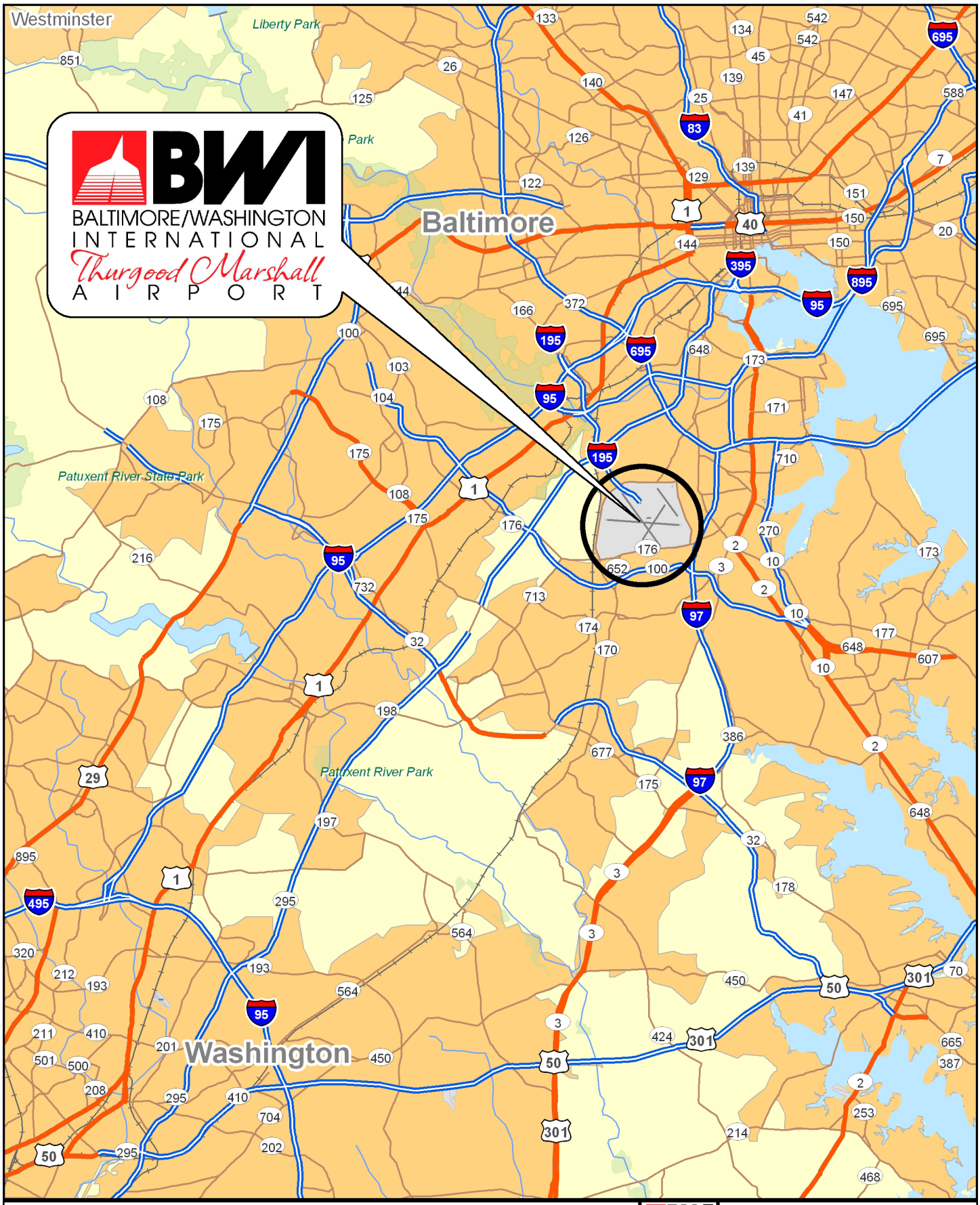
The purposes of the proposed improvements are to accomplish those tasks that would allow BWI Marshall to continue to operate in a safe and efficient manner while meeting FAA design criteria, and accommodating the Airport's current and future needs. Based on the information presented in this section, the proposed actions are needed for the following reasons:

- The current RSAs for all runways at BWI Marshall are deficient;
- There is insufficient separation between the Glide Slope and runway centerline on Runways 15R-33L and 10-28;
- Portions of the existing perimeter roadway penetrate the RSA and ROFA on the Runway 15R, 33L, 10, and 15L ends;
- There are existing deficiencies to airside and landside pavements that need to be improved;

- There are several existing penetrations to the 14 CFR Part 77 surfaces to Runway 10-28 and 15R-33L; and
- The MAA does not own portions of the existing RPZs of Runway 15R, 33L, and 10.

1.3 REQUESTED FEDERAL ACTION

This EA, which was prepared for the FAA by MAA, presents the evaluation of impacts to the environment and provides a detailed review of the proposed development actions as required by FAA Order 5050.4B and Order 1050.1E, Change 1. This EA is being submitted in accordance with the CEQ's *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act*. The Requested Federal Action is the approval of the *2015 Improvements Plan* portion of the FAA approved ALP and approval of use of Federal Funds for these projects at BWI Marshall, as applicable. If a Finding of No Significant Impact (FONSI) is granted from the FAA, the MAA will coordinate with the FAA prior to implementation or construction of any of the proposed projects.



Environmental Assessment
for Proposed Airport Improvements

VICINITY MAP

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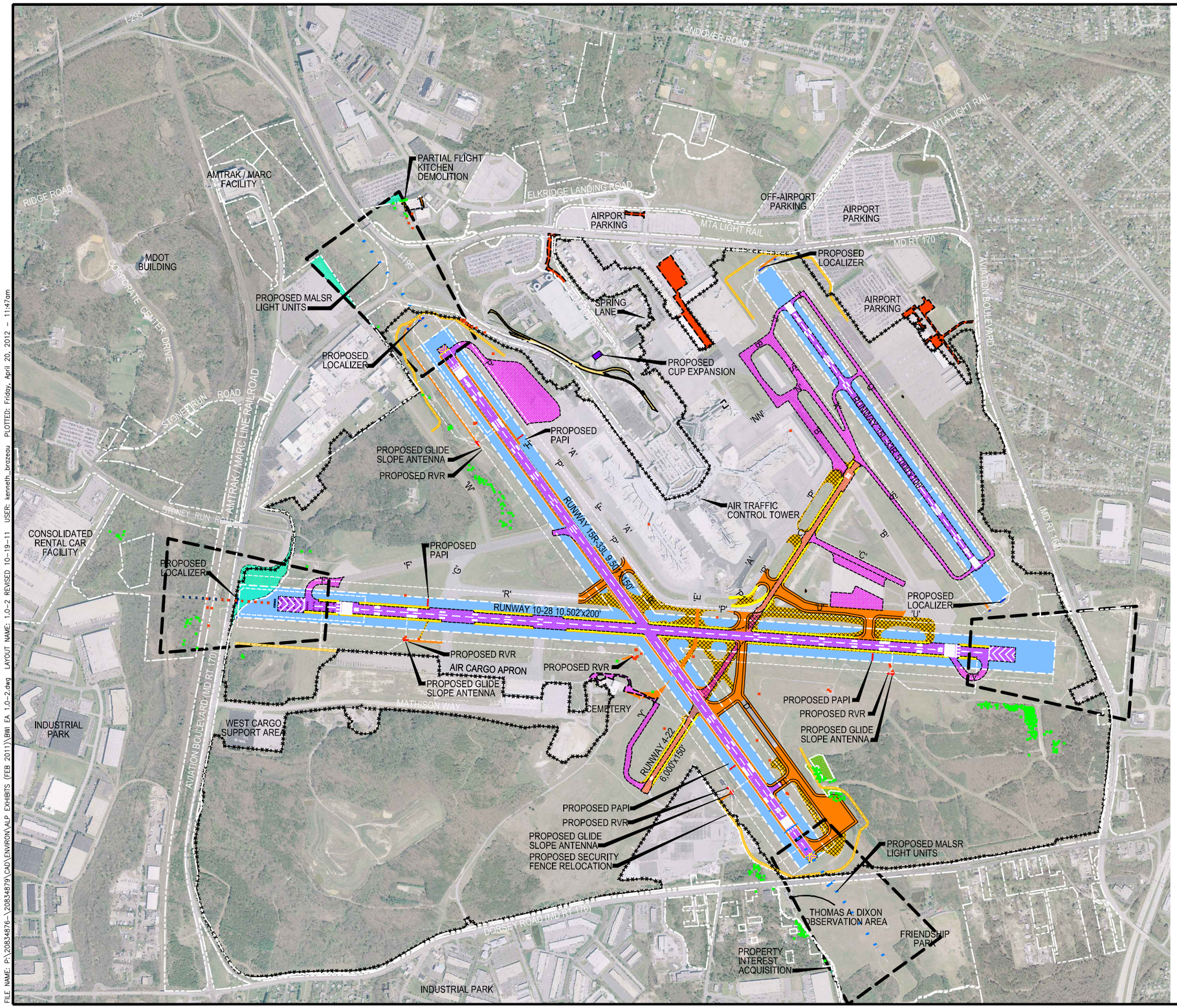

PROPOSED AIRPORT IMPROVEMENTS:

RUNWAY SAFETY AREA IMPROVEMENTS:

- (SEE NEW MARKINGS) RUNWAY 15R-33L THRESHOLD DISPLACEMENT
- RUNWAY SAFETY AREA GRADING
- RUNWAY 15R-33L MALSR RELOCATION
- RUNWAY 15R-33L RVR AND PAPI RELOCATION
- RUNWAY 28 AND 15L-33R LOCALIZER RELOCATION

FAA DESIGN STANDARDS:

- PERIMETER ROAD RELOCATION
- SERVICE ROAD IMPROVEMENTS
- (NOT SHOWN) RUNWAY 15R-33L 3 FOOT SHIFT
- GLIDE SLOPE RELOCATION
- NEW PAVEMENT - 35' SHOULDERS AND TAXIWAY IMPROVEMENTS

TERMINAL EXIT ROADWAY IMPROVEMENTS:

- NEW PAVEMENT

AIRFIELD PAVEMENT IMPROVEMENTS:

- AIRSIDE PAVEMENT MANAGEMENT PROGRAM IMPROVEMENTS
- LANDSIDE PAVEMENT MANAGEMENT PROGRAM IMPROVEMENTS
- PAVEMENT CONVERSION TO SHOULDER
- PAVEMENT REMOVAL FOR AIRFIELD PROJECTS INCLUDING CONVERSION OF RUNWAY 4-22 TO TAXIWAY

CENTRAL UTILITY PLANT (CUP) IMPROVEMENTS:

- PROPOSED CUP EXPANSION

OBSTRUCTION POINTS:

- MAN-MADE OBSTRUCTION POINTS
- VEGETATIVE OBSTRUCTION POINTS
- LINE-OF-SIGHT CLEARANCE

RUNWAY PROTECTION ZONE COMPLIANCE:

- PROPERTY INTEREST ACQUISITION

LEGEND:

- AIRPORT PROPERTY LINE
- SECURITY FENCE
- RUNWAY PROTECTION ZONE
- RUNWAY OBJECT FREE AREA (OFA)

SOURCE: BWI MARSHALL AIRPORT LAYOUT PLAN (APPROVED 2/11/11)
BWI MARSHALL PAVEMENT MANAGEMENT PROGRAM (SEPTEMBER 2008)
(REVISED JANUARY 2011)

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BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment
for Proposed Airport Improvements

PROPOSED AIRPORT
IMPROVEMENT PROJECTS

URS AVIATION

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Exhibit: 1.0-2

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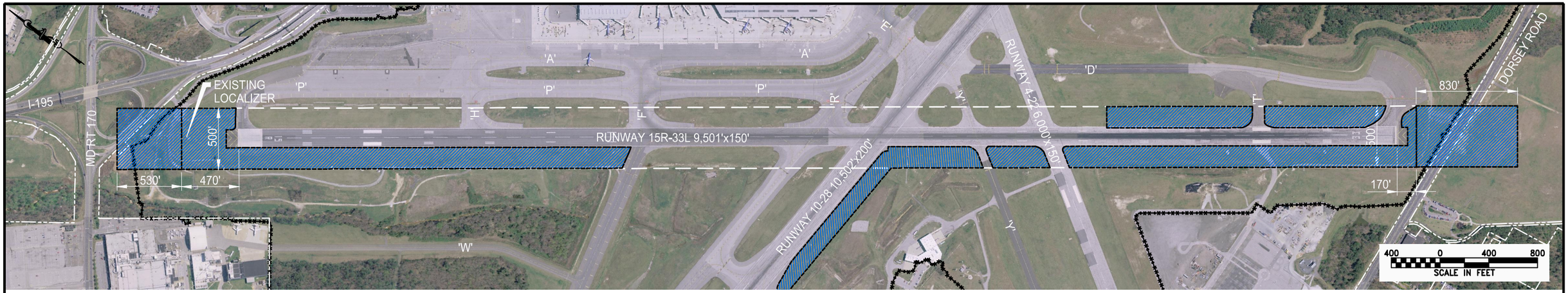

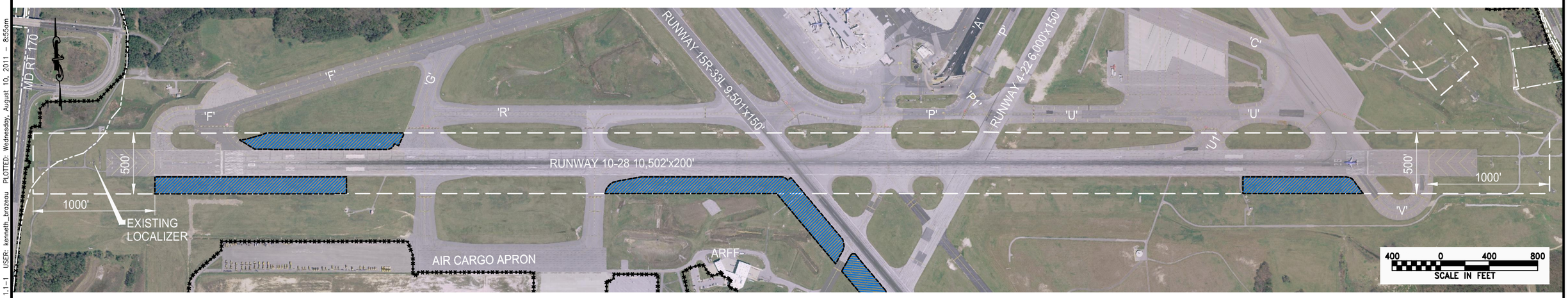

LEGEND:

- AIRPORT PROPERTY LINE
- SECURITY FENCE
- RUNWAY SAFETY AREA (RSA)
- EXISTING RSA GRADING DEFICIENCY

SOURCE: BWI MARSHALL AIRPORT LAYOUT PLAN (APPROVED 2/11/11)
BWI MARSHALL PAVEMENT MANAGEMENT PROGRAM (SEPTEMBER 2008)

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Environmental Assessment
for Proposed Airport Improvements

EXISTING RUNWAY SAFETY AREAS AND DEFICIENCIES

URS AVIATION

Scale: AS SHOWN

Exhibit: 1.1-1

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LEGEND

NEW AIRSIDE PAVEMENT

PAVEMENT REMOVAL

200 0 200 400

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Environmental Assessment
for Proposed Airport Improvements

TAXIWAY D AND RUNWAY 33L HOLD PAD

URS AVIATION

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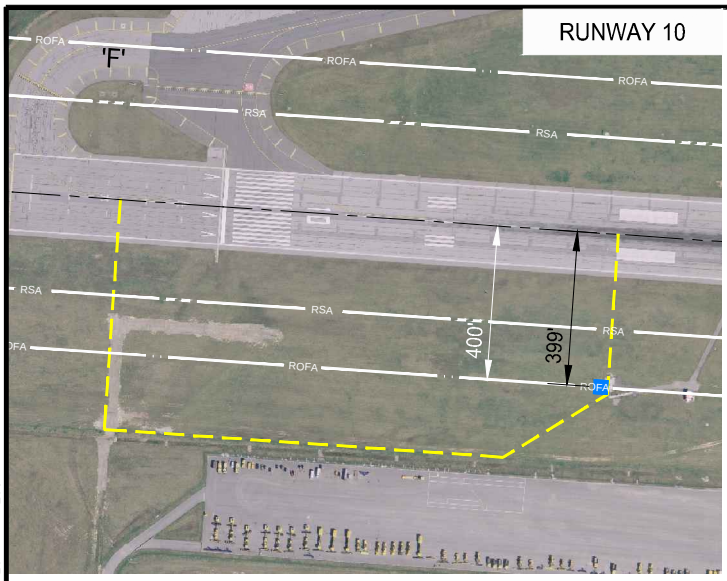

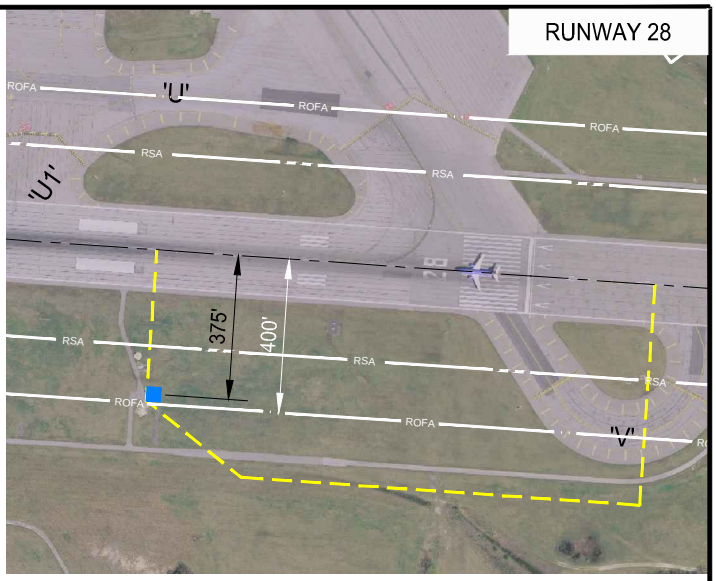

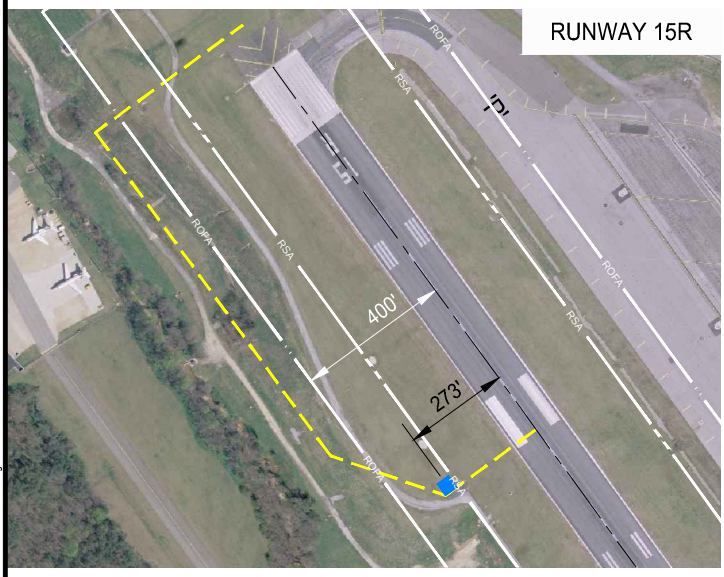

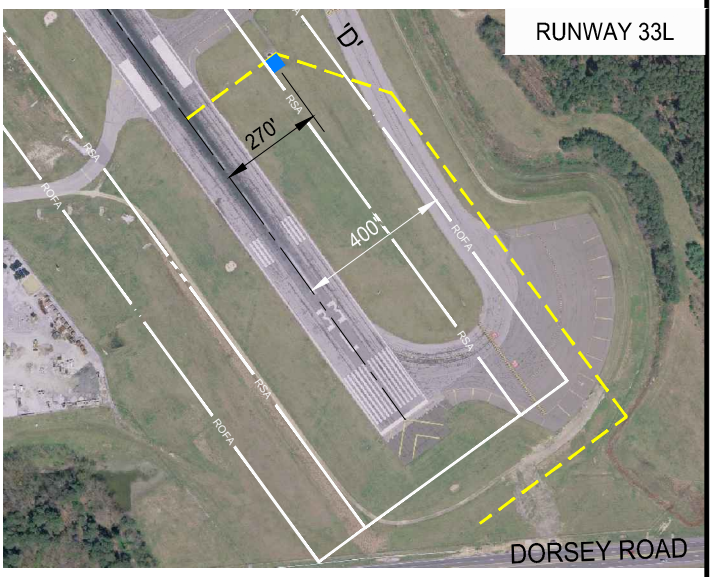

LEGEND:

- RSA — RUNWAY SAFETY AREA (RSA)
- ROFA — RUNWAY OBJECT FREE AREA (OFA)
- ANTENNA GLIDE SLOPE CRITICAL AREA
- EXISTING GLIDE SLOPE ANTENNA

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BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment
for Proposed Airport Improvements

EXISTING GLIDE SLOPE LOCATIONS

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Exhibit: 1.1-3

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RUNWAY 10-28

RUNWAY 15R-33L

RUNWAY 4-22

'A' 'A' 'A' 'B' 'C' 'C' 'C' 'D' 'D' 'E' 'E' 'E' 'P' 'P' 'P' 'P' 'P1' 'R' 'R' 'R' 'S' 'U' 'V' 'Y' 'Y'

10

28

LEGEND:

- NEW AIRSIDE PAVEMENT
- PAVEMENT REMOVAL
- PAVEMENT CONVERSION TO SHOULDER

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BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment
for Proposed Airport Improvements

ENGINEERING BRIEF #75 TAXIWAY RECONFIGURATIONS

URS AVIATION

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Exhibit: 1.1-4

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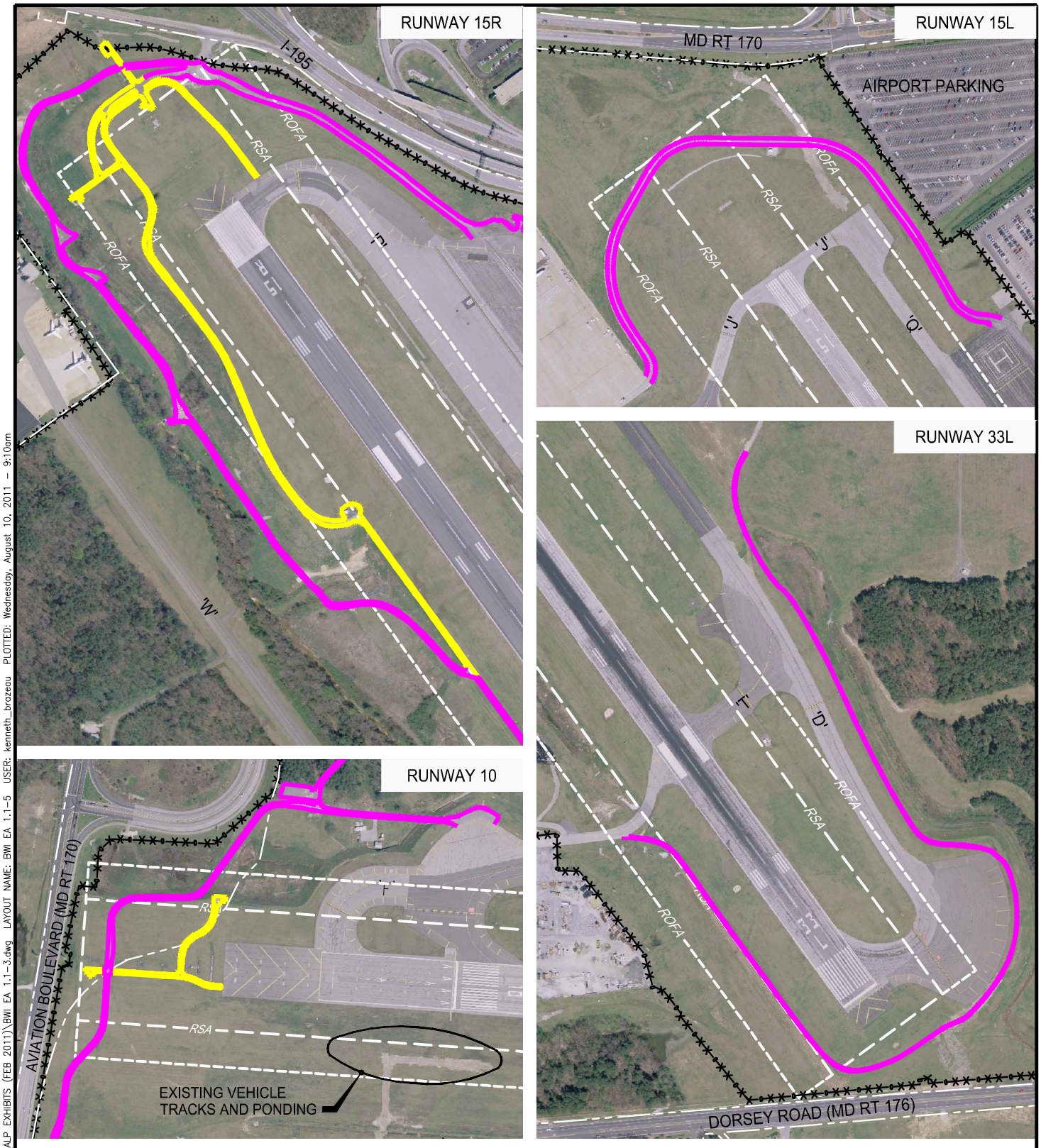

LEGEND:

- AIRPORT PROPERTY LINE
- SECURITY FENCE
- RUNWAY SAFETY AREA
- RUNWAY OBJECT FREE AREA
- EXISTING PERIMETER ROAD
- EXISTING SERVICE ROAD

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BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment
for Proposed Airport Improvements

EXISTING ROADWAYS

URS AVIATION

Scale: AS SHOWN

Exhibit: 1.1-5

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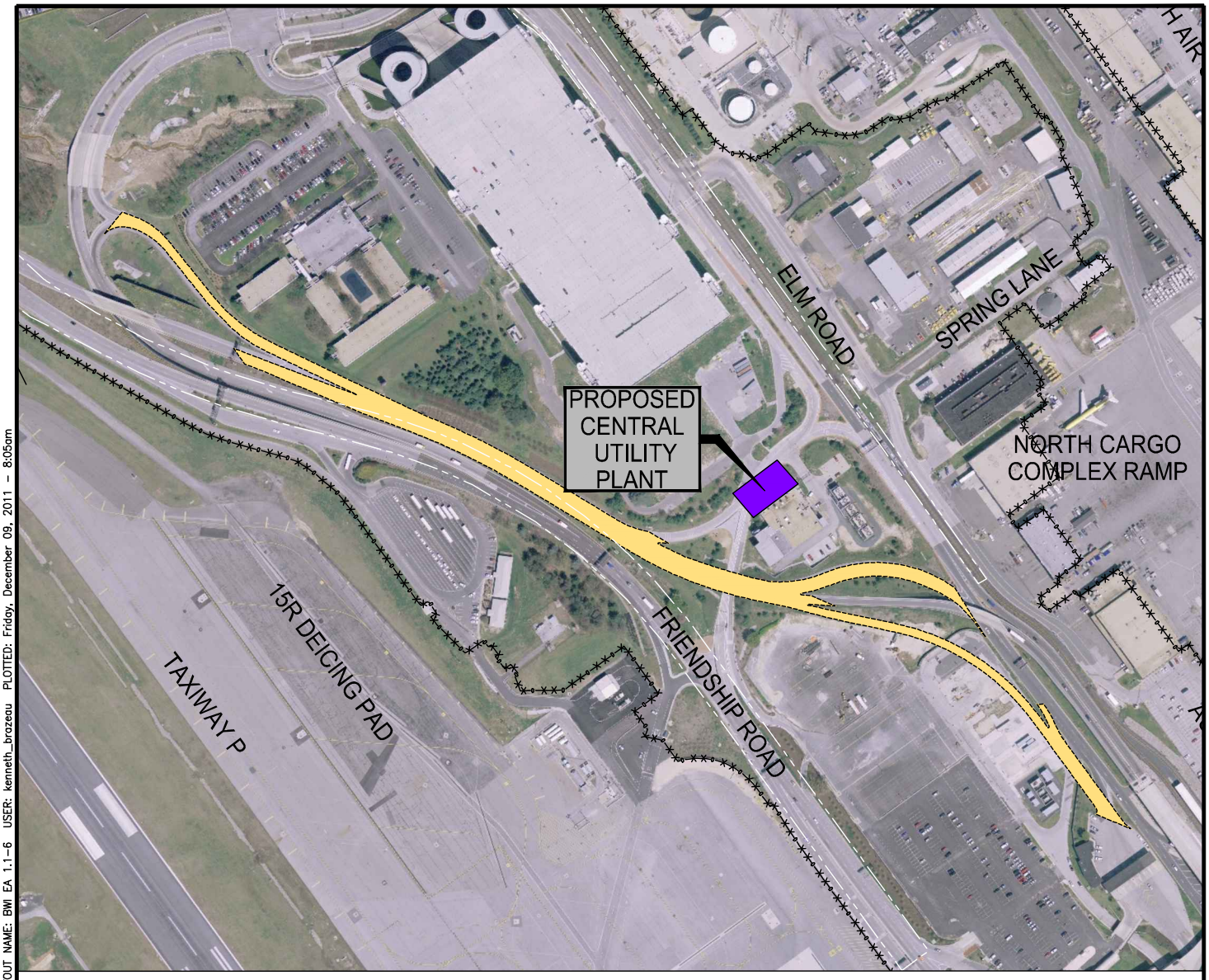


FILE NAME: P:\20834876-\20834879\CAD\ENVIRON\ALP EXHIBITS (FEB 2011)\BWI EA TERM ROAD AND CUP.dwg LAYOUT NAME: BWI EA 1.1-6 USER: kenneth_brazeau PLOTTED: Friday, December 09, 2011 - 8:05am

LEGEND:

- AIRPORT PROPERTY LINE
- SECURITY FENCE
- PROPOSED TERMINAL EXIT ROADWAY IMPROVEMENTS

200 0 200 400
SCALE IN FEET

SOURCE: BWI MARSHALL AIRPORT LAYOUT PLAN (APPROVED 2/11/11)
FEASIBILITY STUDY FOR ARRIVALS LEVEL EXIT ROAD IMPROVEMENTS AT BWI (JANUARY 2007)

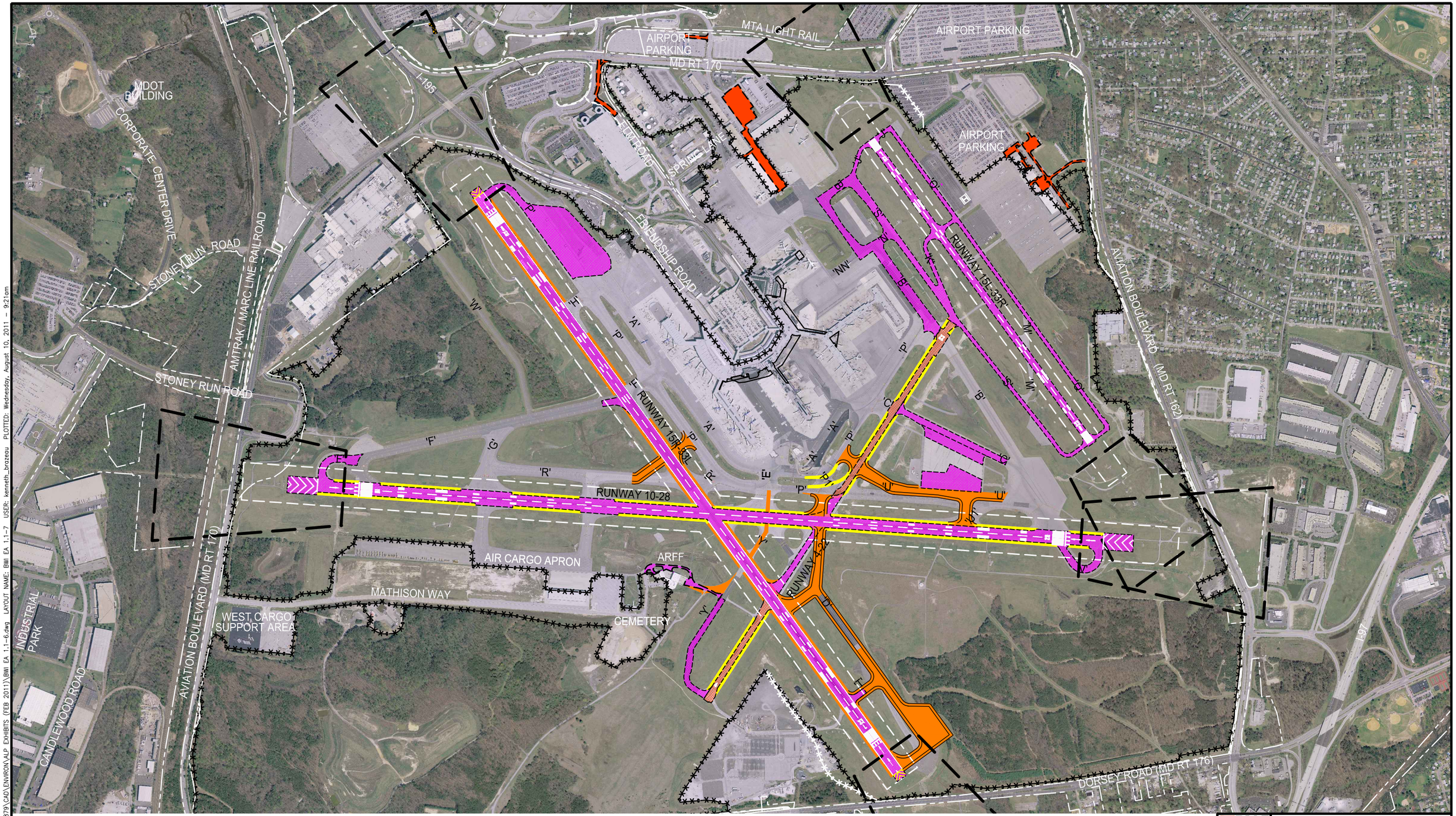
BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment
for Proposed Airport Improvements

TERMINAL EXIT ROADWAY AND CENTRAL UTILITY PLANT IMPROVEMENTS

URS AVIATION

Scale:	Exhibit:
AS SHOWN	1.1-6



LEGEND:

- AIRSIDE PAVEMENT MANAGEMENT PROGRAM IMPROVEMENTS
- LANDSIDE PAVEMENT MANAGEMENT PROGRAM IMPROVEMENTS
- PAVEMENT CONVERSION TO SHOULDER
- NEW PAVEMENT
- SECURITY FENCE
- AIRPORT PROPERTY LINE

600 0 600 1200
SCALE IN FEET

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment for Proposed Airport Improvements

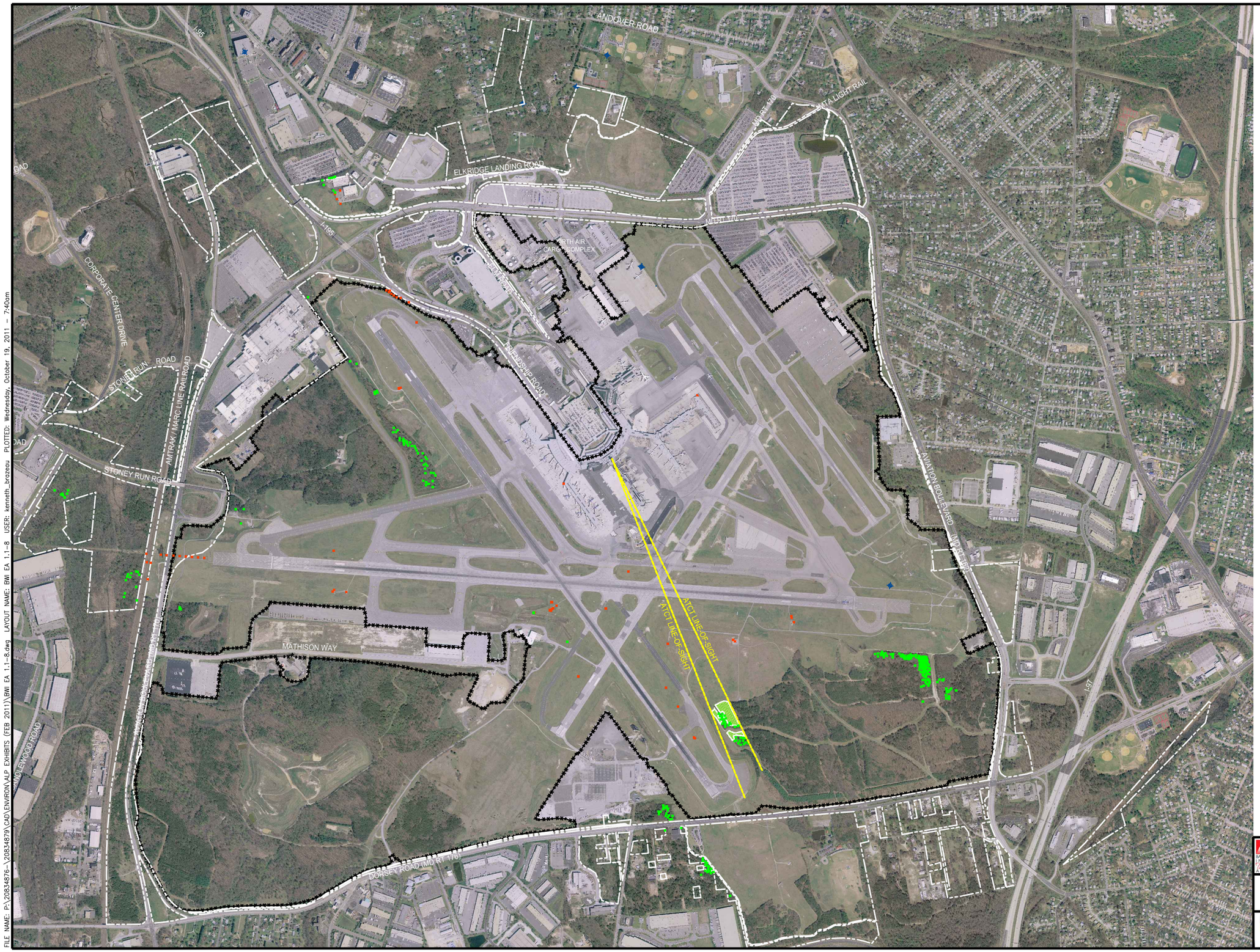
AIRFIELD PAVEMENT IMPROVEMENTS

URS AVIATION

Scale: AS SHOWN

Exhibit: 1.1-7

FILE NAME: P:\20834876-\20834879\CAD\ENVRON\ALP EXHIBITS (FEB 2011)\BWI EA 1.1-6.dwg LAYOUT NAME: BWI EA 1.1-7 USER: kenneth_brozeu PLOTTED: Wednesday, August 10, 2011 - 9:21cm



LEGEND

- AIRPORT PROPERTY LINE
- SECURITY FENCE
- LINE-OF-SITE CLEARING
- MAN-MADE OBSTRUCTIONS
- VEGETATIVE OBSTRUCTIONS

SOURCE: BWI MARSHALL AIRPORT LAYOUT PLAN (APPROVED 2/11/11)

750 0 750 1500
SCALE IN FEET

BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment for Proposed Airport Improvements

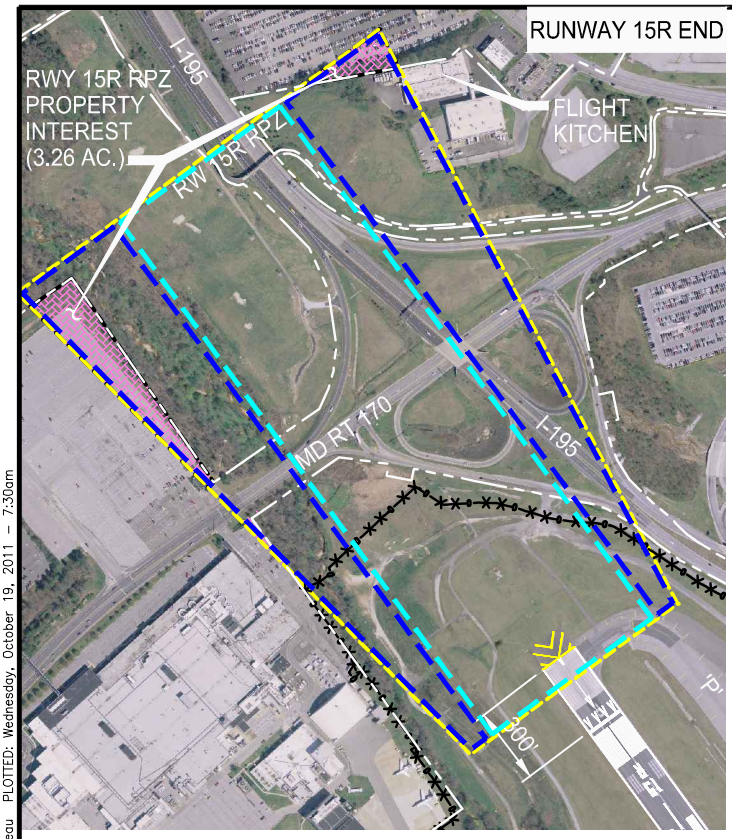
OBSTRUCTION REMOVAL AND OTHER TREE REMOVAL

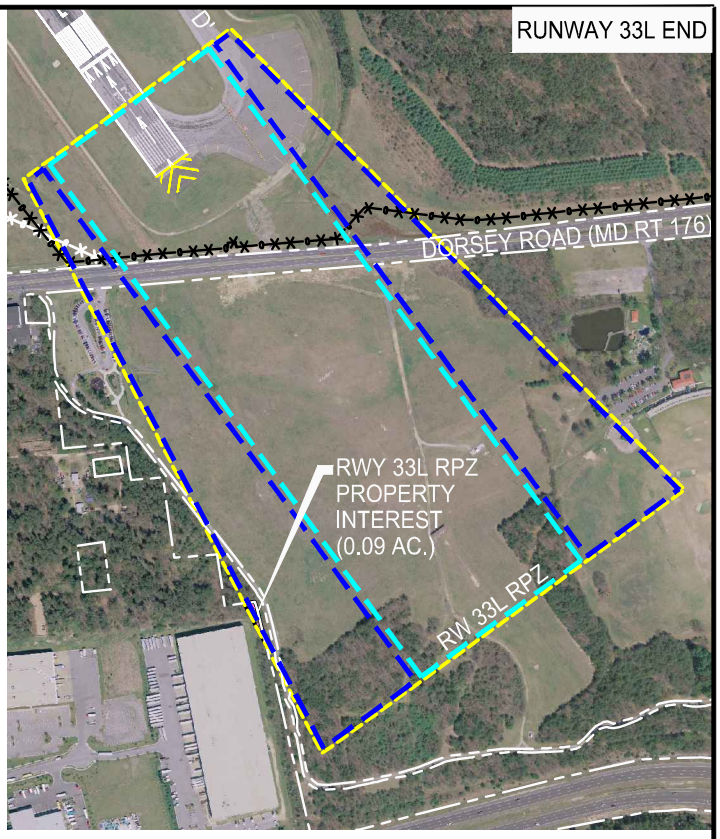
URS AVIATION

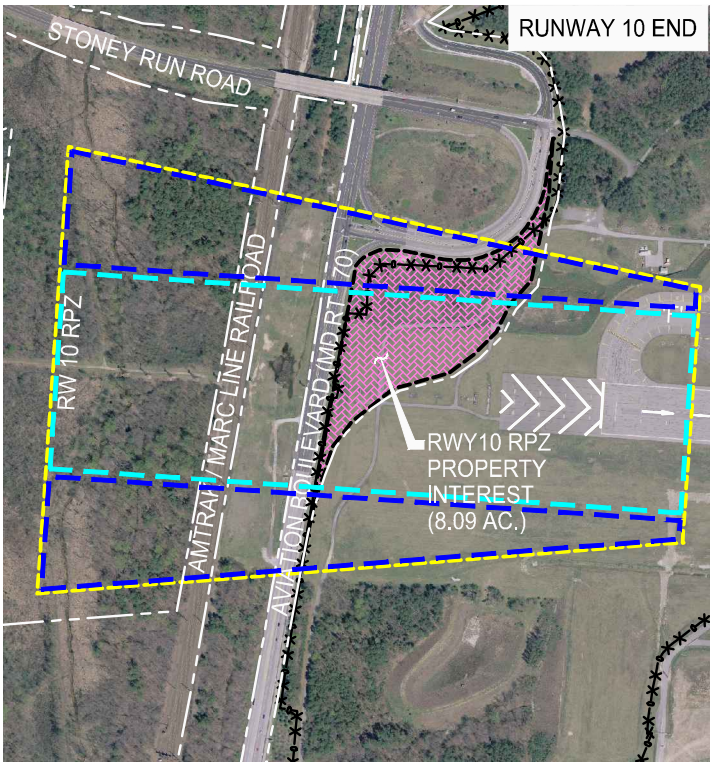
Scale: AS SHOWN

Exhibit: 1.1-8

FILE NAME: P:\20834876-\20834879\CAD\ENVIRON\ALP EXHIBITS (FEB 2011)\BWI EA 1.1-8.dwg LAYOUT NAME: BWI EA 1.1-8 USER: kenneth_brazeau PLOTTED: Wednesday, October 19, 2011 – 7:40am







LEGEND

- AIRPORT PROPERTY LINE
- SECURITY FENCE
- RUNWAY PROTECTION ZONE (RPZ)
- CENTRAL PORTION OF THE RPZ
- CONTROLLED ACTIVITY AREA
- PROPERTY INTEREST ACQUISITION

375 0 375 750
SCALE IN FEET

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment for Proposed Airport Improvements

PROPERTY INTEREST ACQUISITION

URS AVIATION

Scale: AS SHOWN

Exhibit: 1.1-9

FILE NAME: P:\20834876-\20834879\CAD\ENVIRON\ALP EXHIBITS (FEB 2011)\BWI EA 1.1-9.dwg LAYOUT NAME: BWI EA 1.1-9 REVISED 10-19-11 USER: kenneth_brazeau PLOTTED: Wednesday, October 19, 2011 - 7:30am

SECTION 2
ALTERNATIVES

2.0 INTRODUCTION

This section presents a description and analysis of alternatives considered in terms of meeting the identified purpose and need for individual planned improvement projects described in **Section 1**. The alternatives developed for this EA are based on the provisions contained in FAA Order 5050.4B, which require that all reasonable alternatives that could either avoid or minimize adverse environmental impacts, or enhance the quality of the environment, be explored. Consistent with Section 404(b)(1) of the Clean Water Act (CWA) as amended, alternatives that avoid or minimize impacts to wetlands and waters of the US while still meeting the stated purpose and need for the improvements are presented, as appropriate.

2.0.1 ALTERNATIVES ANALYSIS METHODOLOGY

The alternatives analysis includes a range of Build Alternatives identified through numerous planning studies that culminated with the configuration of the current FAA-approved ALP. In order for an alternative to be considered feasible and practicable for implementation, factors evaluated include, but are not limited to: meeting the purpose and need for the improvement; impacts to airport operations; and environmental considerations. Certain development options must support MAA's role in the aviation system and be in compliance with applicable FAA airport design standards and other regulations; these criteria are also included in the alternatives analysis, as appropriate. In addition, a discussion of the No Build Alternative is also presented. Advantages and disadvantages for those projects with more than one practicable Build Alternative are presented.

2.1 RUNWAY SAFETY AREA IMPROVEMENTS

As detailed in **Section 1.1.1**, the RSAs at all of BWI Marshall's runways do not meet current FAA design standards (FAA AC 150/5300-13, Change 17). Proposed improvements associated with Runways 15R-33L, 10-28, and 15L-33R would provide RSAs in compliance with FAA design standards as mandated by FAA Order 5200.8, *Runway Safety Area Program*.

2.1.1 RUNWAY 15R-33L

Runway 15R-33L has an ARC of D-V and has an RSA dimension of 500 feet wide for the entire length of the runway plus an additional 1,000 feet beyond the end of the runway declared usable for an aircraft operation. The threshold for both ends of Runway 15R-33L would be displaced as shown on the current FAA-approved ALP (February 2011): 300 feet for the Runway 15R end; and 500 feet for the Runway 33L end. As connected actions associated with the threshold displacement, the existing Medium-Intensity Approach Lighting System with RAILs (Runway Alignment Indicator Lights) (MALSRs), PAPIs, and RVRs at each runway end would need to be located in accordance with the relocated runway thresholds (see **Exhibit 2.1-1**). In addition, there are several areas within the RSA that do not meet current FAA grading

criteria. These areas would need to be regraded to meet current design standards. The required grading would result in approximately 50 linear feet of Kitten Branch being placed in a pipe.

The preferred RSA improvement alternative for Runway 15R-33L requires the application of declared distances which will diminish the landing length of the 9,500-foot runway by 1,200 feet. An RSA improvement option considered and dismissed for Runway 15R-33L was the installation of an Engineered Materials Arrestor System (EMAS).

2.1.1.1 Build Alternative

Runway 15R Approach – The Runway 15R safety area is 500 feet wide for the entire length of the runway plus an additional 1,000 feet beyond the end of the runway (600 feet prior to the landing threshold). The RSA does not meet FAA design standards (FAA AC 150/5300-13, Change 17) beginning 300 feet beyond the runway threshold due to the presence of the I-195/MD-170 Interchange within the RSA limits. To provide the required 500-foot wide by 600-foot long RSA needed prior to the landing threshold, the runway threshold would be displaced 300 feet (see **Exhibit 2.1-1**). Declared distances can be used to provide standard safety areas by reducing the usable runway length (see **Table 2.1-1**).

TABLE 2.1-1
DECLARED DISTANCES

Runway End	TORA	TODA	ASDA	LDA
15R	9,501	8,801	9,501	8,301
33L	9,501	8,601	9,501	8,301

As defined in FAA AC 150.5300-13, Change 17:

TORA – Take-off Run Available: "the runway length declared available and suitable for the ground run of an airplane taking off"

TODA – Take-off Distance Available: "the TORA plus the length of any remaining runway or clearway (CWY) beyond the far end of the TORA"

ASDA – Accelerated Stop Distance Available: "the runway plus stopway (SWY) length declared available and suitable for the acceleration and deceleration of an airplane aborting a takeoff"

LDA – Landing Distance Available: "the runway length declared available and suitable for a landing airplane"

As connected actions to the threshold displacement, the MALSR, PAPI, and RVR must also be relocated (see **Exhibit 2.1-1**). The MALSR is a series of light bars that allow a pilot to visually align their aircraft with the runway centerline while on approach. Each MALSR tower would be sited in accordance with FAA design standards (FAA AC 150/5300-13, Change 17). According to the standard separation for the MALSR towers, the light bar 1,000 feet from the Runway 33L threshold would be located adjacent to Dorsey Road and would not impact the existing or future function and use of Dorsey Road in this location.

In addition, the existing Runway 33L localizer is located within the RSA off of the Runway 15R end. The localizer would be relocated outside of the proposed Runway 15 safety area limits as calculated for landing operations towards the Runway 15R end.

Portions of the perimeter service roadway (including both paved and gravel portions) on the Runway 15R end goes through the existing and proposed RSAs and ROFAs and would need to be relocated (see **Exhibit 2.1-1**). The relocation of the perimeter roadway will be discussed in detail in **Section 2.3.3**.

Runway 33L Approach – The Runway 33L safety area is 500 feet wide for the entire length of the runway plus an additional 1,000 feet beyond the end of the runway (600 feet prior to the landing threshold). The RSA does not meet FAA design standards (FAA AC 150/5300-13, Change 17) beginning 100 feet beyond the runway end due to the presence of Dorsey Road (MD Route 176). To provide the required 500-foot wide by 600-foot long RSA needed prior to the landing threshold, the runway threshold would be displaced 500 feet (see **Exhibit 2.1-1**). Declared distances can be used to provide standard safety areas by reducing the usable runway length (see **Table 2.1-1**).

Similar to the Runway 15R approach, the MALSR, PAPI, and RVR would also be relocated in accordance with the 500-foot threshold displacement. In addition, as shown on **Exhibit 2.1-1**, a portion of the existing perimeter roadway system (gravel) is located within the existing and proposed RSAs and ROFAs. The relocation of the perimeter roadway will be discussed in detail in **Section 2.3.3**.

2.1.1.2 No Build Alternative

Under the No Build Alternative, the existing RSA deficiencies would remain and the proposed purpose and need for the project and Congressional mandate would not be met.

2.1.1.3 Alternatives Considered but Not Studied in Detail

As a part of the planning process to identify viable alternatives to correct the existing RSA deficiencies, additional options were investigated, but were not retained for further analysis. These options included displacing thresholds to minimize relocation of MALSR units and maintaining currently established thresholds to minimize relocation of all NAVAIDs while minimizing any reductions to runway length.

An option to displace the Runway 15R threshold 400 feet and the Runway 33L threshold 600 feet was identified. This alternative would allow most of the existing MALSR towers to be reused rather than relocating the entire system. However, the 400- and 600-foot displacements would provide 200 feet less of available runway length. In addition, relocating the thresholds on both ends of Runway 15R-33L was discussed, but was deemed not a viable option as the runway length could not be reduced without impacting the current fleet of aircraft. Since the 300- and 500-foot displacements discussed under the Build Alternative would meet the purpose and need for the project while resulting in no additional environmental impacts as compared to the 400- and 600-foot displacements, the option for 400- and 600-foot displacements and/or relocating the thresholds was not retained for further discussion.

In addition, another option was investigated to provide full RSA dimensions using the currently established runway thresholds. In order to achieve standard RSAs with the current threshold locations, portions of Dorsey Road and the I-195 / Aviation Boulevard intersection (including the entrance road to BWI Marshall) would require relocation. The impacts to operations associated with closures of this runway for an extended period of time to accomplish these improvements would negatively impact the operation of the airport and would also be disruptive to the community due to the necessary roadway closures and / or realignments. It was determined that it would not be feasible to achieve these necessary improvements prior to the 2015 deadline for RSA compliance; thus, the MAA proposed to defer these improvements until a later time. In an effort to recapture the runway length lost with the preferred alternative of applying declared distances, the MAA has programmed the recapture of the displaced thresholds on both ends of Runway 15R and 33L on the FAA-approved Airport Layout Plan (ALP) within Phase II (2021 to 2025) (conditional). Prior to the future planned recapture of runway length for Runway 15R-33L, the primary departure runway at BWI Marshall, Runway 10-28 (10,500 feet), will remain available for use by any aircraft that would demand additional length. This will alleviate any potential for weight penalties that might be incurred by the air carriers, and minimize the impact of the loss of runway length on Runway 15R-33L until the future planned recapture of the full existing length.

In an effort to comply with RSA standards on Runway 15L-33R, the MAA investigated the application of EMAS on the approach end of Runway 15L. It was determined that this alternative would exceed the maximum feasible cost per FAA Order 5200.8.

2.1.2 RUNWAY 10-28

Runway 10-28 has an ARC of D-V and has an RSA dimension of 500 feet wide for the entire length of the runway plus an additional 1,000 feet beyond the end of the runway declared usable for an aircraft operation. Runway 10-28 has sufficient space on both runway ends to allow for standard RSAs; however, the localizer for Runway 28 and a portion of an existing paved perimeter road are located within the approach RSA for Runway 10 (see **Exhibit 2.1-2**).

The existing paved perimeter roadway segment that goes through the Runway 10 end approach RSA that varies in width from 12 feet wide to 23 feet wide would remain and appropriate signage would be installed directing vehicles to hold short of the RSA and contact the ATCT for permission to proceed through the RSA. Providing this signage would allow the perimeter roadway to remain and not be relocated by 2015 while still meeting FAA design standards (FAA AC 150/5300-13, Change 17), as uncontrolled access perimeter roadways are not permitted within the RSA.

There are several areas within the RSA that do not meet current FAA grading criteria. These areas would need to be regraded to meet current design standards. There are existing drainage structures (swales and inlets) in the RSA for Runway 10-28 near the headwaters of Kitten Branch that would be relocated to meet FAA criteria. In addition, approximately 60 linear feet of the headwaters of Kitten Branch may need

to be placed in a pipe in order to achieve the necessary grading. The full width of the RSA would be graded and the existing swale moved and lowered to outside the RSA.

The Runway 10 approach RSA extends 1,000 feet beyond the end of usable pavement, meeting FAA design standards for geometry (FAA AC 150/5300-13, Change 17). The Runway 28 Localizer is located within the RSA on the Runway 10 approach. The localizer is proposed to be located 1,010 feet from the runway threshold to outside of the RSA (see **Exhibit 2.1-3**). Each of the Build Alternatives discussed below include a different option for the installation of the Runway 28 localizer. The proposed perimeter roadway signage and RSA grading discussed previously would be the same for each Build Alternative.

2.1.2.1 Build Alternative 1

Under Build Alternative 1, the localizer antenna would be located on top of an elevated tower structure at the top of a 20-foot high retaining wall (see **Exhibit 2.1-4**). Approximately 2,800 cubic yards of fill would be required off of the Runway 10 end to construct the retaining wall.

There are no potential environmental impacts associated with this alternative other than temporary ground disturbance for construction and grading purposes. Potential environmental impacts are discussed in detail in **Section 4**.

This alternative is the Sponsor's Preferred Alternative as is has a lower retaining wall and less ground disturbance and overall environmental impacts.

2.1.2.2 Build Alternative 2

Under Build Alternative 2, the localizer would also be located 1,010 feet from the runway threshold, but would be located at the proposed ground level on the top of a 30-foot high retaining wall (see **Exhibit 2.1-4**). Approximately 4,000 cubic yards of fill would be required off of the Runway 10 end to construct the retaining wall.

Potential environmental impacts to an existing stormwater management pond, wetland buffer, and streams (Kitten Branch) are anticipated with this alternative. Potential environmental impacts are discussed in detail in **Section 4**.

2.1.2.3 No Build Alternative

Under the No Build Alternative, the existing RSA deficiencies would remain and the proposed purpose and need for the project and Congressional mandate would not be met.

2.1.2.4 Alternatives Comparison

Advantages

- Build Alternatives 1 and 2 would meet the proposed purpose and need for the project.
- Build Alternative 1 for the localizer require less ground disturbance.
- The proposed localizer would function, as designed, in the locations proposed under Build Alternatives 1 and 2.

Disadvantages

- Build Alternative 2 for the localizer requires more ground disturbance and would result in impacts to an existing wetland buffer.
- Approximately 60 linear feet of the headwaters of Kitten Branch (jurisdictional stream) will be impacted by this alternative.

2.1.3 RUNWAY 15L-33R

Runway 15L-33R currently has a Runway ARC classification of B-III (approach category B – 91 to <121 knots; airplane design group III –79 to <118 foot wingspan). The classification, which was developed by the FAA, relates design criteria with characteristics of airplane types such as approach speed and aircraft wingspan. This classification along with visibility minimum determines the RSA dimensional standards for a given runway. The current visibility minimum for Runway 15L-33R is lower than ¾ statute mile, which results in a RSA width of 400 feet wide for the entire length of the runway plus an additional 1,000 feet beyond the end of the runway declared usable for an aircraft operation.

Runway 15L-33R has sufficient space to allow for standard RSAs; however, the localizers and existing paved and gravel roadway segments are within the RSA on the Runway 15L end. Although only a portion of the roadway is located within the RSA, the roadway segments on the Runway 15L are also located in the ROFA and need to be relocated in their entirety. In addition, if Runway 15L-33R were to remain a B-III runway (lower than ¾ statute mile), standard ROFAs would not be possible without relocating a portion of Aviation Boulevard. The alternatives discussed herein involve the relocation of the localizer and roadway segments.

2.1.3.1 Build Alternative

In the Build Alternative, the runway minimum visibility would be increased to ¾ statue mile or greater, thus reducing the RSA dimensions to 300 feet by 600 feet (see **Exhibit 2.1-5**).

Runway 15L Approach – The Runway 33R Localizer (located on the Runway 15L end) is located within the proposed RSA limits and must be relocated to outside the RSA (approximately 600 feet from the end of the runway) to meet current FAA design standards (FAA AC 150/5300-13, Change 17). In addition, the existing perimeter roadway around the Runway 15L end is located within the proposed RSA limits and must be relocated. A new access road to the proposed localizer shelter would also be constructed off of

the proposed perimeter roadway and outside the proposed RSA limits. The existing segments of roadway would be removed.

Runway 33R Approach – Similar to the Runway 15L approach, the Runway 15L Localizer (located on the Runway 33R end) is located within the proposed RSA limits and must be relocated to outside the RSA. A new access road to the proposed localizer shelter would also be constructed off of an existing NAVAID access road.

There are no potential environmental impacts associated with this Build Alternative other than temporary ground disturbance for construction and grading purposes.

2.1.3.2 No Build Alternative

Under the No Build Alternative, the existing RSA deficiencies would remain and the proposed purpose and need for the project would not be met.

2.1.3.3 Alternatives Considered but Not Studied in Detail

As a part of the planning process to identify viable alternatives to correct the existing RSA deficiencies, additional options were investigated, but were not retained for further analysis.

An option was investigated to provide full RSA dimensions without increasing the visibility minimums. In order to achieve standard RSAs with the current visibility minimums, a portion of Aviation Boulevard located within the existing ROFA would need to be relocated. In addition, relocating the Runway 15L localizer to 800 feet off of the Runway 33R end would require an area of fill be placed at the runway end as the ground elevation off of the Runway 33R end drops. The impacts to operations associated with closures of this runway for an extended period of time to accomplish these improvements would negatively impact the operation of the airport and would also be disruptive to the community due to the necessary roadway closures and / or realignments.

In addition, an option involving shortening the Runway 15L end to either allow the perimeter roadway and/or localizer to remain in their current location was investigated. The operational impacts resulting from the reduced runway length would not be acceptable in accordance with recent MAA planning studies (*BWI Marshall Master Plan*, 2010).

In an effort to comply with RSA standards on Runway 15L-33R, the MAA investigated the application of EMAS on the approach end of Runway 15L. It was determined that this alternative would exceed the maximum feasible cost per FAA Order 5200.8.

2.2 FAA DESIGN STANDARDS

Changes to the location of various navigational aids (NAVAIDs) are necessary to meet FAA design standards. Each NAVAID and airfield element is discussed separately below.

2.2.1 RUNWAY TO TAXIWAY SEPARATION DEFICIENCY

The existing runway to taxiway separation between Runway 15R-33L and Taxiway P is 399 feet. FAA design standards require a separation of 400 feet plus an additional two feet for sea level allowance. The entire length of Runway 15R-33L is proposed to be shifted to the west to allow for the appropriate separation with Taxiway P (402 feet). Previous construction of Taxiways A and P will be corrected to achieve standard separation requirements with the above-mentioned alternative to shift the runway.

Future plans for Runway 15R-33L would ultimately require a 502-foot separation; therefore, the portion of Taxiway D to be relocated will be placed at a 550-foot separation to join the existing segment of Taxiway D that is currently at a 550-foot separation rather than relocating both segments now and then again in the future. Relocating Taxiway D and the hold apron would improve the capacity of the taxiway system. The proposed alternatives for the relocation of the Runway 33L hold apron include variations for the displacement of Fork Branch as a result of the relocated hold apron.

2.2.1.1 Build Alternative 1

Under Build Alternative 1, a proposed culvert containing 1,480 linear feet of Fork Branch would go from a location north of the proposed Runway 33L hold pad, under the hold pad, and rejoining Fork Branch just southeast of the proposed hold pad (see **Exhibit 2.2-1**). Additional impacts to Fork Branch as a result of grading and project construction are detailed in **Section 4**.

Potential environmental impacts to wetlands, wetland buffers, forests, and streams (Fork Branch) are anticipated with this alternative. The potential environmental impacts are discussed in detail in **Section 4**.

This alternative is the Sponsor's Preferred Alternative as it includes a culvert to allow Fork Branch to go under the proposed Taxiway D hold pad with a majority of the culvert not being located beneath the proposed hold pad pavement so as to not have an excess aircraft load on the proposed culvert.

2.2.1.2 Build Alternative 2

As a variation to Build Alternative 1, this alternative would place 1,640 linear feet of Fork Branch in a culvert; however, the culvert would go around the proposed hold pad so that less of the culvert would be located underneath existing or proposed airfield pavement (see **Exhibit 2.2-2**). Additional impacts to Fork Branch as a result of grading and project construction are detailed in **Section 4**.

Potential environmental impacts to wetlands, wetland buffers, forests, and streams (Fork Branch) are anticipated with this alternative. The potential environmental impacts discussed in detail in **Section 4**.

2.2.1.3 No Build Alternative

The No Build Alternative would not meet the purpose and need for the proposed project and the runway would continue to have a non-standard runway to taxiway separation which would reduce capacity and not meet current FAA design standards.

2.2.1.4 Alternative Considered but Not Studied in Detail

Fork Branch would be relocated around the proposed hold pad and the stream would be relocated to the east and northeast to provide sufficient room to allow for the proposed and relocated hold pad and Runway 33L end perimeter roadway. FAA AC 150-5200-33B, *Wildlife Attractants on or Near Airports* discourages the creation of stormwater management ponds, wetlands, streams, and forests on airport property. This alternative is not preferred by USDA Wildlife Service personnel at BWI Marshall, agents for the FAA for wildlife management, as it is seen as potentially increasing the attractiveness of the area to hazardous wildlife and would not comply with FAA's wildlife AC.

2.2.1.5 Alternatives Comparison

Advantages

- Both of the proposed Build Alternatives would meet the stated purpose and need for the project.
- Build Alternative 1 would have a shorter culvert length than Build Alternative 2.
- Build Alternative 2 would eliminate placement of the culvert under the proposed hold pad pavement.

Disadvantages

- Build Alternative 2 would have more potential forest impacts and a larger limit of disturbance.
- There is an increased likelihood of the collection of debris at each turn of the culvert that would pose additional maintenance concerns under Build Alternative 2.

2.2.2 RUNWAY 15R GLIDE SLOPE RELOCATION

Section 2.2.2 details the siting requirements for Glide Slope antennas. FAA Order 6750.16D requires the Glide Slope antenna to be located near the runway approach end at a distance from the threshold to provide optimum threshold crossing height (TCH) and be located outside the RSA and ROFA. The glide slope antenna can be located to either side of the runway (the optimal location being anywhere free from building, power lines, and moving vehicle interference as well as relatively smooth terrain), but the entire facility must be at least 400 feet from the runway centerline on Runway 15R-33L to ensure it is outside the ROFA. All of the proposed Glide Slopes at BWI Marshall are Capture Effect image type, which is the

system of choice for complicated terrain as it is the most tolerant and most complex in that it uses separate transmitters to provide the course and clearances (FAA Order 6750.16D).

Given the existing terrain surrounding the area for the Runway 15R Glide Slope, the relocation from its existing location would require grading within the Glide Slope Critical Area (GSCA) and reflective grading plane to allow the Glide Slope to function within modeling tolerances. The current Glide Slope is located 273 feet off the runway centerline and 1,147 feet from the existing runway threshold. While the Glide Slope antenna is currently 23 feet outside of the RSA, it is within the ROFA limits (which extend 400 feet off the runway centerline).

Each build alternative is required to provide a uniform grading area that prevents interference and discontinuities while maximizing the smooth terrain for the "grading area" that allows for the signal reflection for the glide slope to function (grading plane). In addition, the GSCA must be kept free of signal reflections, power lines, vehicles, fences, guard rails, etc. to maintain the most reliable operation. Each alternative incorporates the required reflecting grading plane and GSCA as required by FAA to provide the most reliable operation of the glide slope antenna.

FAA Order 6750.16D defines the TCH as the trigonometrically calculated height of the glide path above the runway threshold and is a product of the distance from the threshold, the terrain slope (of the runway), and the glide path angle (usually 3.0 degrees). FAA Order 8273.3B indicates that the recommended TCH for Height Group IV (Runway 15R-33L) is 55 feet +/- 5 feet, meaning acceptable results range from 50-60 feet. The current placement of the Glide Slope yields a TCH of 62 feet, which is outside of the acceptable range. The proposed Runway 15R Glide Slope would be relocated approximately 280 feet from the existing location which results in a distance of 1,109 feet from the proposed threshold displacement (as discussed within **Section 2.1.1**) to achieve a TCH of 55 feet. The proposed Glide Slope location takes into consideration the proposed 300-foot threshold displacement and the proposed 3-foot runway shift (as discussed previously in **Section 2.2.1**) resulting in a separation of 413 feet from the runway centerline.

The proposed alternatives for the Runway 15R Glide Slope relocation include variations in the ways to implement the proposed project components, including grading and encroachment on Kitten Branch with the proposed Glide Slope in the same location for each alternative (413-foot runway from centerline). A paved NAVAID access road from the Runway 15R end to the proposed Glide Slope location is also proposed under all Build Alternatives to allow for FAA-only access to the NAVAID for necessary repairs. Avionics modeling has determined that the relocated Glide Slope would function within acceptable tolerance limits under all of the Build Alternatives.

Relocation of the Glide Slope facility and the required GSCA results in an area of fill that will encroach on non-MAA owned property. Inclusion of the perimeter road grading requirements and proximity of the property limits for the airport create the need for a retaining wall approximately 200 feet long and partial box culvert associated with each build alternative described below. In addition, an existing outfall from the airfield that currently empties into a rip-rap area (identified as a tributary of Kitten Branch) on the downslope west of Runway 15R would need to be extended to allow for the proposed fill in the GSCA and

grading plane. As these conditions are consistent for each alternative, the three build alternatives discussed below provide a variation to provide the necessary glide slope grading plane as well as allow the proposed perimeter roadway to be located outside the necessary grading plane while staying on MAA-owned property. While attempts were made to minimize impacts to the floodplain for each Build Alternative, it is impractical to avoid encroaching on the floodplains due to the existing terrain and the closed proximity of the runway to the floodplain associated with Kitten Branch. It is also not practical or environmentally prudent to move the runway in order to avoid the floodplain impacts.

2.2.2.1 Build Alternative 1

Two retaining walls (approximately 200 feet and 275 feet long) and a culvert (approximately 575 feet long) are being proposed under Build Alternative 1 (see **Exhibit 2.2-3**). The 200-foot long retaining wall, as discussed in **Section 2.2.2**, is required to allow for the construction of the proposed perimeter roadway. The 275-foot long retaining wall location is set outside of the proposed GSCA and grading plane to limit any potential interference source for the Glide Slope. Implementation of the wall would create a near 30-foot elevation difference and require protection elements, such as a guard rail, at the top of the proposed wall to provide fall protection during maintenance activities such as mowing and snow removal, etc.

The location of the wall is outside the GSCA which places the footprint within the limits of Kitten Branch. Placement of the wall inside the GSCA but outside of the grading area would increase the potential interference created by fall protection (i.e., guard rails, etc.) at the top of wall. The box culvert would be approximately 8 feet tall, 12 feet wide, and approximately 575 feet long and convey flow from the downstream end of the retaining wall under the perimeter roadway to allow all of these proposed improvements to remain on MAA-owned property. In this alternative, the culvert would be constructed outside of the existing stream. Once completed, the stream would be diverted into the new culvert. Headwall structures, inflow/outfall grading, and scour protection at both inflow and outflow locations would also be required.

Future development plans at BWI Marshall include reclaiming the 300-foot threshold displacement currently proposed for the RSA improvements for the Runway 15R end. The proposed retaining wall to support the relocated glide slope and its' associated grading plane would likely need to be removed and/or deemed unnecessary at the time MAA would reclaim the threshold displacement on the Runway 15R end.

The existing sanitary sewer line would be relocated under this alternative. Details regarding the final location and timing of the proposed line installation would be developed during the design phase of the project, but would occur within the proposed limits of disturbance.

Potential environmental impacts are associated with this work in addition to temporary ground disturbance for construction and grading purposes, including impacts to wetlands, wetland buffers, the Kitten Branch stream channel and 100-year floodplain, and forests.

2.2.2.2 Build Alternative 2

Build Alternative 2 would include the 200-foot long retaining wall, as discussed in **Section 2.2.2**, for the proposed perimeter roadway as well as a 9-foot tall by 14-foot wide box culvert approximately 755 feet long placed directly in the existing stream channel of Kitten Branch (see **Exhibit 2.2-3**). As compared to Build Alternative 1, the proposed culvert would negate the need for a second retaining wall and reduce the safety hazard and potential for interference to the Glide Slope signal. Build Alternative 2 reduces the permanent impact to the stream while still providing the most reliable functionality for the Glide Slope. In order to place the proposed culvert in the stream channel while maintaining functionality of Kitten Branch during construction, the stream would need to be temporarily diverted to the east. The temporary channel would be sized for a two-year storm event (per MDE guidelines) requiring the diversion to be approximately ten feet wide with a depth capacity ranging between three and four feet.

The existing sanitary sewer line would be relocated under this alternative. Details regarding the final location and timing of proposed installation would be developed during the design phase of the project, but would occur within the proposed limits of disturbance.

Potential environmental impacts are associated with this work in addition to temporary ground disturbance for construction and grading purposes, including impacts to wetlands, wetland buffers, the Kitten Branch stream channel and 100-year floodplain, and forests.

Build Alternative 2 is the Sponsor's Preferred Alternative. Similar to Alternatives 1 and 3, Alternative 2 would not require construction or use of property that is not owned by MAA. Other solutions that were considered but not studied in detail, as discussed below, would require construction of the perimeter road within the adjacent Northop Grumman property and would include impacts to wetlands, wetland buffers, the Kitten Branch Stream channel, 100-year floodplains, and forests. Alternatives 1, 2, and 3 were discussed in greater detail due to their lack of off-airport impacts.

Alternative 2 is preferred over Alternative 1 because Alternative 2 would: 1) not include Alternative 1's 30-foot retaining wall which would require fall protection devices that may affect the functionality of the glide slope antenna; 2) reduce the wildlife hazard potential of Kitten Branch as compared to Alternative 1; 3) have a shorter construction duration than Build Alternative 1; and 4) be less likely to interfere with future BWI Marshall development plans. While Alternative 2 has greater approximated impacts to Kitten Branch and the 100-year floodplain than Alternative 1, the differences are negligible. Specifically, Alternative 2 impacts 0.12 acres more of floodplains than Alternative 1 and has 60 more linear feet of temporary impacts to Kitten Branch. Additionally, Alternative 2 is preferable to Alternative 3 because it creates fewer impacts to floodplains and Kitten Branch. For more information on floodplains impacts see **Section 4.10**.

2.2.2.3 Build Alternative 3

Build Alternative 3 would also include the 200-foot long retaining wall, as discussed in **Section 2.2.2**, for the proposed perimeter roadway as well as a 8-foot tall by 12-foot wide box culvert approximately 875 feet long placed east of the existing stream channel of Kitten Branch (see **Exhibit 2.2-4**). Placement of the culvert outside of the existing stream channel of Kitten Branch allows for construction to occur outside of the stream with the final intent being to divert the stream into the culvert once constructed. Headwalls structures, inflow/outfall grading, and scour protection at both inflow and outflow locations would also be required.

An existing sanitary sewer line would be relocated under this alternative. Details regarding the final location and timing of the proposed installation would be developed during the design phase of the project, but would occur within the proposed limits of disturbance.

Potential environmental impacts are associated with this work in addition to temporary ground disturbance for construction and grading purposes, including impacts to wetlands, wetland buffers, the Kitten Branch stream channel and 100-year floodplain, and forests.

2.2.2.4 No Build Alternative

The No Build Alternative would not meet the purpose and need for the proposed project and the Glide Slope would remain within the ROFA and would not meet current FAA design standards.

2.2.2.5 Alternative Considered but Not Studied in Detail

An alternative was considered that included the same standard grading of the proposed Glide Slope Critical Area and grading plane as proposed with Build Alternatives 1 through 3, but approximately 1,000 linear feet of Kitten Branch would be relocated rather than placed in a culvert. As with Build Alternatives 1 through 3, a new Glide Slope antenna access road would be proposed at the top of the slope, but outside of the ROFA. Potential environmental impacts are associated with this work beyond temporary ground disturbance for construction and grading purposes, including impacts to wetlands, wetland buffers, the Kitten Branch stream channel (temporary due to relocation) and 100-year floodplain, and forests. This alternative would also encroach onto Northrop Grumman property and includes potential impacts to Taxilane W that would require an alternate access point for Northrop Grumman to access the airfield be constructed. Taxilane W would likely need to be closed in order to allow for the necessary grading needed to allow for the re-creation of the Kitten Branch stream channel (stream relocation). FAA AC 150-5200-33B, *Wildlife Attractants on or Near Airports* discourages the creation of stormwater management ponds, wetlands, streams, and forests on airport property. This alternative is not preferred by USDA Wildlife Service personnel at BWI Marshall, agents for the FAA for wildlife management, as it is seen as potentially increasing the attractiveness of the area to hazardous wildlife and would not comply with FAA's wildlife AC.

An additional alternative was proposed to try to minimize potential impacts to Kitten Branch. A 30-foot retaining wall would be constructed outside the glide slope grading plane. The necessary safety features and fall protection that would be required to be installed at the top of the proposed retaining wall would interfere with the functionality of the glide slope antenna. In addition, the location of the retaining wall would not allow the proposed perimeter roadway to be constructed on MAA-owned property.

2.2.2.6 Alternatives Comparison

Advantages

- All of the proposed Build Alternatives would meet the stated purpose and need for the project.
- The total stream impacts (temporary and permanent) for the three Build Alternatives only differ by 60 linear feet (ranging from 1,600 linear feet to 1,660 linear feet).
- Build Alternatives 2 and 3 would ultimately reduce the wildlife hazard potential of Kitten Branch by placing over 850 linear feet of the stream in a culvert.
- Build Alternative 1 would have fewer impacts to floodplains as there is less permanent ground disturbance associated with the installation of the retaining walls and shorter culvert.
- The proposed perimeter roadway associated with all the Build Alternatives would be built over the proposed culvert section so as to not further impact Kitten Branch.
- Build Alternative 3 has the potential for a reduced construction duration.
- Avionics modeling has shown the glide slope antenna would function within acceptable tolerance limits under Build Alternative 1.

Disadvantages

- Build Alternative 1 would require fall protection devices (i.e., guard rails, etc.) to be installed at the top of the proposed 30-foot tall retaining wall for fall protection which may affect the functionality of the glide slope antenna.
- Build Alternative 1 would have the longest construction duration and could impact BWI Marshall's ability to meet the 2015 Congressional RSA Compliance mandate.
- The installation of the 30-foot tall retaining wall under Build Alternative 1 would interfere with future BWI Marshall development plans in Phase II (2021-2025). The retaining wall would likely need to be removed and/or deemed unnecessary at the time MAA reclaims the 300-foot threshold displacement on the Runway 15R end.
- Build Alternative 2 would require the construction of the stream diversion prior to installation of the in-stream culvert.
- The proposed limit of disturbance is greater for Build Alternatives 2 and 3.

2.2.3 RUNWAY 33L GLIDE SLOPE RELOCATION

In accordance with the FAA siting criteria, the Runway 33L Glide Slope needs to be relocated to be outside of the ROFA. For Runway 33L, the ROFA is 800 feet wide requiring the glide slope to be located 400 feet from the runway centerline. The existing Glide Slope is currently located 270 feet from the

existing runway centerline on the right side of the Runway 33L approach. If the Glide Slope were to remain on the right side of the approach at a standard separation, it would be located within the OFA of Taxiway D and would require aircraft to hold outside of the GSCA during ILS operations. As such, the Glide Slope is proposed to be relocated to the left side of the Runway 33L approach.

The Glide Slope is proposed to be relocated 681 feet south of its current location and offset 410 feet from the runway centerline to provide a TCH of 55 feet. A new Glide Slope antenna access road would be proposed in the same location for both Build Alternatives (see **Exhibit 2.2-5**).

At the proposed location, the glide slope would encroach on an existing infiltration trench. The standard location for placing the Glide Slope to the left side of the Runway 33L approach, while providing for the appropriate TCH, places the antenna in an existing infiltration trench. The proposed alternatives for placement of the Runway 33L Glide Slope include variations for the replacement of the loss of function to the existing infiltration trench. Avionics modeling has determined that the relocated Glide Slope would function within acceptable tolerance limits under either Build Alternative.

2.2.3.1 Build Alternative 1

One option for replacement of the loss of function of the existing infiltration trench would be to expand the trench to the north. This alternative would be located closer to the existing trench and would have less ground disturbance than Build Alternative 2.

Potential environmental impacts to an intermittent stream are anticipated with this alternative. The potential environmental impacts are discussed in detail in **Section 4**.

This alternative is the Sponsor's Preferred Alternative as it would involve less overall ground disturbance when replacing the infiltration trench.

2.2.3.2 Build Alternative 2

An additional option for replacement of the loss of function of the existing infiltration trench would be to expand the trench to the west. This Alternative would impact an existing overflow parking lot and would involve more ground disturbance than Build Alternative 1.

Potential environmental impacts to an intermittent stream are anticipated with this alternative. The potential environmental impacts are discussed in detail in **Section 4**.

2.2.3.3 No Build Alternative

The No Build Alternative would not meet the purpose and need for the proposed project and the Glide Slope would remain within the ROFA and would not meet current FAA design standards.

2.2.3.4 Alternatives Comparison

Advantages

- The proposed Build Alternatives would meet the stated purpose and need for the project.
- Build Alternative 1 has a smaller limit of disturbance.

Disadvantages

- Build Alternative 2 has a larger limit of disturbance with the expansion of the trench to the west impacting the overflow parking lot.
- Build Alternatives 1 and 2 would impact the overflow parking lot to allow for the grading of the Glide Slope Critical Area.
- Stream impacts would be required with either Build Alternative.

2.2.4 RUNWAY 10 GLIDE SLOPE RELOCATION

In accordance with the FAA siting criteria, the Runway 10 Glide Slope needs to be relocated to provide a standard separation from the runway centerline. The existing Glide Slope is currently located on the right side of the Runway 10 approach within the ROFA with a 399-foot runway centerline separation. Avionics modeling has confirmed that the proposed Glide Slope would function within the acceptable tolerance levels at the proposed location.

2.2.4.1 Build Alternative

The proposed Runway 10 Glide Slope would be relocated approximately 420 feet from the runway centerline outside of the ROFA and south of existing weather instruments (see **Exhibit 2.2-6**). Laterally, the Glide Slope would be shifted 11 feet away from the landing threshold (creating a resultant total of 1,019 feet) to produce a TCH value of exactly 55 feet. The existing Glide Slope access road from Runway 10-28 would be demolished so that maintenance vehicles servicing the Glide Slope do not have to travel on Runway 10-28, rather they would gain access from Taxiway G from a proposed access road.

There are no potential environmental impacts associated with this alternative other than temporary ground disturbance for construction and grading purposes. No impacts to wetlands or forests are anticipated.

2.2.4.2 No Build Alternative

The No Build Alternative would not meet the purpose and need for the proposed project and the Glide Slope would remain within the ROFA and would not meet current FAA design standards.

2.2.5 RUNWAY 28 GLIDE SLOPE RELOCATION

In accordance with the FAA siting criteria, the Runway 28 Glide Slope needs to be relocated to provide a standard separation from the runway centerline. The existing Glide Slope is currently located on the left side of the Runway 28 approach within the ROFA approximately 375 feet from the runway centerline. The Glide Slope distance from the existing landing threshold is 951 feet, yielding a TCH of about 55 feet. Avionics modeling has confirmed that the proposed Glide Slope would function within the acceptable tolerance levels at the proposed location.

2.2.5.1 Build Alternative

The proposed Glide Slope antenna would be located 35 feet from its current location at a total of 410 feet from the runway centerline (see **Exhibit 2.2-7**). The Glide Slope would shift 14 feet laterally from the existing location, away from the current landing threshold location. The shift would place the antenna 965 feet from the landing threshold, providing a TCH of exactly 55 feet.

Potential environmental impacts to wetlands are anticipated with this alternative. The potential environmental impacts are discussed in detail in **Section 4**.

2.2.5.2 No Build Alternative

The No Build Alternative would not meet the purpose and need for the proposed project and the Glide Slope would remain within the ROFA and would not meet current FAA design standards.

2.2.6 RUNWAY 10-28 MID-POINT RVR RELOCATION

The existing Runway 10-28 mid-point RVR is located within the ROFA and, as such, does not meet current FAA design standards (FAA AC 150/5300-13, Change 17) (see **Exhibit 2.2-8**). The RVR would be sited in accordance with FAA design standards, as discussed in **Section 1.1.2.3** (FAA Order 6560.10B).

2.2.6.1 Build Alternative

The existing mid-point RVR would be relocated to outside of the ROFA and a new RVR access road would be constructed.

There are no potential environmental impacts associated with this alternative other than temporary ground disturbance for construction and grading purposes.

2.2.6.2 No Build Alternative

The No Build Alternative would not meet the purpose and need for the proposed project and the RVR would remain within the ROFA and would not meet current FAA design standards.

2.2.7 RUNWAY 10 APPROACH LIGHTING SYSTEM MODIFICATION

The Approach Lighting System with Flashers (ALSF-II) component of the existing ALS for the Runway 10 approach does not meet current FAA design standards for the existing light plane (FAA AC 150/5300-13, Change 17) (see **Exhibit 2.1-3**).

2.2.7.1 Build Alternative

Under this alternative, the existing ALSF-II towers would be lowered in place to a height that is consistent with the ALS light plane and would not create obstructions to navigable airspace (CFR Part 77). There would be no ground disturbance as a part of this proposed project as each tower would remain in its current location with only the tower lighting structure being lowered on the existing foundation. Coordination with AMTRAK would be required to lower four to six of the existing catenary towers so that they do not penetrate the proposed light plane.

There are no potential environmental impacts associated with this alternative.

2.2.7.2 No Build Alternative

The existing ALSF-II would not be lowered under the No Build Alternative and the system would not meet FAA design standards.

The No Build Alternative would not meet the purpose and need for the project.

2.2.8 ENGINEERING BRIEF NO. 75 TAXIWAY RECONFIGURATIONS

Engineering Brief No. 75, *Incorporation of Runway Incursion Prevention into Taxiway and Apron Design*, has been incorporated into FAA AC 150/5300-13, Change 17, *Airport Design* [January 2011] and provides guidance on "design strategies of taxiways and aprons to help prevent runway incursions." As a part of the planning process that was undergone during the development of the current FAA-approved ALP (February 2011), several taxiways have been proposed for demolition and/or reconfiguration to incorporate those strategies suggested by the FAA and to increase the capacity of the airfield. As a measure to prevent runway incursions at BWI Marshall, all acute taxiway to runway connections and straight line apron access points to the runway are to be eliminated with the proposed alternative.

2.2.8.1 Build Alternative

Numerous taxiways would be reconfigured under Build Alternative to provide perpendicular runway to taxiway intersections, where available, and also reduce direct access to the runways (see **Exhibit 2.2-9**):

- Taxiway C – portions to be narrowed at the Runway 4-22 intersection
- Taxiway D – portions to be removed and new perpendicular intersections with Runway 10-28 and Runway 15R-33L to be constructed
- Taxiway E – portions to be removed while maintaining an ARFF access road
- Taxiway P1 – portions to be removed and also narrowed at the Runway 10-28 intersection
- Taxiway R – portions to be removed and relocated to provide a perpendicular intersection with Runway 15R-33L
- Taxiway U – portions to be relocated to a 502-foot separation with Runway 10-28
- Taxiway U1 – portions to be narrowed to provide a perpendicular intersection with Runway 10-28
- Taxiway Y – portions to be removed while maintaining an ARFF access road

Additional reconfigurations are proposed as part of the conversion of Runway 4-22 to a taxiway and are discussed in detail in **Section 2.4**.

There are no potential environmental impacts associated with this alternative other than temporary ground disturbance for construction and grading purposes. No impacts to wetlands or forests are anticipated.

2.2.8.2 No Build Alternative

The existing taxiway configurations would remain and would not meet the intent of FAA's guidance contained in Engineering Brief No. 75. The No Build Alternative would not meet the purpose and need for the project.

2.3 PERIMETER ROADWAY IMPROVEMENTS

There are segments of the existing perimeter roadways on the ends of Runways 15R, 33L, and 15L that are located within their respective RSAs and ROFAs and are proposed for relocation, as shown on the February 2011 ALP. In addition, a new roadway segment is proposed south of the Runway 10 end. The proposed roadway segments have been designed in accordance with previous MAA roadway studies (*Perimeter Road Study*, PB [June 2002] and *Perimeter Road Study Addendum – Northwest Quadrant*, PB [May 2004]) (see **Appendix D**).

2.3.1 RUNWAY 15R END

A portion of the existing perimeter roadway (with both paved and gravel portions ranging in width from 12 to 24 feet) around the Runway 15R end goes through the ROFA. The perimeter roadway would be designed to allow traffic to travel around the runway end, and along the western side of the runway in the

area of Kitten Branch, without penetrating the RSA, ROFA, localizer critical area, and Glide Slope Critical Area, as defined by current FAA design standards. The roadway would be a paved 24-foot wide road with 4foot shoulders, except where the road would cross Kitten Branch. At the location of the Kitten Branch crossing, the road would be 20 feet wide with no shoulders. As the road travels around the runway end to the west, several alternatives are presented in accordance with the proposed Glide Slope alternatives. Therefore, the alternative selected for the Runway 15R Glide Slope dictates the Perimeter Roadway configuration in this area and impacts presented for the Glide Slope alternatives are inclusive of all impacts attributed to the Perimeter Roadway configuration as shown on **Exhibits 2.2-3** and **2.2-4**. Each of the three Build Alternatives includes the same 200-foot long retaining wall to allow the perimeter roadway to remain on MAA-property while traversing the proposed culvert options.

2.3.1.1 Build Alternative 1

For Runway 15R Glide Slope Build Alternative 1 where a 200-foot long retaining wall is proposed for the perimeter roadway with an additional 275-foot long retaining wall at the base of the glide slope grading plane as well as a 575-foot long culvert that the proposed perimeter service roadway would cross over.

The impacts for the relocated Glide Slope and proposed perimeter roadway are not separated by project as these projects would be designed and built within the same time period and geography. The proposed roadway segment that is the same under all three alternatives does not have additional potential environmental impacts.

2.3.1.2 Build Alternative 2

The Runway 15R Glide Slope Build Alternative 2 includes the same 200-foot retaining wall as in Build Alternative 2 as well as a temporary stream diversion of Kitten Branch prior to placing the stream in a 850-foot long culvert. The perimeter roadway would traverse Kitten Branch on top of the proposed culvert.

The impacts for the relocated Glide Slope and proposed perimeter roadway are not separated by project as these projects would be designed and built within the same time period and geography. The proposed roadway segment that is the same under all three alternatives does not have additional potential environmental impacts.

This alternative is the Sponsor's Preferred Alternative as it includes a straight culvert and would allow for the proposed perimeter roadway to remain on MAA property.

2.3.1.3 Build Alternative 3

The Runway 15R Glide Slope Build Alternative 3 includes the same 200-foot retaining wall as in Build Alternatives 1 and 2 as well as placing a segment of Kitten Branch in a 875-foot long culvert. The perimeter roadway would traverse Kitten Branch on top of the proposed culvert.

The impacts for the relocated Glide Slope and proposed perimeter roadway are not separated by project as these projects would be designed and built within the same time period and geography. The proposed roadway segment that is the same under all three alternatives does not have additional potential environmental impacts.

2.3.1.4 No Build Alternative

The No Build Alternative would not meet the purpose and need for maintaining a perimeter roadway around the Runway 15R end that is outside the ROFA, RSA, and NAVAID critical areas.

2.3.1.5 Alternatives Comparison

Advantages and disadvantages for the perimeter roadway improvements are not provided, as the roadway configuration chosen coincides with the Glide Slope alternative selected, and does not have additional stand-alone environmental impacts. The impacts for the relocated Glide Slope and proposed perimeter roadway are not separated by project as these projects would be designed and built within the same time period and geography.

2.3.2 RUNWAY 33L END

There is an existing perimeter service roadway (gravel, approximately eight feet wide) located on the Runway 33L end that has segments located within the ROFA as well as the RSA. FAA design standards dictate that perimeter roadways be located outside of these restricted areas (FAA AC 150/5300-13, Change 17). Under this Build Alternative, the existing roadway would be relocated outside the RSA and ROFA. In addition, the roadway would be located to the east of a proposed Runway 33L end hold pad discussed previously.

The perimeter road would be installed to allow traffic to circulate around the runway end and proposed relocated and expanded hold pad without penetrating the RSA, ROFA, and Glide Slope Critical Area. With any of the Build Alternatives, the perimeter roadway joins an existing roadway segment northwest of the Runway 33L end and travels southeast around an existing Airport Surface Detection Equipment Model X (ASDE-X) location and around the Runway 33L end. A connected action for this portion of the roadway segment includes relocation of the existing perimeter security fence. The alternatives discussed below vary in the ways by which the proposed roadway would traverse Fork Branch northeast of the Runway 33L end. As the road travels around the proposed hold pad on the east side of the Runway 33L end, several alternatives are presented in accordance with the proposed hold pad alternatives. Therefore, the alternative selected for the Runway 33L hold pad would dictate the Perimeter Roadway configuration in this area and impacts presented for the hold pad alternatives are inclusive of all impacts attributed to the Perimeter Roadway configuration.

2.3.2.1 Build Alternative 1

The roadway segment proposed under Build Alternative 1 would go over a proposed culvert containing a portion of Fork Branch around the proposed hold pad and then would bridge Fork Branch at the end of the runway (see **Exhibit 2.2-1**).

The proposed environmental impacts are directly associated with the Taxiway D / Runway 33L hold pad reconfiguration and are not separated into roadway and taxiway impacts. The proposed roadway segment that is the same under all the alternatives does not have additional potential environmental impacts. The potential environmental impacts are discussed in detail in **Section 4**.

This alternative is the Sponsor's Preferred Alternative as it includes a culvert to allow Fork Branch to go under the proposed Taxiway D hold pad with a majority of the culvert not being located beneath the proposed hold pad pavement so as to not have an excess aircraft load on the proposed culvert.

2.3.2.2 Build Alternative 2

As a variation to Build Alternative 1, this alternative would also place Fork Branch in a culvert; however, the culvert would go around the edge of the proposed hold pad so that no portions of the culvert are located underneath existing or proposed airfield pavement (see **Exhibit 2.2-2**).

The proposed environmental impacts are directly associated with the Taxiway D / Runway 33L hold pad reconfiguration and are not separated into roadway and taxiway impacts. The proposed roadway segment that is the same under all the alternatives does not have additional potential environmental impacts. The potential environmental impacts are discussed in detail in **Section 4**.

2.3.2.3 No Build Alternative

The No Build Alternative would not meet the purpose and need for providing a perimeter roadway around the Runway 33L end that is outside the ROFA, RSA, and NAVAID critical areas.

2.3.2.4 Alternatives Comparison

Advantages and disadvantages for the perimeter roadway improvements are not provided, as the roadway configuration is dependent on the Runway 33L hold pad alternative selected.

2.3.3 RUNWAY 15L END

There is an existing perimeter service roadway (paved, approximately 22 feet wide) located on the Runway 15L end that has segments located within the ROFA as well as the RSA. FAA design standards

dictate that perimeter roadways be located outside of these restricted areas (FAA AC 150/5300-13, Change 17). Under this Build Alternative, the existing roadway would be relocated outside the RSA and ROFA. In addition, the roadway would be located to the north of the proposed Runway 33R localizer and associated localizer critical area discussed previously.

2.3.3.1 Build Alternative

The alignment for the proposed roadway segment is north of the proposed Runway 33R localizer and associated localizer critical area discussed previously. The existing roadway segments would be demolished as a part of this project.

There are no potential environmental impacts associated with this alternative other than temporary ground disturbance for construction and grading purposes. No impacts to wetlands or forests are anticipated.

2.3.3.2 No Build Alternative

The No Build Alternative would not meet the purpose and need for providing a perimeter roadway around the Runway 15L end that is outside the ROFA, RSA, and NAVAID critical areas.

2.3.4 RUNWAY 10 END

There is currently no existing perimeter roadway south of the Runway 10 end connecting to the Midfield Air Cargo Apron. Due to the lack of a roadway, the vehicles travelling from the Midfield Air Cargo Apron to the Runway 10 end have created vehicle tracks (approximately six to eight inches deep) and areas of ponding within the RSA. To alleviate this condition and prevent further ponding and ruts within the RSA, a perimeter roadway segment is proposed.

2.3.4.1 Build Alternative

The alignment for the proposed roadway segment is north of an existing forest area and joins an existing roadway segment in the Midfield Air Cargo Apron (see **Exhibit 2.3-1**). A connected action to this proposed roadway is the relocation of a portion of the Midfield Air Cargo Apron security fence and/or the construction of a security access gate.

There are no potential environmental impacts associated with this alternative other than temporary ground disturbance for construction and grading purposes. No impacts to wetlands or forests are anticipated.

2.3.4.2 No Build Alternative

The No Build Alternative would not meet the purpose and need for providing a perimeter roadway segment between the Runway 10 end the Midfield Air Cargo Apron.

2.4 RUNWAY 4-22 IMPROVEMENTS – CONVERSION TO A TAXIWAY

In accordance with the *BWI Marshall Master Plan* (2010), it was determined that Runway 4-22 could be converted to a Group V taxiway to serve the other commercial service runways at BWI Marshall (see **Section 1.1.3**). The conversion of Runway 4-22 to a taxiway would not result in unacceptable delays and would enhance the taxiway system and increase the capacity of the airfield.

2.4.1 BUILD ALTERNATIVE

The Build Alternative consists of removing 2.5 feet of pavement from either side of the existing 150-foot runway for conversion to a 75-foot taxiway with 35-foot shoulders (145 feet total width) (see **Exhibit 2.4-1**). Pavement removal for this Build Alternative also includes existing pavement between Runways 15R-33L and 10-28 and between Runway 10-28 and Taxiway P. At the Runway 22 end, pavement removal includes removal to either side of the proposed taxiway, a small amount of removal to the parallel Taxiway P (to make it 75 feet wide), as well as additional removal to the pavement adjacent to the infield areas between the two taxiways (P and converted Runway 4-22 taxiway). To eliminate another potential incursion site, the acute angled taxiway connector P1, has also been removed. The pavement removal proposed as a part of this Build Alternative totals approximately 4.8 acres.

The new taxiway alignment would transition into existing Taxiway P and have a new taxiway connector (with a 90 degree intersection angle) into Runway 10-28 in order to comply with Engineering Brief No. 75 (refer back to **Section 2.2.10**). Taxiway alignment between Runways 15R-33L and 10-28 would be replaced with two taxiway connectors branching out from existing Taxiway D and intersecting each runway at the recommended angle of 90 degrees. Pavement prior to intersection with Runway 15R-33L would be utilized for overnight aircraft (Remain Overnight [RON]) storage. New taxiway markings would also be required to complete the conversion.

There are no potential environmental impacts associated with this alternative other than temporary ground disturbance for construction and grading purposes. No impacts to wetlands or forests are anticipated.

2.4.2 NO BUILD ALTERNATIVE

Under the No Build Alternative, Runway 4-22 would remain a runway and would not meet the purpose and need for providing another taxiway to serve other commercial runways at BWI Marshall.

The No Build Alternative would not meet the purpose and need for the project.

2.5 TERMINAL EXIT ROADWAY IMPROVEMENTS

As currently configured, the I-195 and terminal exit roadway intersection does not provide acceptable merging space or signage to allow for safe and efficient exiting from the terminal.

2.5.1 BUILD ALTERNATIVE

As outlined in the *Feasibility Study for Arrivals Level Exit Road Improvements at BWI* (January 2007) there are current traffic flow issues that could be alleviated if the exit level ramp were widened to two lanes. The proposed widening of the terminal exit roadway would provide increased areas for merging, as well as new signage to allow for a smoother traffic flow for egress from the terminal (see **Exhibit 2.5-1**).

There are no potential environmental impacts associated with this alternative other than temporary ground disturbance for construction and grading purposes. No impacts to wetlands or forests are anticipated.

2.5.2 NO BUILD ALTERNATIVE

If the proposed exit widening of I-195 does not occur, the existing traffic operation and congestion would remain. The stated purpose and need of alleviating traffic congestion would not be met.

2.6 CENTRAL UTILITY PLANT IMPROVEMENTS

The existing Central Utility Plant building at BWI Marshall is located to the northwest of the hourly parking garage and is approximately 18,800 square feet in size (see **Exhibit 2.5-1**). The Central Utility Plant at BWI Marshall provides a central storage area for the airport terminal's HVAC utilities. MAA studies indicate that additional floors (vertically) may be required for office space within the terminal footprint.

2.6.1 BUILD ALTERNATIVE

Under the Build Alternative, the Central Utility Plant would be expanded approximately 6,000 square feet to accommodate future HVAC needs for vertical expansion of the terminal. The existing facility was recently upgraded with more energy-efficient equipment and it is ideally located to provide the additional HVAC services.

There are no potential environmental impacts associated with this alternative other than temporary ground disturbance for construction and grading purposes.

2.6.2 NO BUILD ALTERNATIVE

Under the No Build Alternative, the existing Central Utility Plant would not be expanded and would not accommodate future HVAC needs for vertical expansion of the terminal. The No Build Alternative would not meet the purpose and need for the project.

2.7 AIRFIELD PAVEMENT MANAGEMENT IMPROVEMENTS

The purpose of the proposed airfield pavement improvements is to repair aged and failing pavements as well as improving current taxiway geometries to lessen the likelihood of future aircraft incursions and bringing existing taxiways into conformance with FAA standards. In several areas of the airfield, pavements are deteriorating, in poor condition, and have exceeded their useful life. By rehabilitating the recommended areas, the MAA would restore the pavements load-carrying capacity and decrease the opportunity for Foreign Object Debris (FOD) as well as avoid possible future pavement failures (in the case of Runway 15R-33L).

As a result of recommendations within the *Airside Pavement Management Program Volume I FINAL Report* (All About Pavements, Inc., September 2008 [revised January 2011]) and the Task 2365 Runway 15R-33L and 10-28 Pavement Evaluation, a plan recommending multiple areas of pavement rehabilitation has been developed and included within the planned near-term improvement projects.

2.7.1 BUILD ALTERNATIVE

The Build Alternative would result in the rehabilitation of multiple areas of pavement, as depicted in **Exhibit 2.7-1.** Existing Runway 4-22 would be rehabilitated under a separate project prior to its conversion to a taxiway.

In addition to the proposed pavement rehabilitation areas, the Build Alternative would also include the expansion of the roadway located in between the ARFF facility and Taxiway E (see **Exhibit 2.7-1**) and new 35-foot wide shoulders on Runway 15R-33L. These proposed additions account for approximately nine acres of new impervious surface. Also, grading within the existing and proposed Taxiway Safety Areas would be graded, as appropriate, to meet FAA design standards (FAA AC 150/5300-13).

There are potential environmental impacts associated with creating additional impervious surfaces under this alternative as well as temporary impacts for ground disturbance for construction and grading purposes.

2.7.2 NO BUILD ALTERNATIVE

The No Build Alternative means that no pavement rehabilitation and/or fillet widening improvements would be undertaken at BWI Marshall, regardless of future pavement condition. Also, taxiway/taxiway or taxiway/runway connector improvements would also be eliminated.

The No Build Alternative would not meet the purpose and need for the project.

2.8 COMPLIANCE WITH RUNWAY PROTECTION ZONE REQUIREMENTS

As discussed in **Section 1.1.8**, there are several properties not owned by the MAA that are located within the RPZ of existing runways (see **Exhibit 2.8-1)**. As such, these property interests need to be acquired.

2.8.1 RUNWAY 15R END

2.8.1.1 Build Alternative

As shown on **Exhibit 2.8-1**, this alternative involves the threshold displacement of 300 feet as discussed in **Section 2.1.1** for the proposed Runway 15R safety area improvements. This displacement would require the acquisition of sufficient property interests in areas of non-MAA owned property within the RPZ to Runway 15R, totaling 3.3 acres.

The Runway 15R RPZ for this alternative contains three parcels within the controlled activity area, all of which contain automobile parking, requiring acquisition of avigation easements. A fourth parcel, currently owned by MAA and leased for flight kitchen activities, is also located within the controlled activity area. FAA AC/150-5300-13 states that automobile parking lots may be permitted within a RPZ if they are located outside of the central portion. Since these automobile parking lots are located outside of the central portion of the RPZ, it is assumed that they can remain in use if the Airport acquires avigation easements in these areas.

The portion of the Flight Kitchen located within the RPZ would need to be demolished. The loss of space demolished within the RPZ would be replaced on the east side of the existing structure.

There are no potential environmental impacts associated with this alternative other than temporary ground disturbance for construction purposes.

2.8.1.2 No Build Alternative

With the implementation of the No Build Alternative, the MAA would not gain control of their Runway 15R end RPZ and non-compatible land uses would remain in the RPZ and would not meet current FAA design standards. The No Build Alternative would not meet the purpose and need for the project.

2.8.2 RUNWAY 33L END

2.8.2.1 Build Alternative

This Build Alternative, which is also depicted on **Exhibit 2.8-1**, involves a threshold displacement of 500 feet as discussed in **Section 2.1.1** for the proposed Runway 33L safety area improvements. This displacement would require the acquisition of an avigation easement in one area of non-airport owned property located within the former Arundel Manor subdivision, along the southwest edge of the RPZ to Runway 33L, totaling approximately 0.1 acres.

There are no potential environmental impacts associated with this alternative.

2.8.2.2 No Build Alternative

With the implementation of the No Build Alternative, the MAA would not gain control of their Runway 33L end RPZ and non-compatible land uses would remain in the RPZ and would not meet current FAA design standards. The No Build Alternative would not meet the purpose and need for the project.

2.8.3 RUNWAY 10 END

2.8.3.1 Build Alternative

The Runway 10 RPZ contains one parcel requiring acquisition of property interest, located adjacent to the Aviation Boulevard and Stoney Run Road interchange. This area of land contains 8.1 acres of land that is currently undeveloped grass and forest (see **Exhibit 2.8-1**). The MAA proposes to acquire property interests in this parcel for RPZ purposes to accommodate the RSA project (see **Section 2.1**). The proposed acquisition of 8.1 acres would be negotiated with Anne Arundel County and take into consideration prior arrangements made in the 1980s when the Stoney Run Road interchange was constructed.

There are no potential environmental impacts associated with this alternative.

2.8.3.2 No Build Alternative

With the implementation of the No Build Alternative, the MAA would not gain control of their Runway 10 end RPZ and non-compatible land uses would remain in the RPZ and would not meet current FAA design standards. The No Build Alternative would not meet the purpose and need for the project.

2.9 OBSTRUCTION REMOVAL AND LINE-OF-SIGHT CLEARANCE

2.9.1 OBSTRUCTION REMOVAL

As discussed in **Section 1.1.7**, there are areas requiring man-made and vegetative obstructions to be removed to meet FAR Part 77 requirements (see **Exhibit 2.9-1)**.

2.9.1.1 Build Alternative

At BWI Marshall, those obstructions that have been identified for removal within the latest approved BWI Marshall ALP penetrate either the approach surface or the transitional surfaces to Runways 15R-33L and 10-28 (see **Exhibit 2.9-1**). As specified within the disposition column of the BWI Marshall ALP Plan and Profiles, all vegetative obstructions are proposed "to be removed". All manmade obstructions, such as fences, utility and light poles, and fencing would be lowered or moved to remain clear of the imaginary surfaces. The existing Runway 10 approach light units would remain in place, but would be lowered below the Part 77 surface elevation(s).

Potential environmental impacts to forests are anticipated with this alternative. The potential environmental impacts are discussed in detail in **Section 4**.

2.9.1.2 No Build Alternative

The No Build Alternatives would not meet the purpose and need for the project to remove all existing obstructions to Runways 10-28 and 15R-33L. If the obstructions are not removed, the FAA could increase the instrument approach minimums for the runways that continue to have obstructions and those runways would have less instrument utility.

The No Build Alternative would not meet the purpose and need for the project.

2.9.2 LINE-OF-SIGHT CLEARANCE

In order to maintain safe operations on the Runway 33L end hold pad and Taxiway D, the ATCT personnel must maintain line-of-sight to these surfaces.

2.9.2.1 Build Alternative

Under this Build Alternative, there would be 2.35 acres of trees removed northeast of the Runway 33L end to allow the ATCT to have visual line of site to the existing (and proposed) Taxiway D and hold pad pavement so that aircraft travelling in those areas would be visible at all times (see **Exhibit 2.9-1**).

Potential environmental impacts to forests are anticipated with this alternative. The potential environmental impacts discussed in detail in **Section 4**.

2.9.2.2 No Build Alternative

The line-of-sight from the existing ATCT to Taxiway D and the Runway 33L hold pad would remain obstructed under the No Build Alternative and would not meet FAA standards for having aircraft travelling in these areas to be visible by ATCT personnel at all times.

The No Build Alternative would not meet the purpose and need for the project.

2.10 SPONSOR'S PREFERRED ALTERNATIVE

The Sponsor's Preferred Alternative for each proposed project element are detailed below. For those projects with more than one Build Alternative, the preferred alternative is listed in *italics*; all other projects only have one Build Alternative studied in detail.

- Runway Safety Area Improvements
  - Runway 15R-33L – Build Alternative (300- and 500-foot threshold displacements)
  - Runway 10-28 – *Build Alternative 1 (Localizer on a 20-foot retaining wall and tower structure)*
  - Runway 15L-33R – Build Alternative (Relocate Localizers)
- FAA Design Standards
  - Runway to Taxiway Separation Deficiency – *Build Alternative 1 (Three-foot Runway 15R-33L shift and Taxiway D / Runway 33L Hold Pad reconfiguration with Fork Branch in a Culvert)*
  - Runway 15R Glide Slope Relocation – *Build Alternative 2 (Place a portion of Kitten Branch in a culvert following a temporary stream diversion)*
  - Runway 33L Glide Slope Relocation – *Build Alternative 1 (Replacement of Infiltration Trench to the north)*
  - Runway 10 Glide Slope Relocation – Build Alternative
  - Runway 28 Glide Slope Relocation – Build Alternative
  - Runway 10-28 Mid-Point RVR Relocation – Build Alternative
  - Runway 10 ALS Replacement – Build Alternative
  - Engineering Brief No. 75 Taxiway Reconfigurations – Build Alternative
- Perimeter Roadway Improvements
  - Runway 15R End – *Build Alternative 2 (Locate the roadway over the culvert proposed for the Runway 15R Glide Slope)*
  - Runway 10 End – Build Alternative
  - Runway 33L End – *Build Alternative 1 (Locate the roadway over the culvert proposed for the Runway 33L Hold Pad)*
  - Runway 15L End – Build Alternative
- Runway 4-22 Improvements – Conversion of Runway 4-22 to a Taxiway – Build Alternative
- Terminal Exit Roadway Improvements – Build Alternative
- Central Utility Plant – Build Alternative
- Airfield Pavement Management Improvements – Build Alternative

- Compliance with Runway Protection Zone Requirements
    - Runway 15R End – Build Alternative
    - Runway 33L End – Build Alternative
    - Runway 10 End – Build Alternative
- Obstruction Removal and Line-of-Sight Clearance – Build Alternative

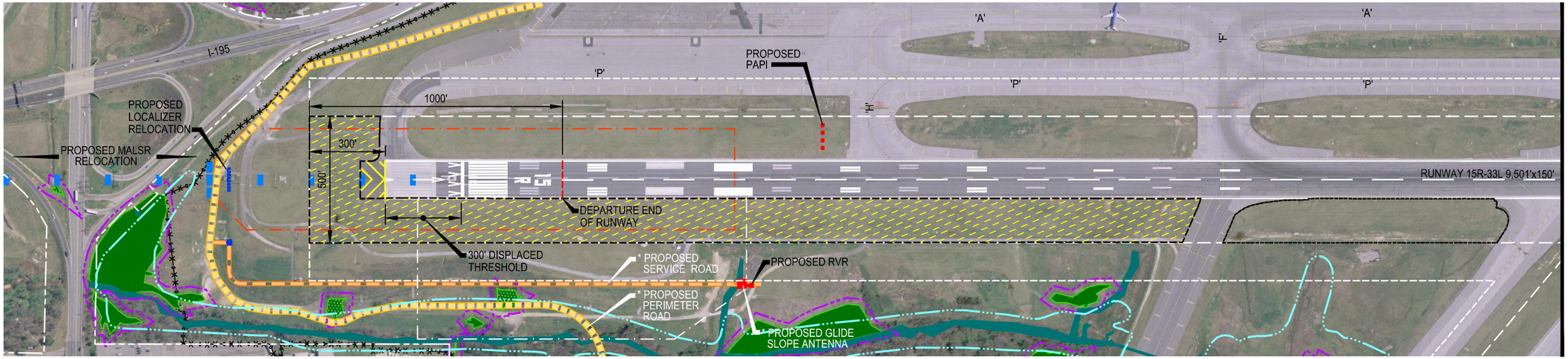
2.10.1 POTENTIAL ENVIRONMENTAL IMPACTS

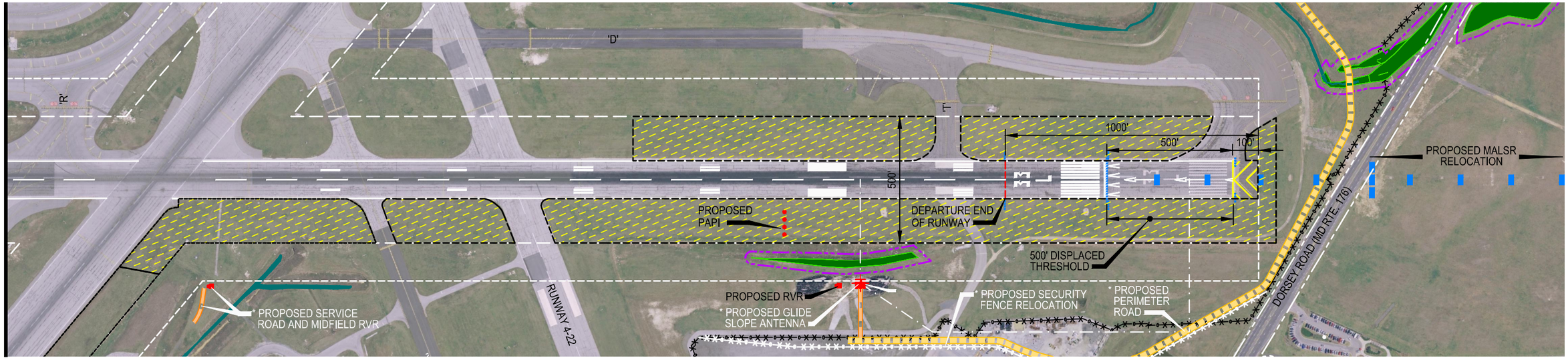
Section 4 will present a detailed assessment of the potential environmental impacts that would occur if the proposed airport improvements are implemented. **Table 2.10-1** provides a summary of the environmental consequences of the proposed preferred Build Alternatives for those categories with impacts. There are no anticipated impacts for Noise, Compatible Land Use, Environmental Justice, and Children's Environmental Health and Safety Risks, Air Quality, Farmlands, Historical, Architectural, Archaeological, and Cultural Resources, Wild and Scenic Rivers, Department of Transportation: Section 4(f) Lands, Natural Resources and Energy Supply, or Light Emissions and Visual Impacts. The No Build Alternative for all projects does not have any potential impacts.

TABLE 2.10-1
SUMMARY OF POTENTIAL IMPACTS

Alternative	Secondary (Induced) Impacts	Water Quality	Fish, Wildlife, and Plants	Wetlands	Floodplains	Coastal Resources	Hazardous Materials, Pollution, and Solid Waste	Construction Impacts	Socioeconomic Impacts
Runway 15R-33L Safety Area Build Alternative	Temporary increase in economic activity anticipated during the construction phase of the project.	50 linear feet of impact to Kitten Branch (perm.)	None	4,000 square feet (temp.) of wetland buffer impacts 900 square feet (perm.) of wetland buffer impacts	None	A Coastal Zone Consistency Determination will be requested from MDE for the proposed project as part of the JPA process.	Construction debris would be disposed of in accordance with MAA specifications. Construction within known areas of contamination would be coordinated with the MAA Office of Environmental Compliance.	Noise – none. Water Quality – none. Air Quality – none. Solid Waste – any solid waste generated would be disposed of according to MAA specifications.	None
Runway 10-28 Safety Area Build Alternative 1		60 linear feet of impact to Kitten Branch (perm.)	None	850 square feet (perm.) of wetland buffer impacts	None				None
Runway 10-28 Safety Area Build Alternative 2		60 linear feet of impact to Kitten Branch (perm.)	None	2,000 square feet (temp.) of wetland buffer impacts 1,000 square feet (perm.) of wetland buffer impacts	None				None
Runway 15L-33R Safety Area Build Alternative		None	None	None	None				None
Runway to Taxiway Separation Deficiency Build Alternative 1		300 linear feet (int.) and 350 linear feet (per.) of temporary impacts to Fork Branch 900 linear feet (int.) and 700 linear feet (per.) of permanent impacts to Fork Branch	3.50 acres of forest stand removal 0.28 acres of afforestation removal	2,400 square feet (temp.) of wetland impacts 2,600 square feet (perm.) of wetland impacts 8,100 square feet (temp.) of wetland buffer impacts 6,100 square feet (perm.) of wetland buffer impacts	None				None
Runway to Taxiway Separation Deficiency Build Alternative 2		200 linear feet (int.) and 100 linear feet (per.) of temporary impacts to Fork Branch 1,020 linear feet (int.) and 1,130 linear feet (per.) permanent impacts to Fork Branch	Same as Build Alternative 1	Same as Build Alternative 1	None				None
Runway 15R Glide Slope Relocation Build Alternative 1		400 linear feet of temporary impacts to Kitten Branch 1,200 linear feet of permanent impacts to Kitten Branch	2.16 acres of forest stand removal	275 square feet (temp.) of wetland impacts 11,228 square feet (perm.) of wetland impacts 3,400 square feet (temp.) of wetland buffer impacts 32,200 square feet (perm.) of wetland buffer impacts	53,500 square feet (temp.) or 1.22 acres 227,100 square feet (perm.) or 5.21 acres				None
Runway 15R Glide Slope Relocation Build Alternative 2		460 linear feet of temporary impacts to Kitten Branch 1,200 linear feet of permanent impacts to Kitten Branch	Same as Build Alternative 1	Same as Build Alternative 1	53,500 square feet (temp.) or 1.22 acres 232,000 square feet (perm.) or 5.33 acres				None
Runway 15R Glide Slope Relocation Build Alternative 3		350 linear feet of temporary impacts to Kitten Branch 1,300 linear feet of permanent impacts to Kitten Branch	Same as Build Alternative 1	Same as Build Alternative 1	50,800 square feet (temp.) or 1.17 acres 237,900 square feet (perm.) or 5.46 acres				None
Runway 33L Glide Slope Relocation Build Alternative 1		650 linear feet (int.) of permanent impacts to Fork Branch No perennial impacts	None	None	None				None
Runway 33L Glide Slope Relocation Build Alternative 2		Same as Build Alternative 1	None	None	None				None
Runway 10 Glide Slope Relocation Build Alternative		None	None	None	None				None
Runway 28 Glide Slope Relocation Build Alternative		None	None	None	None				None
Runway 10-28 Mid-Point RVR Relocation Build Alternative		None	None	None	None				None
Runway 10 Approach Lighting System Modification Build Alternative		None	None	None	None				None
Engineering Brief No. 75 Build Alternative		None	None	None	None				None
Runway 15R End Perimeter Roadway Build Alternatives 1, 2, and 3		See Runway 15R Glide Slope Relocation Impacts							None
Runway 33L End Perimeter Roadway Build Alternatives 1 and 2		None	None	None	None				None
Runway 15L End Perimeter Roadway Build Alternative		None	None	None	None				None
Runway 10 End Perimeter Roadway Build Alternative		None	None	None	None				None
Runway 4-22 Improvements – Conversion to a Taxiway Build Alternative		None	None	None	None				None
Terminal Exit Roadway Improvements Build Alternative		None	None	None	None				None
Central Utility Plant Improvements Build Alternative		None	None	None	None				None
Airfield Pavement Management Improvements Build Alternative		None	None	None	None				None
Runway 15R End Protection Zone Build Alternative		None	None	None	None				Avigation easement will be obtained. No land use changes would occur.
Runway 33L End Protection Zone Build Alternative		None	None	None	None				Avigation easement will be obtained. No land use changes would occur.
Runway 10 End Protection Zone Build Alternative		None	None	None	None				Parcel would be acquired. No land use changes would occur.
Obstruction Removal and Line-of-Sight Clearance Build Alternative		None	Obstruction Removal – 507 Trees Line-of-Sight Clearance – 2.35 acres of forest stand removal	315 square feet (temp.) of wetland impacts 945 square feet (temp.) of wetland buffer impacts	None				None

Temp. – Temporary; Perm. Permanent; Int. – Intermittent ; Per. - Perennial





LEGEND:

- AIRPORT PROPERTY LINE
- SECURITY FENCE
- RUNWAY SAFETY AREA (RSA)
- RUNWAY OBJECT FREE AREA (ROFA)
- GLIDE SLOPE ANTENNA
- GLIDE SLOPE CRITICAL AREA
- LOCALIZER ANTENNA
- LOCALIZER CRITICAL AREA
- PAPI (4 BOX)
- PERIMETER ROAD IMPROVEMENTS
- SERVICE ROAD IMPROVEMENTS
- JURISDICTIONAL STORM WATER MANAGEMENT POND WITH 25' BUFFER
- WATERS OF THE U.S.
- WETLANDS WITH 25' BUFFER
- ISOLATED WETLANDS WITH 25' BUFFER
- FLOODPLAIN BOUNDARY

RSA LEGEND:

- RUNWAY SAFETY AREA GRADING DEFICIENCIES

* DENOTES PROJECTS UNRELATED TO THE PROPOSED ALTERNATIVE

200 0 200 400
SCALE IN FEET

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment for Proposed Airport Improvements

RUNWAY 15R-33L SAFETY AREA BUILD ALTERNATIVE

URS AVIATION

Scale: AS SHOWN

Exhibit: 2.1-1

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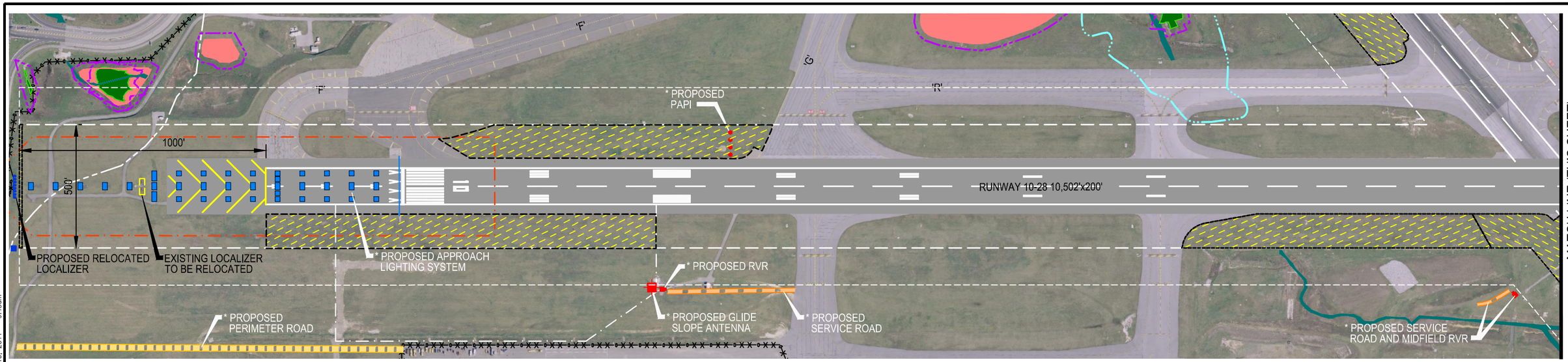

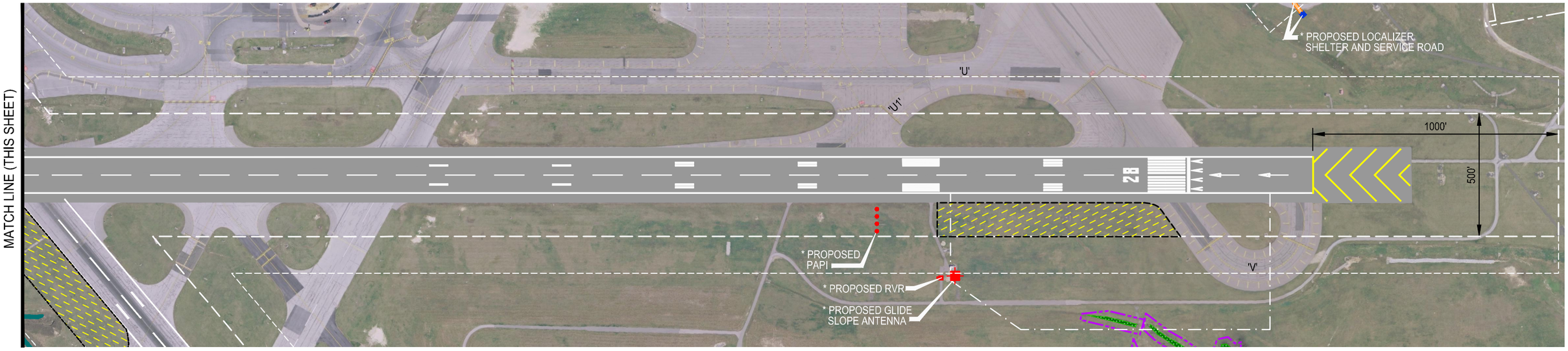

LEGEND:

- AIRPORT PROPERTY LINE
- SECURITY FENCE
- RUNWAY SAFETY AREA (RSA)
- RUNWAY OBJECT FREE AREA (ROFA)
- GLIDE SLOPE ANTENNA
- GLIDE SLOPE CRITICAL AREA
- LOCALIZER ANTENNA
- LOCALIZER CRITICAL AREA
- PAPI (4 BOX)
- PERIMETER ROAD IMPROVEMENTS
- SERVICE ROAD IMPROVEMENTS
- JURISDICTIONAL STORM WATER MANAGEMENT POND WITH 25' BUFFER
- WATERS OF THE U.S.
- WETLANDS WITH 25' BUFFER
- ISOLATED WETLANDS WITH 25' BUFFER
- FLOODPLAIN BOUNDARY

RSA LEGEND:

- RUNWAY SAFETY AREA GRADING DEFICIENCIES

* DENOTES PROJECTS UNRELATED TO THE PROPOSED ALTERNATIVE

200 0 200 400
SCALE IN FEET

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment for Proposed Airport Improvements

RUNWAY 10-28 SAFETY AREA BUILD ALTERNATIVE

URS AVIATION

Scale: AS SHOWN

Exhibit: 2.1-2

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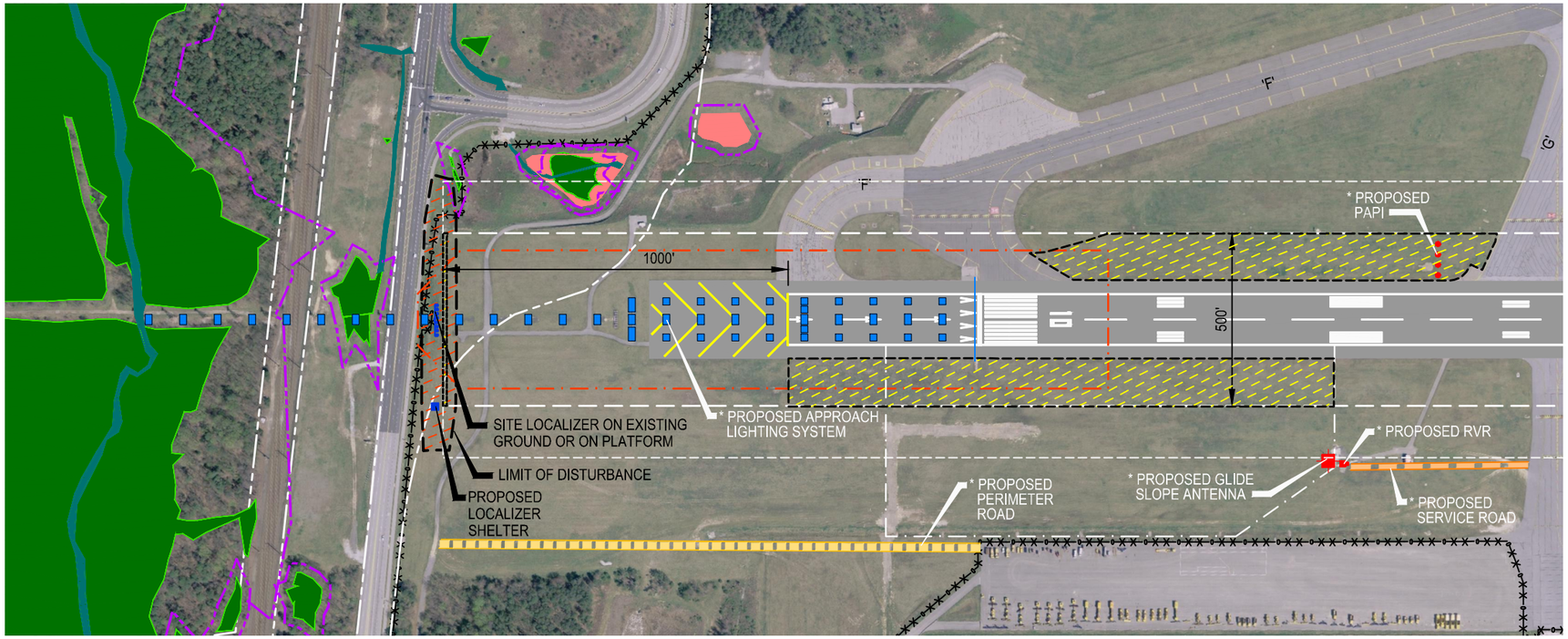
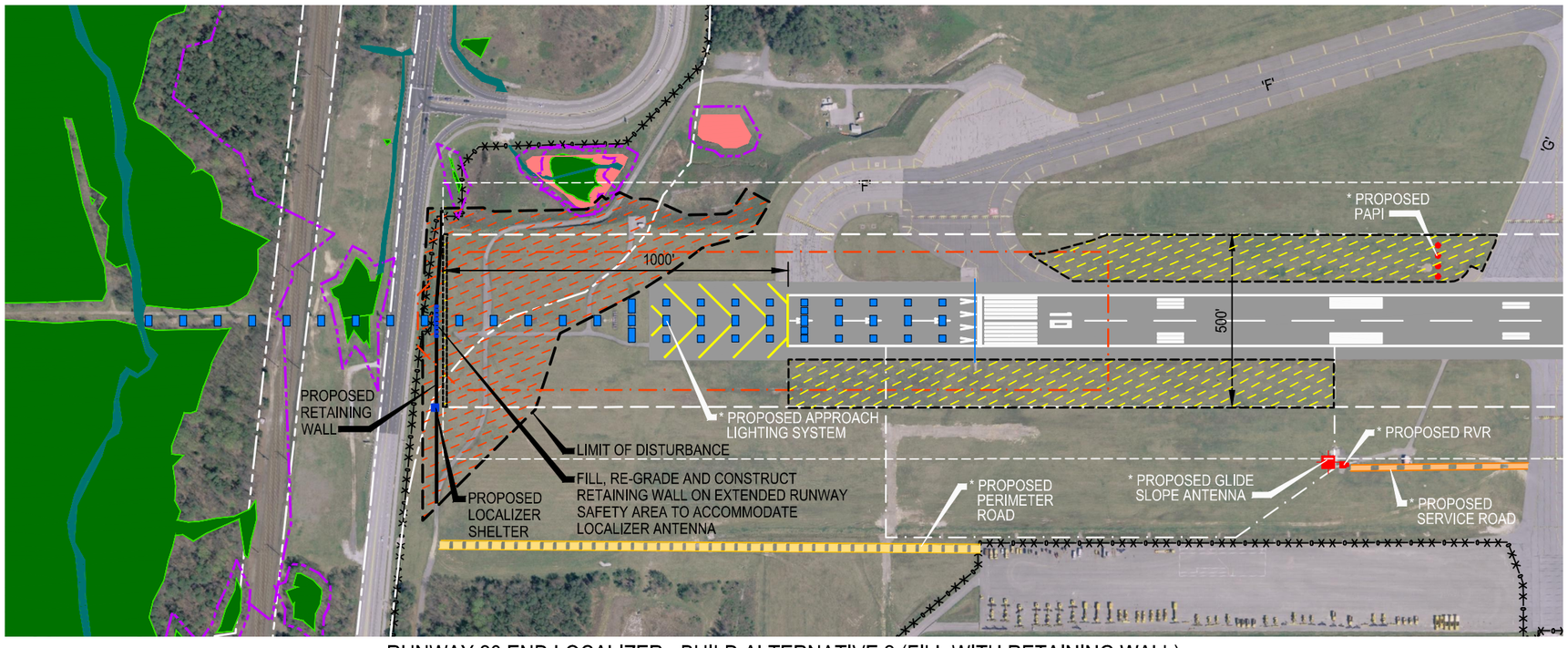


RUNWAY 28 END LOCALIZER - BUILD ALTERNATIVE 1 (PLATFORM)



RUNWAY 28 END LOCALIZER - BUILD ALTERNATIVE 2 (FILL WITH RETAINING WALL)

LEGEND:

- AIRPORT PROPERTY LINE
- SECURITY FENCE
- RUNWAY SAFETY AREA (RSA)
- RUNWAY OBJECT FREE AREA (ROFA)
- GLIDE SLOPE ANTENNA
- GLIDE SLOPE CRITICAL AREA
- LOCALIZER ANTENNA
- LOCALIZER CRITICAL AREA
- PAPI (4 BOX)
- PERIMETER ROAD IMPROVEMENTS
- SERVICE ROAD IMPROVEMENTS
- JURISDICTIONAL STORM WATER MANAGEMENT POND WITH 25' BUFFER
- WATERS OF THE U.S.
- WETLANDS WITH 25' BUFFER
- ISOLATED WETLANDS WITH 25' BUFFER
- FLOODPLAIN BOUNDARY

RSA LEGEND:

- RUNWAY SAFETY AREA GRADING DEFICIENCIES
- LIMIT OF DISTURBANCE FOR LOCALIZER ALTERNATIVES

* DENOTES PROJECTS UNRELATED TO THE PROPOSED ALTERNATIVE

NOTE: SEE EXHIBIT 2.1-4 FOR LOCALIZER ALTERNATIVE PROFILES

200 0 200 400
SCALE IN FEET

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment for Proposed Airport Improvements

RUNWAY 28 LOCALIZER BUILD ALTERNATIVES

URS AVIATION

Scale: AS SHOWN

Exhibit: 2.1-3

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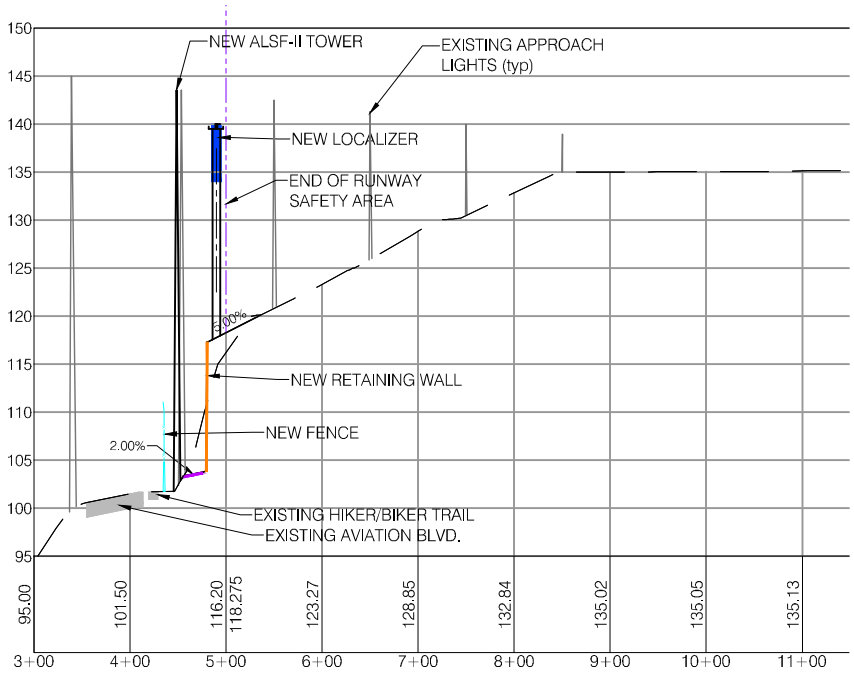
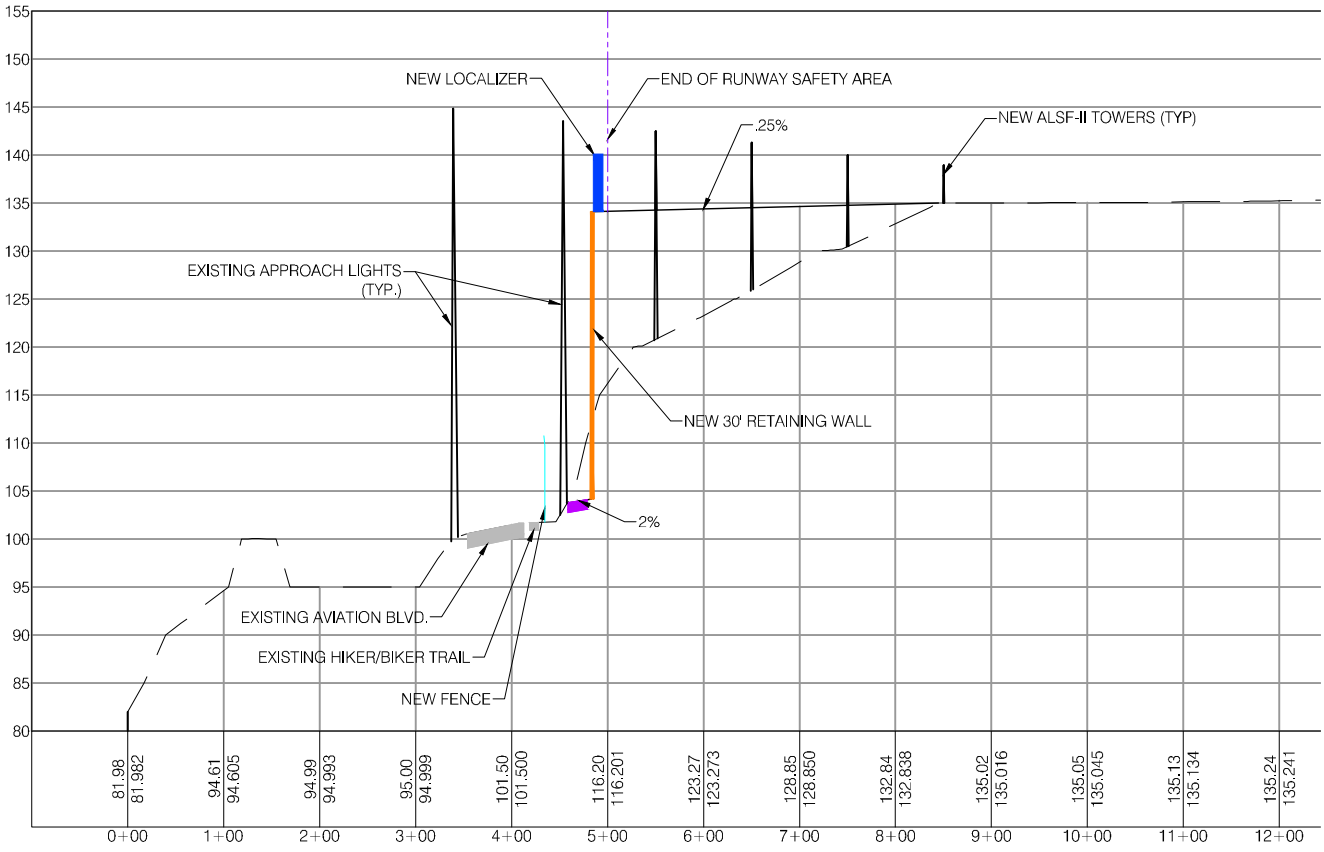


ALTERNATIVE 1 PROFILE

RW 10 SAFETY AREA WITH LOCALIZER ELEVATED TO
MEET LINE OF SIGHT FOR RW 28 THRESHOLD CROSSING HEIGHT



ALTERNATIVE 2 PROFILE

RW 10 SAFETY AREA
WITH LOCALIZER ON 30 FOOT RETAINING WALL

PROFILE SCALE
HOR: 1"=200'
VER: 1"=20'

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment
for Proposed Airport Improvements

RUNWAY 28 LOCALIZER PROFILES

URS AVIATION

Scale: AS SHOWN

Exhibit: 2.1-4

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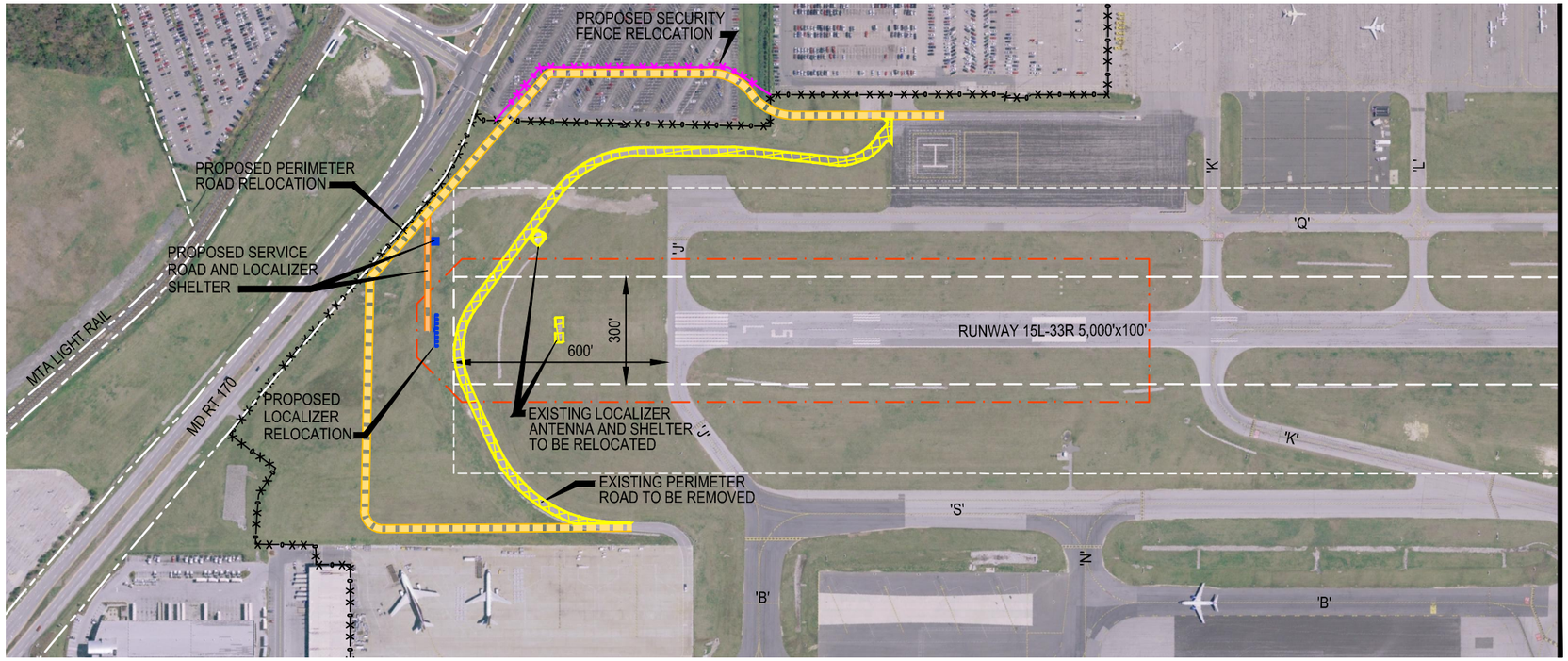
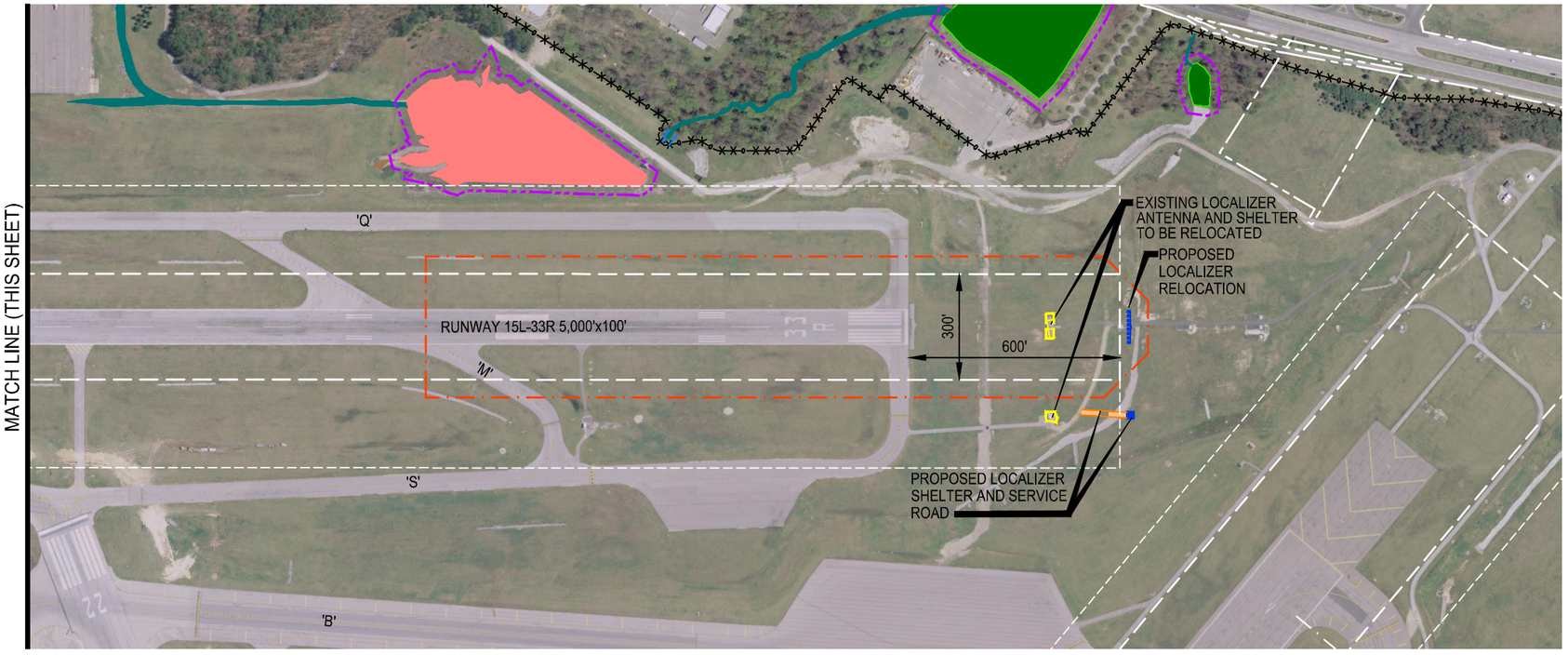


MATCH LINE (THIS SHEET)

RUNWAY 15L END MODIFICATIONS



MATCH LINE (THIS SHEET)

RUNWAY 33R END MODIFICATIONS

LEGEND:

- AIRPORT PROPERTY LINE
- SECURITY FENCE
- RUNWAY SAFETY AREA (RSA)
- RUNWAY OBJECT FREE AREA (ROFA)
- GLIDE SLOPE ANTENNA
- GLIDE SLOPE CRITICAL AREA
- LOCALIZER ANTENNA
- LOCALIZER CRITICAL AREA
- PAPI (4 BOX)
- PERIMETER ROAD IMPROVEMENTS
- SERVICE ROAD IMPROVEMENTS
- JURISDICTIONAL STORM WATER MANAGEMENT POND WITH 25' BUFFER
- WATERS OF THE U.S.
- WETLANDS WITH 25' BUFFER
- ISOLATED WETLANDS WITH 25' BUFFER
- FLOODPLAIN BOUNDARY

200 0 200 400
SCALE IN FEET

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment
for Proposed Airport Improvements

RUNWAY 15L-33R SAFETY AREA
BUILD ALTERNATIVE

URS AVIATION

Scale: AS SHOWN

Exhibit: 2.1-5

FILE NAME: P:\20834876-\20834879\CAD\ENVIRON\ALP EXHIBITS (FEB 2011)\BWI EA 15L-33R-RSA.dwg LAYOUT NAME: BWI EA 2.1-5 REVISED 10-19-11 USER: kenneth_brozeau PLOTTED: Wednesday, October 19, 2011 - 2:36pm

FORK BRANCH INTERMITTENT STREAM

FORK BRANCH PERRENIAL STREAM

* LINE-OF-SIGHT TREE REMOVAL

PROPOSED CULVERT

'D'

1000'

600'

* PROPOSED BRIDGE

* PROPOSED MALSR RELOCATION

500'

33L

15R

* PROPOSED PAPI

* DEPARTURE END OF RUNWAY

FORK BRANCH TRIBUTARY

* 500' DISPLACED THRESHOLD

* PROPOSED RVR

* PROPOSED GLIDE SLOPE ANTENNA AND SERVICE ROAD

* PROPOSED SECURITY FENCE RELOCATION

* PROPOSED PERIMETER ROAD

DORSEY ROAD (MD RTE. 176)

LEGEND:

- AIRPORT PROPERTY LINE
- SECURITY FENCE
- RUNWAY SAFETY AREA (RSA)
- RUNWAY OBJECT FREE AREA (ROFA)
- GLIDE SLOPE ANTENNA
- GLIDE SLOPE CRITICAL AREA
- LOCALIZER ANTENNA
- LOCALIZER CRITICAL AREA
- PAPI (4 BOX)
- JURISDICTIONAL STORM WATER MANAGEMENT POND WITH 25' BUFFER
- WATERS OF THE U.S.
- WETLANDS WITH 25' BUFFER
- ISOLATED WETLANDS WITH 25' BUFFER
- FLOODPLAIN BOUNDARY

AIRFIELD PAVMENT LEGEND:

- NEW AIRSIDE PAVEMENT
- PAVEMENT REMOVAL
- PAVEMENT CONVERSION TO SHOULDER

PERIMETER ROAD ALTERNATIVES LEGEND:

- PERIMETER ROAD IMPROVEMENTS
- SERVICE ROAD IMPROVEMENTS

* DENOTES PROJECTS UNRELATED TO THE PROPOSED ALTERNATIVE

200 0 200 400
SCALE IN FEET

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment for Proposed Airport Improvements

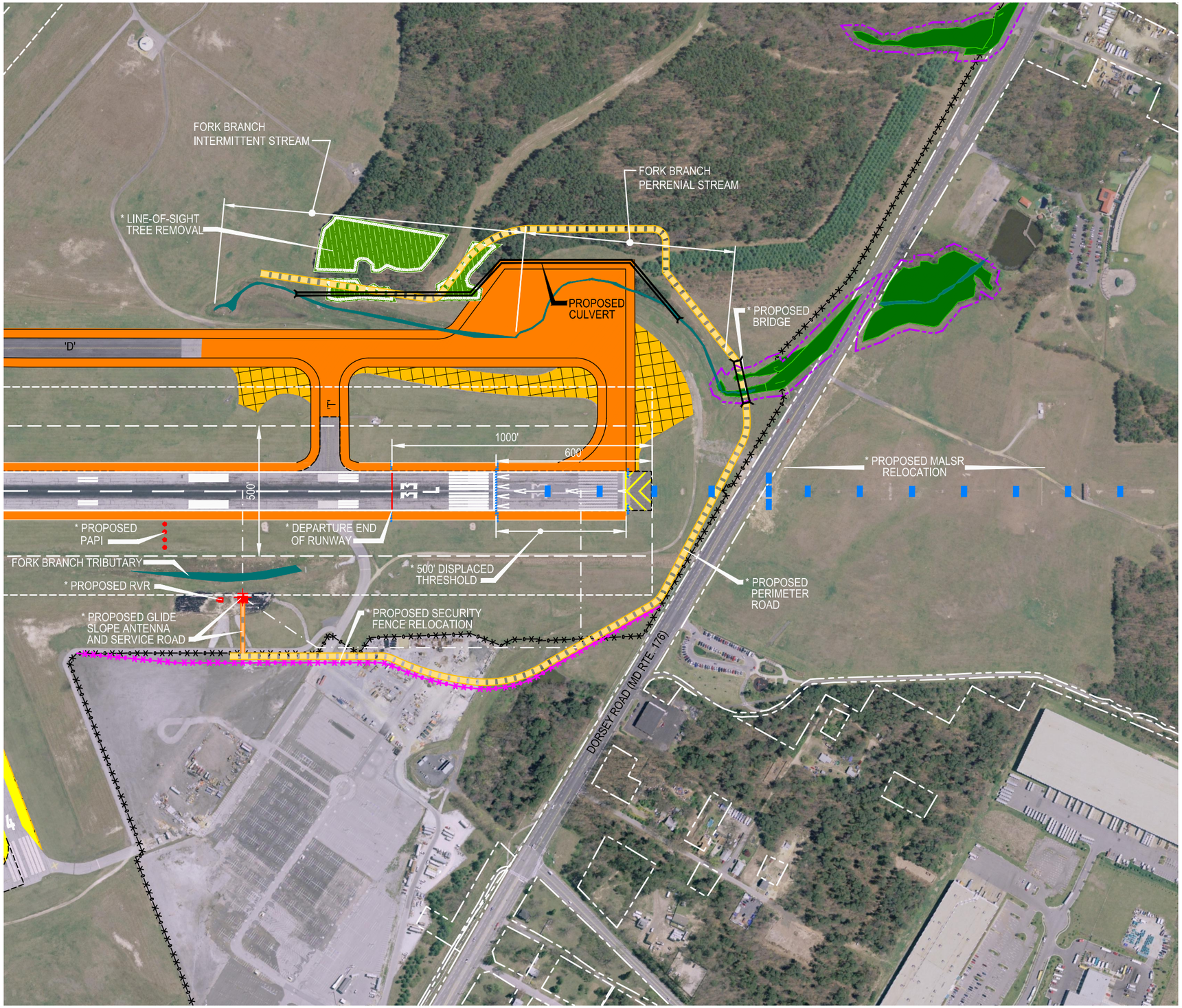
TAXIWAY D AND HOLD PAD BUILD ALTERNATIVE 1

URS AVIATION

Scale: AS SHOWN

Exhibit: 2.2-1

FILE NAME: P:\20834876-\20834879\CAD\ENVIRON\ALP EXHIBITS (FEB 2011)\BWI EA 33L-END PERIMETER ROAD.dwg LAYOUT NAME: BWI EA 2.2-1 USER: kenneth.brazeau PLOTTED: Friday, February 24, 2012 - 1:24pm



LEGEND:

- AIRPORT PROPERTY LINE
- SECURITY FENCE
- RUNWAY SAFETY AREA (RSA)
- RUNWAY OBJECT FREE AREA (ROFA)
- GLIDE SLOPE ANTENNA
- GLIDE SLOPE CRITICAL AREA
- LOCALIZER ANTENNA
- LOCALIZER CRITICAL AREA
- PAPI (4 BOX)
- JURISDICTIONAL STORM WATER MANAGEMENT POND WITH 25' BUFFER
- WATERS OF THE U.S.
- WETLANDS WITH 25' BUFFER
- ISOLATED WETLANDS WITH 25' BUFFER
- FLOODPLAIN BOUNDARY

AIRFIELD PAVMENT LEGEND:

- NEW AIRSIDE PAVEMENT
- PAVEMENT REMOVAL
- PAVEMENT CONVERSION TO SHOULDER

PERIMETER ROAD ALTERNATIVES LEGEND:

- PERIMETER ROAD IMPROVEMENTS
- SERVICE ROAD IMPROVEMENTS

* DENOTES PROJECTS UNRELATED TO THE PROPOSED ALTERNATIVE

200 0 200 400
SCALE IN FEET

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment
for Proposed Airport Improvements

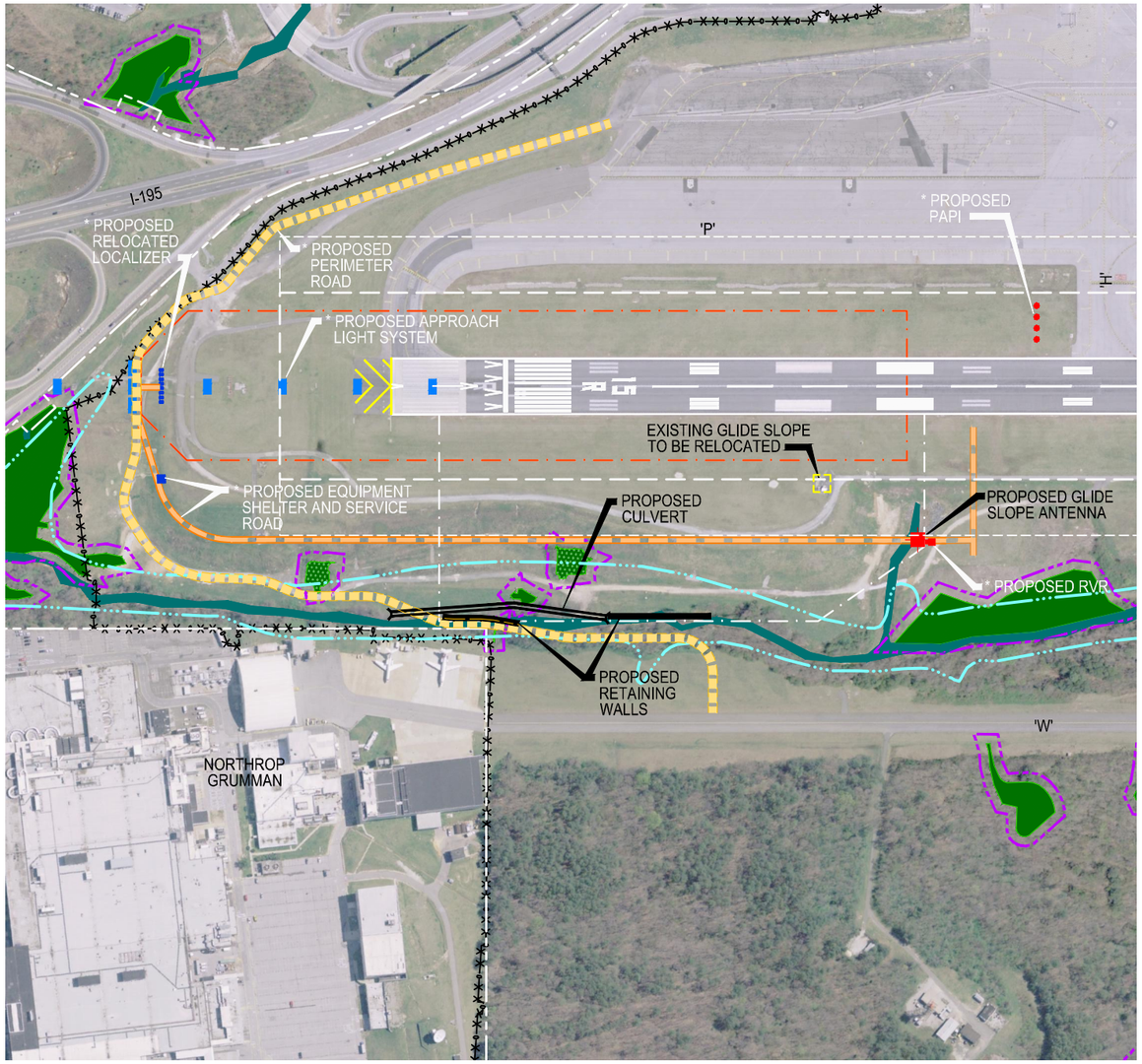
TAXIWAY D AND HOLD PAD
BUILD ALTERNATIVE 2

URS AVIATION

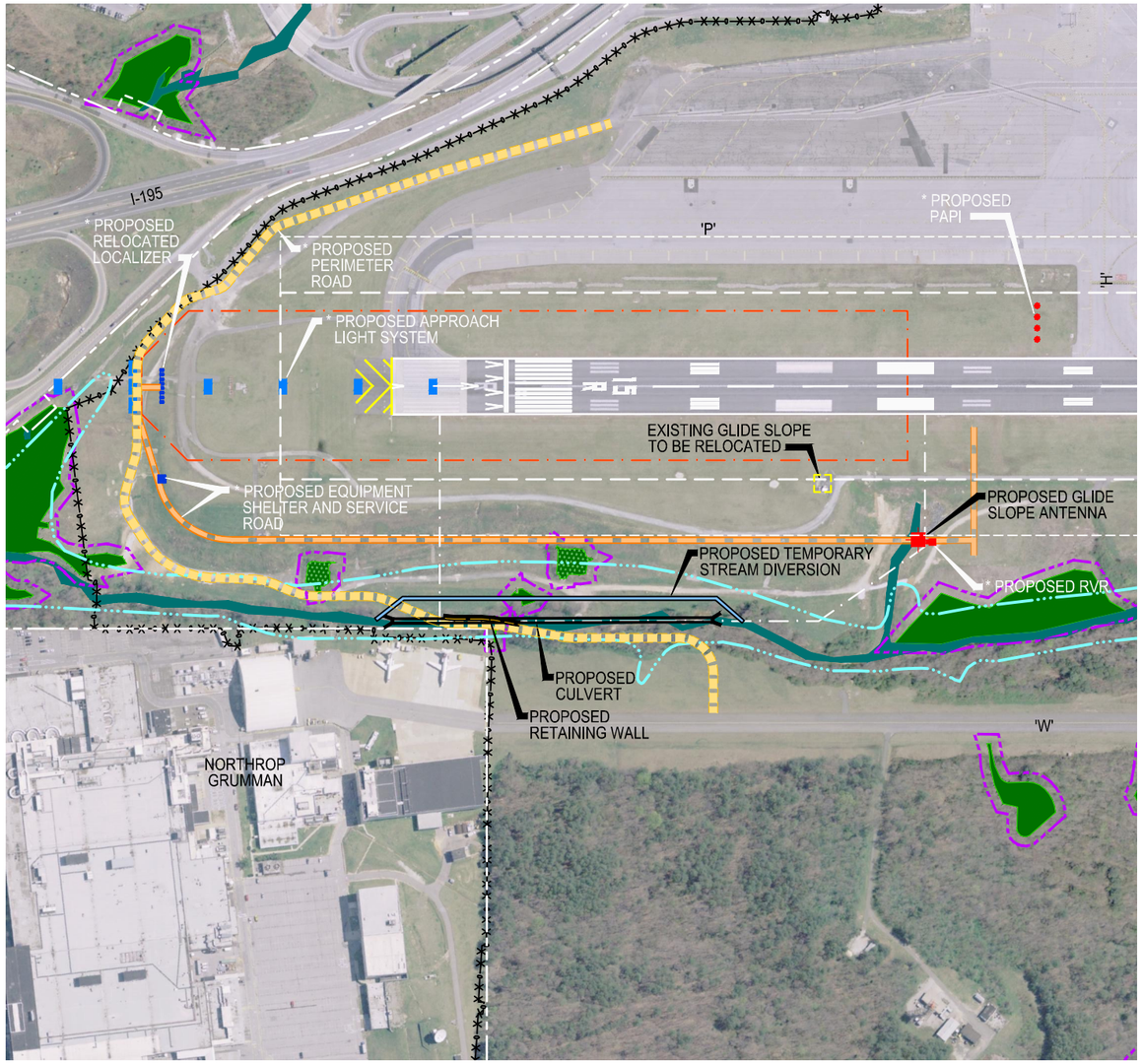
Scale: AS SHOWN

Exhibit: 2.2-2

FILE NAME: P:\20834876-1\20834879\CAD\ENVIRON\ALP EXHIBITS (FEB 2011)\BWI EA 33L-END PERIMETER ROAD.dwg LAYOUT NAME: BWI EA 2.2-2 USER: kenneth.brazeau PLOTTED: Friday, February 24, 2012 - 1:26pm



RUNWAY 15R END GLIDE SLOPE
BUILD ALTERNATIVE 1 - RETAINING WALL INSTALLATION



RUNWAY 15R END GLIDE SLOPE
BUILD ALTERNATIVE 2 - CULVERT INSTALLATION

LEGEND:

- AIRPORT PROPERTY LINE
- SECURITY FENCE
- RUNWAY SAFETY AREA (RSA)
- RUNWAY OBJECT FREE AREA (ROFA)
- GLIDE SLOPE ANTENNA
- GLIDE SLOPE CRITICAL AREA
- LOCALIZER ANTENNA
- LOCALIZER CRITICAL AREA
- PAPI (4 BOX)
- PERIMETER ROAD IMPROVEMENTS
- SERVICE ROAD IMPROVEMENTS
- JURISDICTIONAL STORM WATER MANAGEMENT POND WITH 25' BUFFER
- WATERS OF THE U.S.
- WETLANDS WITH 25' BUFFER
- ISOLATED WETLANDS WITH 25' BUFFER
- FLOODPLAIN BOUNDARY

* DENOTES PROJECTS UNRELATED TO THE PROPOSED ALTERNATIVE

200 0 200 400
SCALE IN FEET

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment
for Proposed Airport Improvements

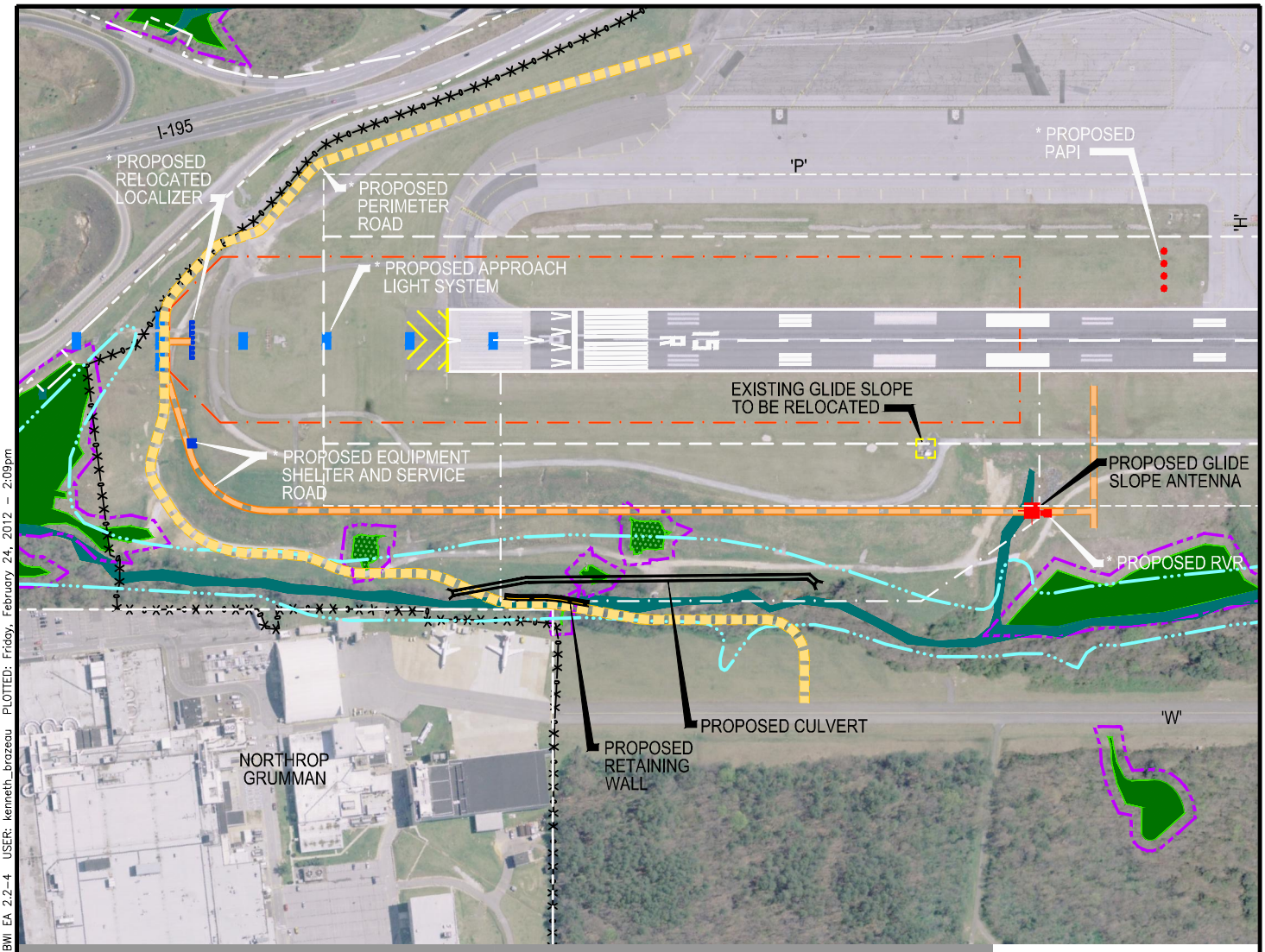
RUNWAY 15R END GLIDE SLOPE
BUILD ALTERNATIVES 1 AND 2

URS AVIATION

Scale: AS SHOWN

Exhibit: 2.2-3

FILE NAME: P:\20834876-\20834879\CAD\ENVIRON\ALP EXHIBITS (FEB 2011)\BWI EA 15R END GLIDE SLOPE.dwg LAYOUT NAME: BWI EA 2.2-3 USER: kenneth_brozeau PLOTTED: Monday, November 07, 2011 - 1:41pm



LEGEND:

- AIRPORT PROPERTY LINE
- SECURITY FENCE
- RUNWAY SAFETY AREA (RSA)
- RUNWAY OBJECT FREE AREA (ROFA)
- GLIDE SLOPE ANTENNA
- GLIDE SLOPE CRITICAL AREA
- LOCALIZER ANTENNA
- LOCALIZER CRITICAL AREA
- PAPI (4 BOX)
- PERIMETER ROAD IMPROVEMENTS
- SERVICE ROAD IMPROVEMENTS
- JURISDICTIONAL STORM WATER MANAGEMENT POND WITH 25' BUFFER
- WATERS OF THE U.S.
- WETLANDS WITH 25' BUFFER
- ISOLATED WETLANDS WITH 25' BUFFER
- FLOODPLAIN BOUNDARY

* DENOTES PROJECTS UNRELATED TO THE PROPOSED ALTERNATIVE

200 0 200 400
SCALE IN FEET

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment for Proposed Airport Improvements

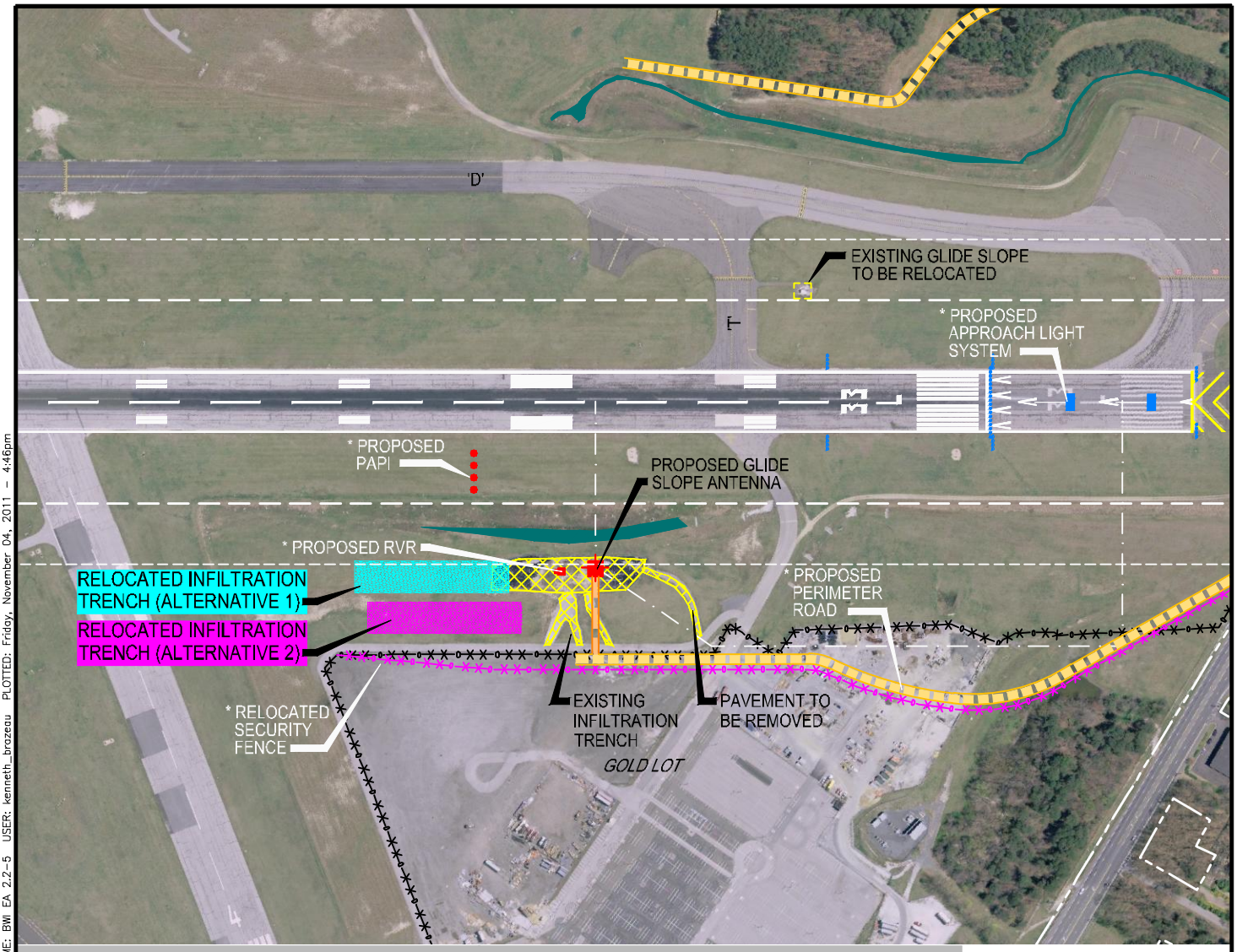
RUNWAY 15R END GLIDE SLOPE BUILD ALTERNATIVE 3

URS AVIATION

Scale: AS SHOWN

Exhibit: 2.2-4

FILE NAME: P:\20834876-\20834879\CAD\ENVIRON\ALP EXHIBITS (FEB 2011)\BWI EA 15R END GLIDE SLOPE.dwg LAYOUT NAME: BWI EA 2.2-4 USER: kenneth_brazeau PLOTTED: Friday, February 24, 2012 - 2:09pm



LEGEND:

- AIRPORT PROPERTY LINE
- SECURITY FENCE
- RUNWAY SAFETY AREA (RSA)
- RUNWAY OBJECT FREE AREA (ROFA)
- GLIDE SLOPE ANTENNA
- GLIDE SLOPE CRITICAL AREA
- LOCALIZER ANTENNA
- LOCALIZER CRITICAL AREA
- PAPI (4 BOX)
- PERIMETER ROAD IMPROVEMENTS
- SERVICE ROAD IMPROVEMENTS
- JURISDICTIONAL STORM WATER MANAGEMENT POND WITH 25' BUFFER
- WATERS OF THE U.S.
- WETLANDS WITH 25' BUFFER
- ISOLATED WETLANDS WITH 25' BUFFER
- FLOODPLAIN BOUNDARY

* DENOTES PROJECTS UNRELATED TO THE PROPOSED ALTERNATIVE

200 0 200 400
SCALE IN FEET

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment for Proposed Airport Improvements

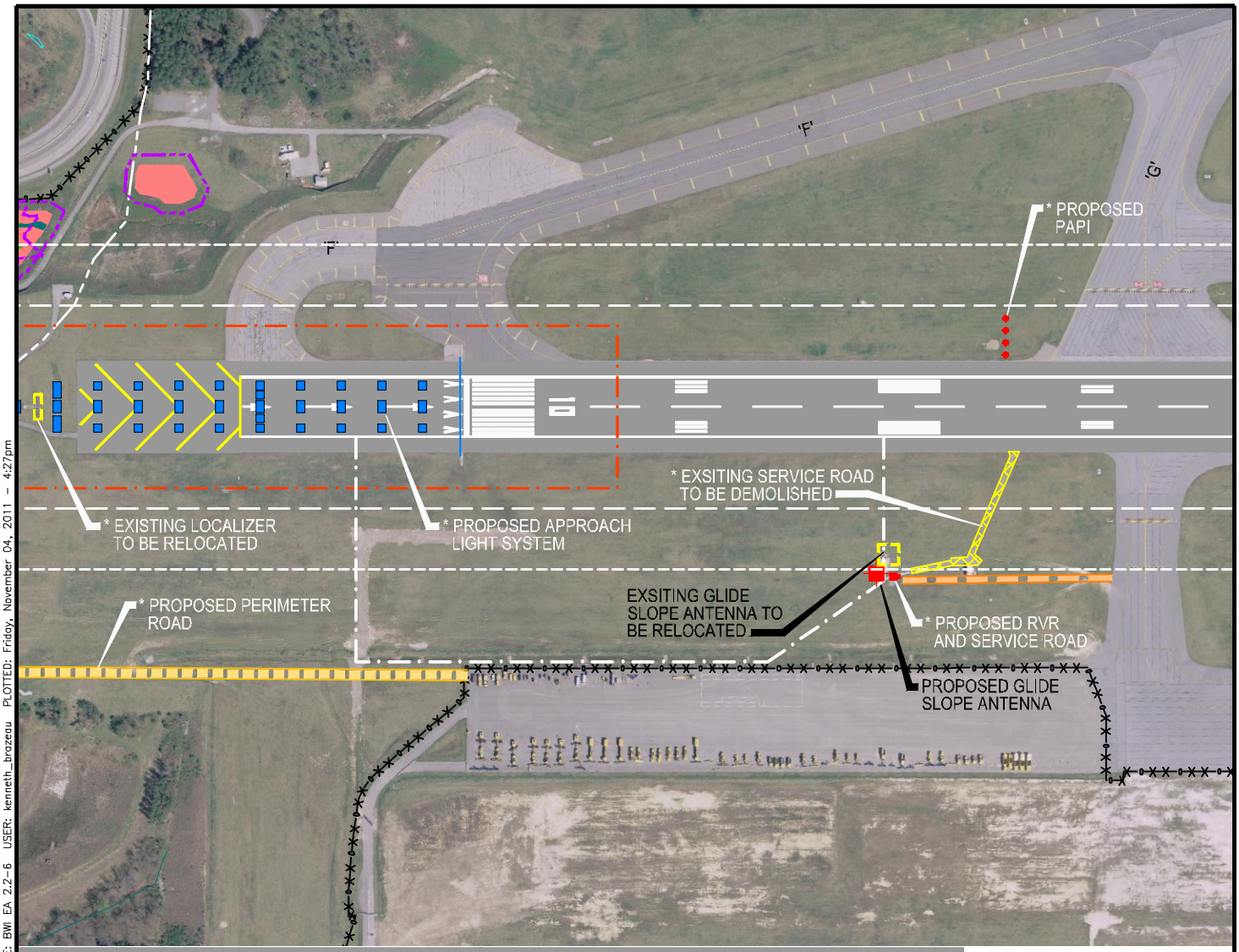
RUNWAY 33L END GLIDE SLOPE BUILD ALTERNATIVES 1 AND 2

URS AVIATION

Scale: AS SHOWN

Exhibit: 2.2-5

FILE NAME: P:\20834876-\20834879\CAD\ENVIRON\ALP EXHIBITS (FEB 2011)\BWI EA 33L END GLIDE SLOPE.dwg LAYOUT NAME: BWI EA 2.2-5 USER: kenneth_brazeau PLOTTED: Friday, November 04, 2011 - 4:46pm



LEGEND:

- AIRPORT PROPERTY LINE
- SECURITY FENCE
- RUNWAY SAFETY AREA (RSA)
- RUNWAY OBJECT FREE AREA (ROFA)
- GLIDE SLOPE ANTENNA
- GLIDE SLOPE CRITICAL AREA
- LOCALIZER ANTENNA
- LOCALIZER CRITICAL AREA
- PAPI (4 BOX)
- PERIMETER ROAD IMPROVEMENTS
- SERVICE ROAD IMPROVEMENTS
- JURISDICTIONAL STORM WATER MANAGEMENT POND WITH 25' BUFFER
- WATERS OF THE U.S.
- WETLANDS WITH 25' BUFFER
- ISOLATED WETLANDS WITH 25' BUFFER
- FLOODPLAIN BOUNDARY

* DENOTES PROJECTS UNRELATED TO THE PROPOSED ALTERNATIVE

200 0 200 400
SCALE IN FEET

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment for Proposed Airport Improvements

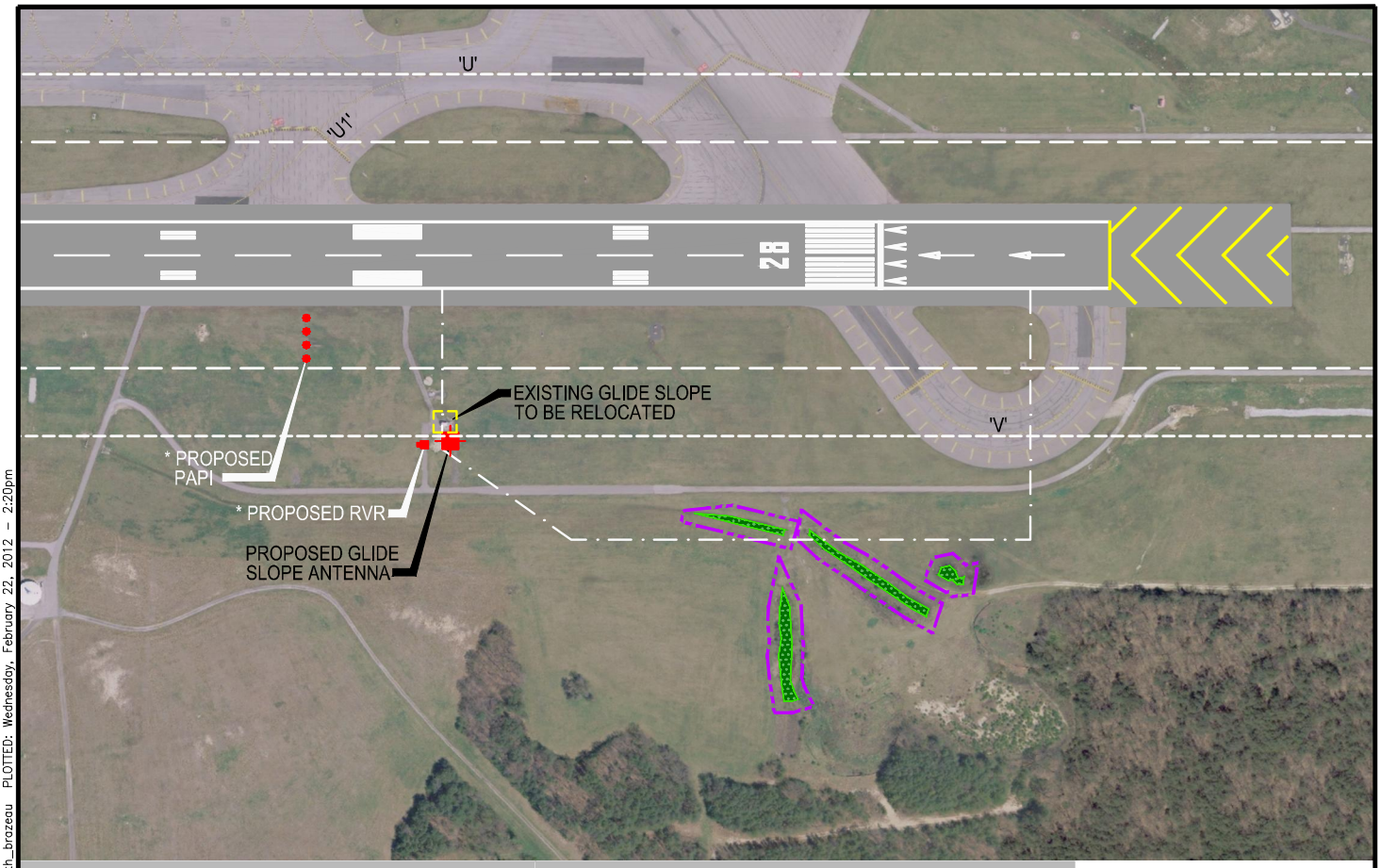
RUNWAY 10 END GLIDE SLOPE BUILD ALTERNATIVE

URS AVIATION

Scale: AS SHOWN

Exhibit: 2.2-6

FILE NAME: P:\20834876-\20834879\CAD\ENVIRON\ALP EXHIBITS (FEB 2011)\BWI EA 10 END GLIDE SLOPE.dwg LAYOUT NAME: BWI EA 2.2-6 USER: kenneth_brazeau PLOTTED: Friday, November 04, 2011 - 4:27pm



LEGEND:

- AIRPORT PROPERTY LINE
- SECURITY FENCE
- RUNWAY SAFETY AREA (RSA)
- RUNWAY OBJECT FREE AREA (ROFA)
- GLIDE SLOPE ANTENNA
- GLIDE SLOPE CRITICAL AREA
- LOCALIZER ANTENNA
- LOCALIZER CRITICAL AREA
- PAPI (4 BOX)
- PERIMETER ROAD IMPROVEMENTS
- SERVICE ROAD IMPROVEMENTS
- JURISDICTIONAL STORM WATER MANAGEMENT POND WITH 25' BUFFER
- WATERS OF THE U.S.
- WETLANDS WITH 25' BUFFER
- ISOLATED WETLANDS WITH 25' BUFFER
- FLOODPLAIN BOUNDARY

200 0 200 400
SCALE IN FEET

* DENOTES PROJECTS UNRELATED TO THE PROPOSED ALTERNATIVE

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment
for Proposed Airport Improvements

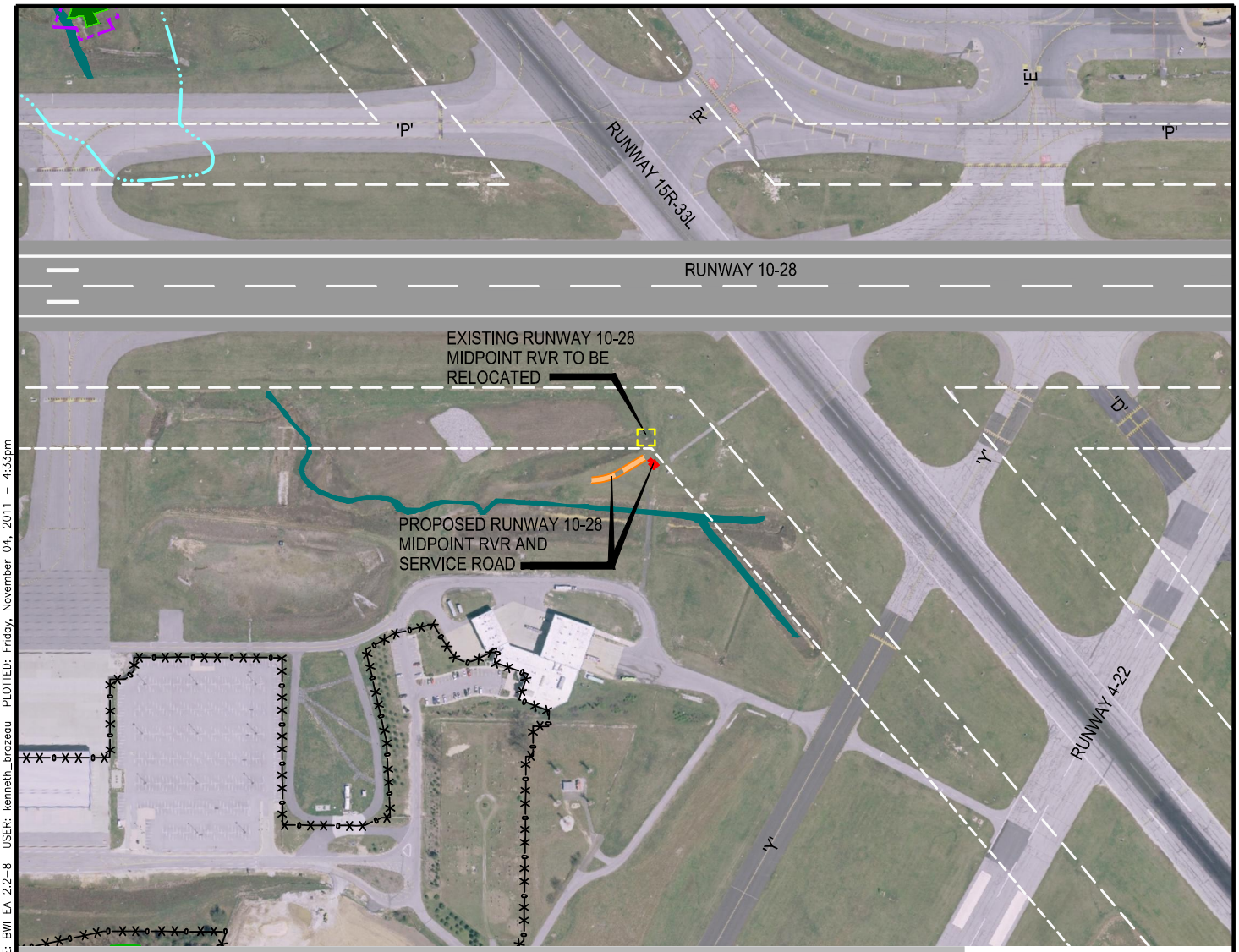
RUNWAY 28 END GLIDE SLOPE BUILD ALTERNATIVE

URS AVIATION

Scale: AS SHOWN

Exhibit: 2.2-7

FILE NAME: P:\20834876-\20834879\CAD\ENVIRON\ALP EXHIBITS (FEB 2011)\BWI EA 28 END GLIDE SLOPE.dwg LAYOUT NAME: BWI EA 2.2-7 USER: kenneth_brazeau PLOTTED: Wednesday, February 22, 2012 - 2:20pm



LEGEND:

- AIRPORT PROPERTY LINE
- SECURITY FENCE
- RUNWAY SAFETY AREA (RSA)
- RUNWAY OBJECT FREE AREA (ROFA)
- GLIDE SLOPE ANTENNA
- GLIDE SLOPE CRITICAL AREA
- LOCALIZER ANTENNA
- LOCALIZER CRITICAL AREA
- PAPI (4 BOX)
- PERIMETER ROAD IMPROVEMENTS
- SERVICE ROAD IMPROVEMENTS
- JURISDICTIONAL STORM WATER MANAGEMENT POND WITH 25' BUFFER
- WATERS OF THE U.S.
- WETLANDS WITH 25' BUFFER
- ISOLATED WETLANDS WITH 25' BUFFER
- FLOODPLAIN BOUNDARY

* DENOTES PROJECTS UNRELATED TO THE PROPOSED ALTERNATIVE

200 0 200 400
SCALE IN FEET

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment
for Proposed Airport Improvements

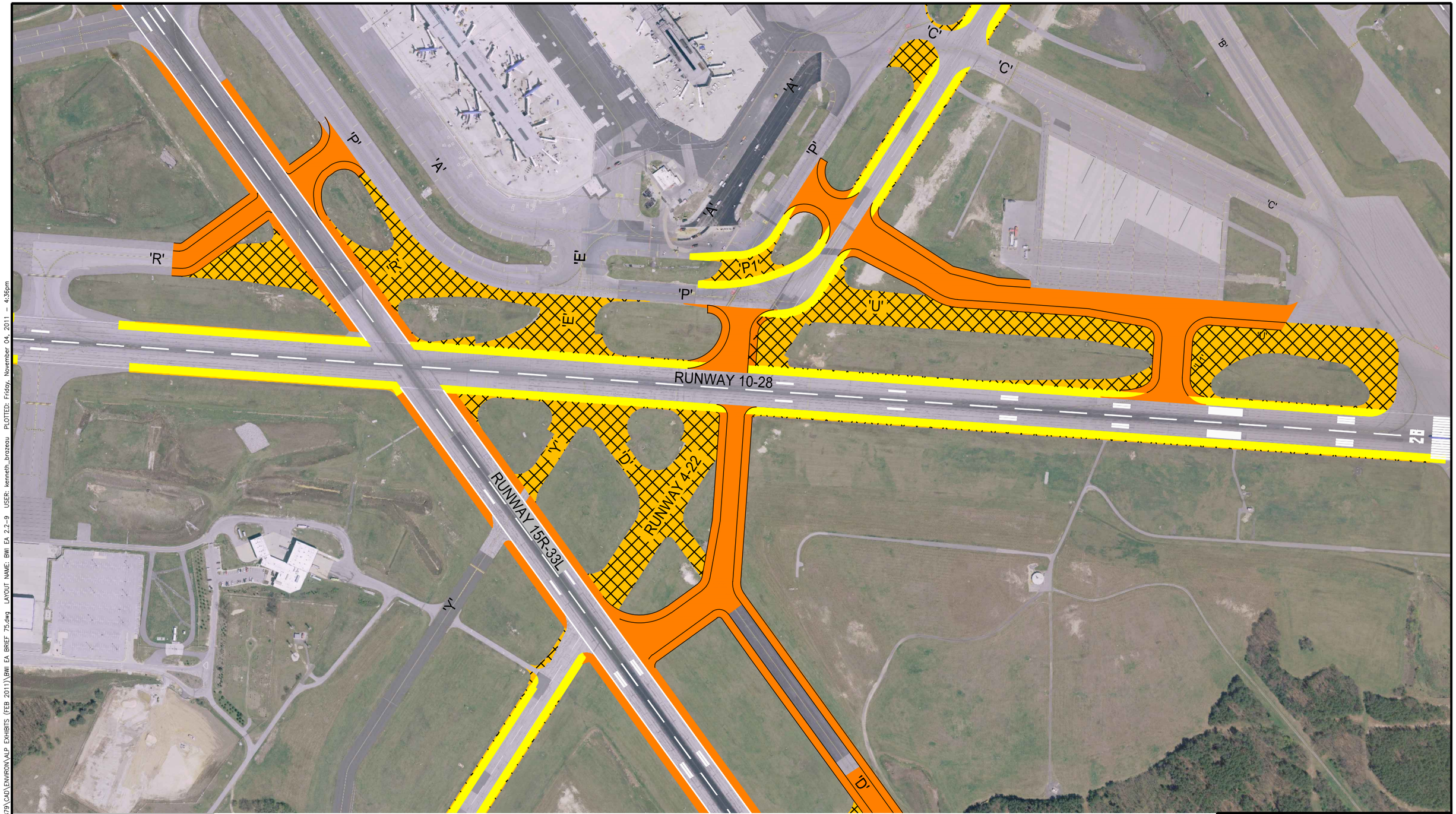
RUNWAY 10-28 MIDPOINT RVR
BUILD ALTERNATIVE

URS AVIATION

Scale: AS SHOWN

Exhibit: 2.2-8

FILE NAME: P:\20834876-\20834879\CAD\ENVIRON\ALP EXHIBITS (FEB 2011)\BWI EA 10-28 MIDPOINT RVR.dwg LAYOUT NAME: BWI EA 2.2-8 USER: kenneth_brazeau PLOTTED: Friday, November 04, 2011 - 4:33pm



LEGEND:

- NEW AIRSIDE PAVEMENT
- PAVEMENT REMOVAL
- PAVEMENT CONVERSION TO SHOULDER

200 0 200 400
SCALE IN FEET

BWI Baltimore/Washington International Thurgood Marshall Airport

Environmental Assessment
for Proposed Airport Improvements

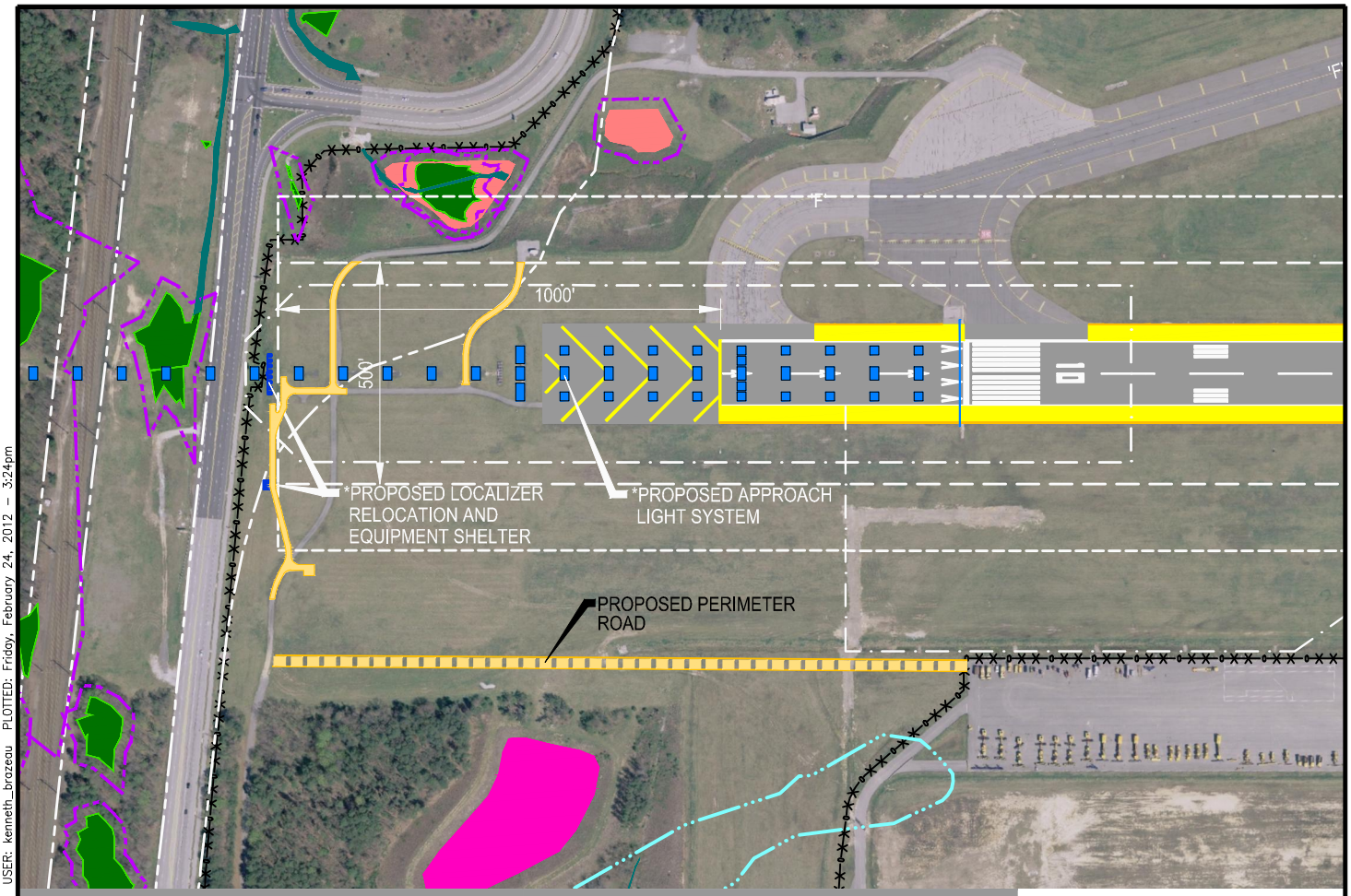
ENGINEERING BRIEF NO. 75
TAXIWAY RECONFIGURATION

URS AVIATION

Scale: AS SHOWN

Exhibit: 2.2-9

FILE NAME: P:\20834876-\20834879\CAD\ENVIRON\ALP EXHIBITS (FEB 2011)\BWI EA BRIEF 75.dwg LAYOUT NAME: BWI EA 2.2-9 USER: kenneth_brozeau PLOTTED: Friday, November 04, 2011 - 4:36pm



LEGEND:

- AIRPORT PROPERTY LINE
- SECURITY FENCE
- RUNWAY SAFETY AREA (RSA)
- RUNWAY OBJECT FREE AREA (ROFA)
- GLIDE SLOPE ANTENNA
- GLIDE SLOPE CRITICAL AREA
- LOCALIZER ANTENNA
- LOCALIZER CRITICAL AREA
- PAPI (4 BOX)
- JURISDICTIONAL STORM WATER MANAGEMENT POND WITH 25' BUFFER
- WATERS OF THE U.S.
- WETLANDS WITH 25' BUFFER
- ISOLATED WETLANDS WITH 25' BUFFER
- FLOODPLAIN BOUNDARY

AIRFIELD PAVMENT LEGEND:

- NEW AIRSIDE PAVEMENT
- PAVEMENT REMOVAL
- PAVEMENT CONVERSION TO SHOULDER

PERIMETER ROAD ALTERNATIVES LEGEND:

- PERIMETER ROAD IMPROVEMENTS
- SERVICE ROAD IMPROVEMENTS

* DENOTES PROJECTS UNRELATED TO THE PROPOSED ALTERNATIVE

200 0 200 400
SCALE IN FEET

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment for Proposed Airport Improvements

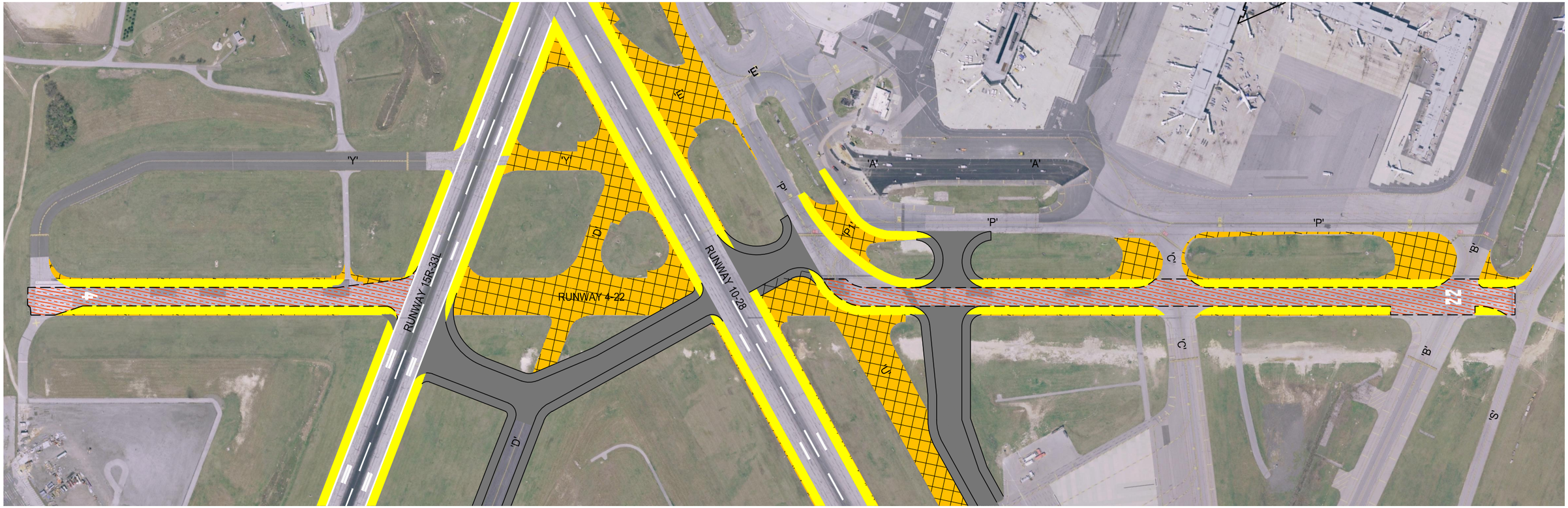
RUNWAY 10 END PERIMETER ROADWAY BUILD ALTERNATIVE

URS AVIATION

Scale: AS SHOWN

Exhibit: 2.3-1

FILE NAME: P:\20834876-\20834879\CAD\ENVIRON\ALP EXHIBITS (FEB 2011)\BWI EA 10 - END PERIMETER ROAD.dwg LAYOUT NAME: BWI EA 2.3-1 USER: kenneth_brozeau PLOTTED: Friday, February 24, 2012 - 3:24pm



LEGEND:

- RUNWAY 4-22 PAVMENT MANAGEMENT PROGRAM IMPROVEMENTS
- NEW AIRSIDE PAVEMENT
- PAVEMENT REMOVAL
- PAVEMENT CONVERSION TO SHOULDER

200 0 200 400
SCALE IN FEET

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment
for Proposed Airport Improvements

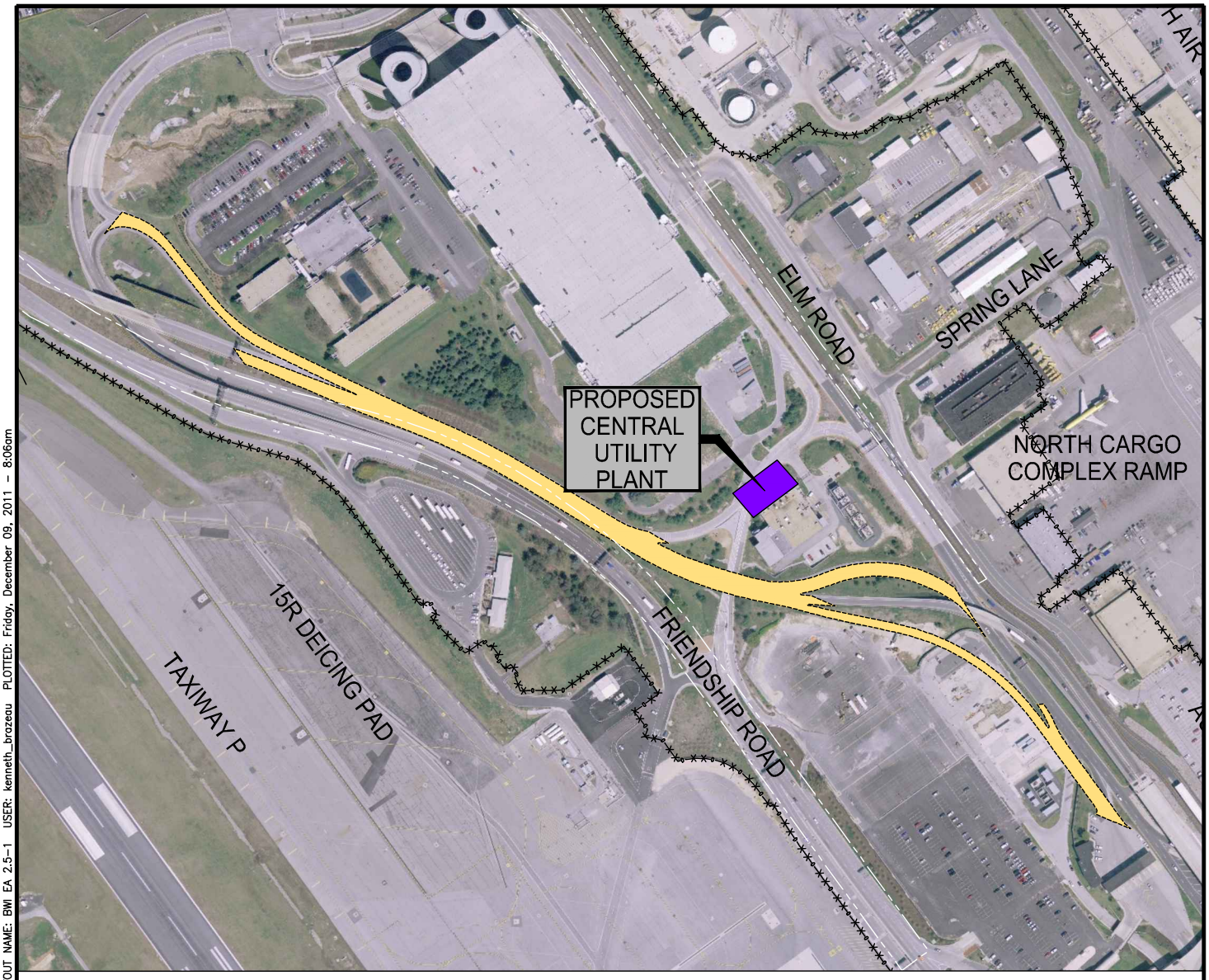
CONVERSION OF RUNWAY 4-22
TO A TAXIWAY BUILD ALTERNATIVE

URS AVIATION

Scale: AS SHOWN

Exhibit: 2.4-1

FILE NAME: P:\20834876-\20834879\CAD\ENVIRON\ALP EXHIBITS (FEB 2011)\BWI EA 1.1-4.dwg LAYOUT NAME: BWI EA 2.4-1 USER: kenneth_brazeau PLOTTED: Wednesday, August 10, 2011 - 1:56pm



LEGEND:

- AIRPORT PROPERTY LINE
- SECURITY FENCE
- PROPOSED TERMINAL EXIT ROADWAY IMPROVEMENTS

200 0 200 400
SCALE IN FEET

SOURCE: BWI MARSHALL AIRPORT LAYOUT PLAN (APPROVED 2/11/11)
FEASIBILITY STUDY FOR ARRIVALS LEVEL EXIT ROAD IMPROVEMENTS AT BWI (JANUARY 2007)

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment
for Proposed Airport Improvements

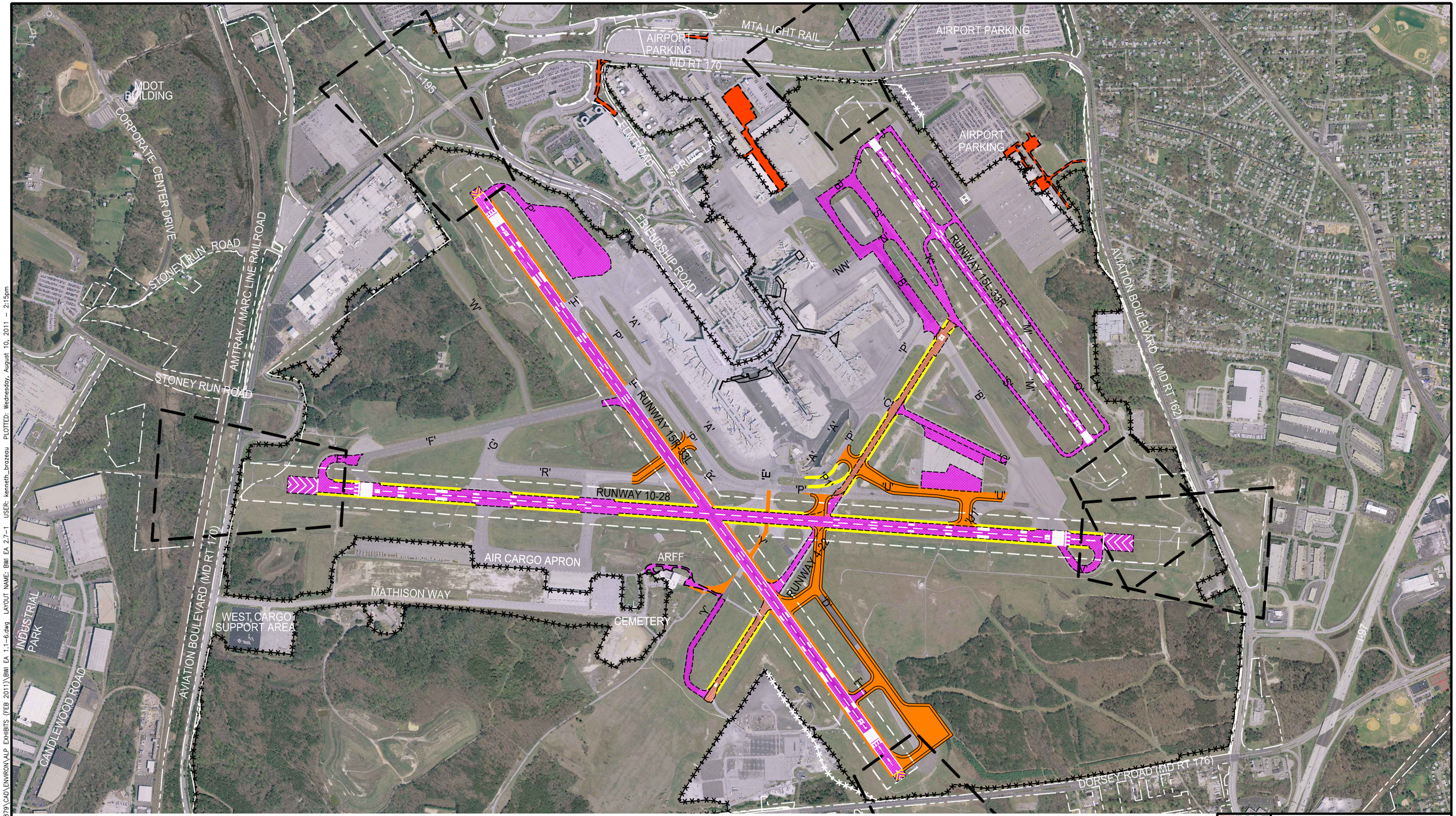
TERMINAL EXIT ROADWAY AND CENTRAL UTILITY PLANT IMPROVEMENTS

URS AVIATION

Scale: AS SHOWN

Exhibit: 2.5-1

FILE NAME: P:\20834876-\20834879\CAD\ENVIRON\ALP EXHIBITS (FEB 2011)\BWI EA TERM ROAD AND CUP.dwg LAYOUT NAME: BWI EA 2.5-1 USER: kenneth_brazeau PLOTTED: Friday, December 09, 2011 - 8:06am



LEGEND:

- AIRSIDE PAVEMENT MANAGEMENT PROGRAM IMPROVEMENTS
- LANDSIDE PAVEMENT MANAGEMENT PROGRAM IMPROVEMENTS
- PAVEMENT CONVERSION TO SHOULDER
- NEW PAVEMENT
- SECURITY FENCE
- AIRPORT PROPERTY LINE

600 0 600 1200
SCALE IN FEET

BWI Baltimore/Washington International Thurgood Marshall Airport

Environmental Assessment
for Proposed Airport Improvements

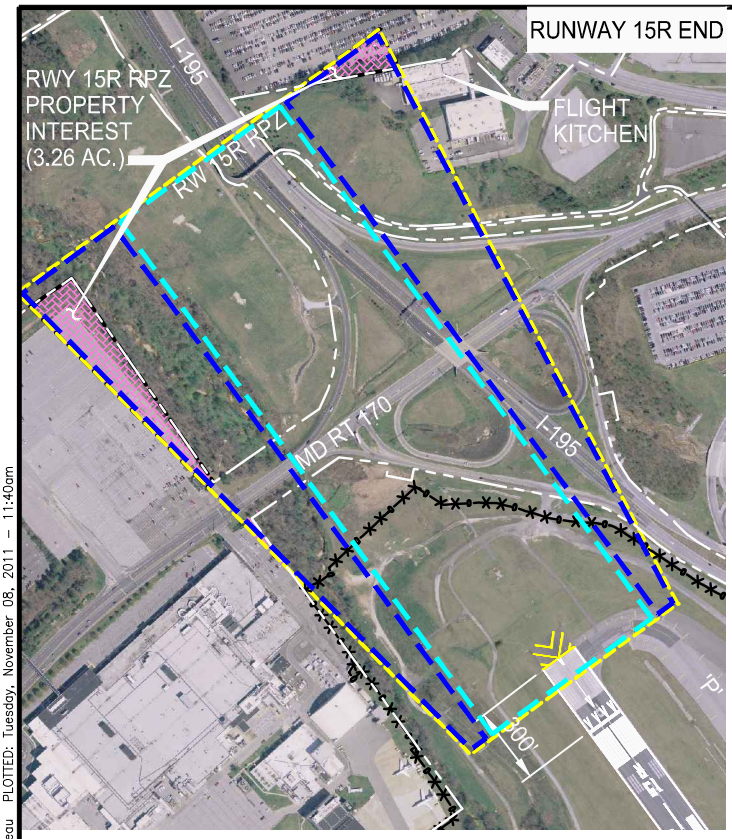
PAVEMENT MANAGEMENT
IMPROVEMENTS BUILD ALTERNATIVE

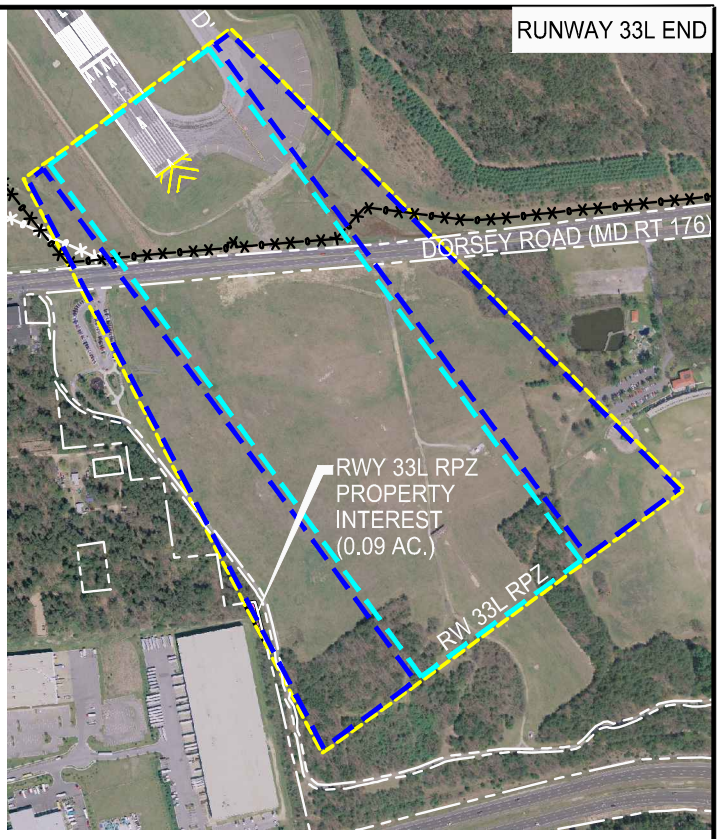
URS AVIATION

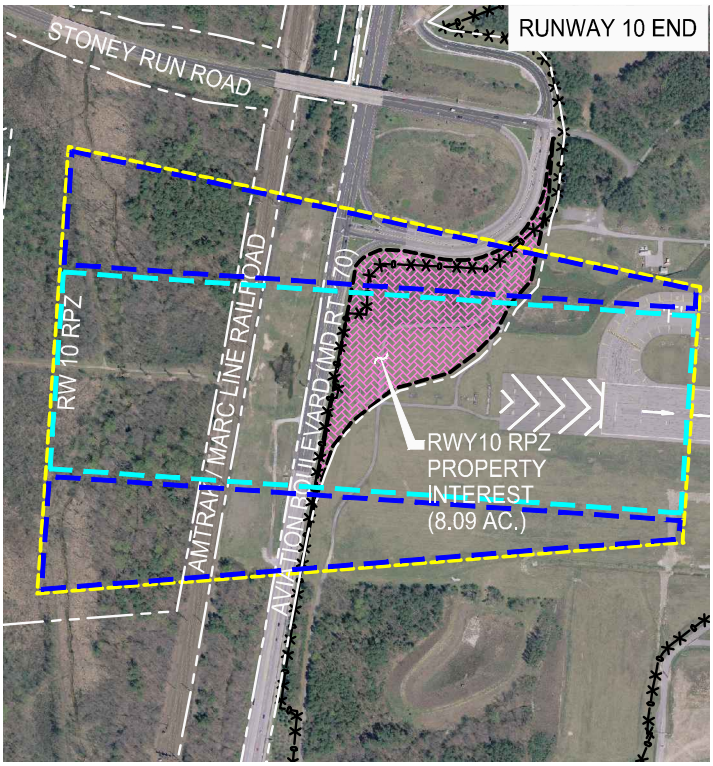
Scale: AS SHOWN

Exhibit: 2.7-1

FILE NAME: P:\20834876-\20834879\CAD\ENVRON\ALP EXHIBITS (FEB 2011)\BWI EA 1.1-6.dwg LAYOUT NAME: BWI EA 2.7-1 USER: kenneth_brozeu PLOTTED: Wednesday, August 10, 2011 - 2:15pm







LEGEND

- AIRPORT PROPERTY LINE
- SECURITY FENCE
- RUNWAY PROTECTION ZONE (RPZ)
- CENTRAL PORTION OF THE RPZ
- CONTROLLED ACTIVITY AREA
- PROPERTY INTEREST ACQUISITION

375 0 375 750
SCALE IN FEET

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment for Proposed Airport Improvements

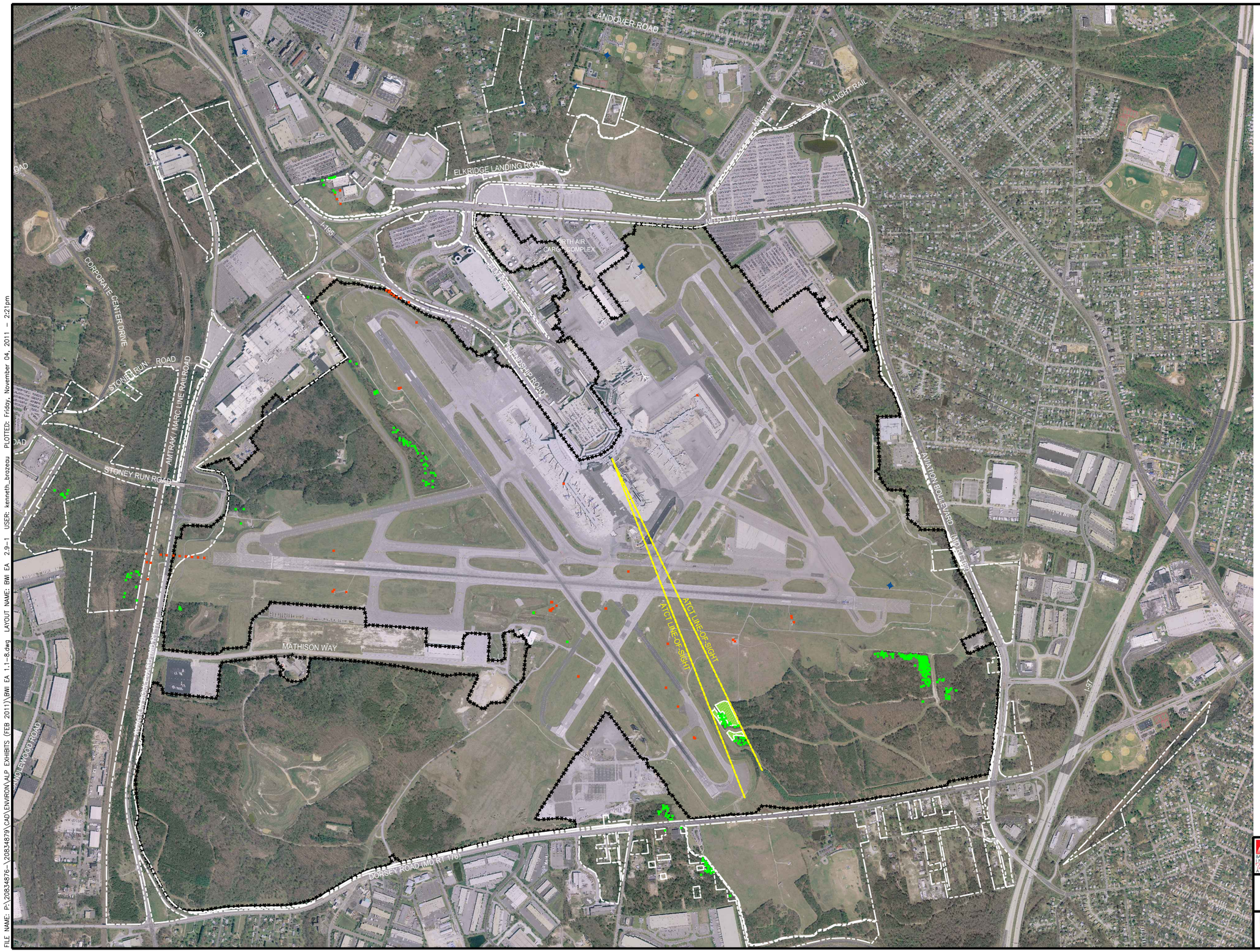
RUNWAY PROTECTION ZONE COMPLIANCE BUILD ALTERNATIVE

URS AVIATION

Scale: AS SHOWN

Exhibit: 2.8-1

FILE NAME: P:\20834876-\20834879\CAD\ENVIRON\ALP EXHIBITS (FEB 2011)\BWI EA 1.1-9.dwg LAYOUT NAME: BWI EA 2.8-1 REVISED 10-19-11 USER: kenneth_brazeau PLOTTED: Tuesday, November 08, 2011 - 11:40am



LEGEND

- AIRPORT PROPERTY LINE
- SECURITY FENCE
- LINE-OF-SITE CLEARING
- MAN-MADE OBSTRUCTIONS
- VEGETATIVE OBSTRUCTIONS

SOURCE: BWI MARSHALL AIRPORT LAYOUT PLAN (APPROVED 2/11/11)

750 0 750 1500
SCALE IN FEET

BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment for Proposed Airport Improvements

OBSTRUCTION REMOVAL AND LINE-OF-SIGHT CLEARANCE

URS AVIATION

Scale: AS SHOWN

Exhibit: 2.9-1

FILE NAME: P:\20834876-\20834879\CAD\ENVIRON\ALP EXHIBITS (FEB 2011)\BWI EA 1.1-8.dwg LAYOUT NAME: BWI EA 2.9-1 USER: kenneth_brozeau PLOTTED: Friday, November 04, 2011 - 2:21pm

SECTION 3
AFFECTED ENVIRONMENT

3.0 INTRODUCTION

This section provides a summary of the existing environmental conditions of the physical, natural, and human environment within the study areas established for this EA. The categories presented reflect the relevant environmental disciplines contained in FAA Order 1050.1E, Change 1.

For the purposes of describing potential impacts to noise-sensitive land uses and social and socioeconomic impacts, a Generalized Study Area (GSA) was established. The GSA is comprised of MAA property including the BWI Marshall "campus" (bounded by Aviation Boulevard to the north, west, and east and Dorsey Road to the south) and also MAA-owned parcels contiguous to the "campus" to the west and south as well as those parcels where some property interest would be acquired within the RPZs for Runway 15R-33L, the Runway 10 end, and Runway 15L-33R (see **Exhibit 3.0-1**). For environmental considerations that deal with more specific, direct (i.e., construction) impacts, such as wetlands, waters of the US, floodplains, etc., the proposed project locations and limits of disturbance (LODs) will be used as the basis for discussion. The LODs include the areas of proposed ground disturbance for each of the individual airport development actions that are part of the Build Alternatives described in **Section 2.0**.

3.1 EXISTING LAND USE

BWI Marshall is located in Anne Arundel County, Maryland. The Airport area can be defined in terms of the Airport campus, generally bounded on the west, north, and east by Aviation Boulevard and on the south by Dorsey Road. Existing land use patterns at BWI Marshall were identified through field observations and the use of the Geographic Information Systems (GIS) database of Anne Arundel County, Maryland, and the BWI Marshall *Long Range Needs Assessment*, September 2008 (see **Exhibit 3.1-1**). Aerial photography and the GIS database provided relevant information for the base maps, such as roads, road names, and other land uses. The *Anne Arundel County General Development Plan* (April 2009) was also reviewed for references to airport land use and the surrounding area.

3.1.1 AIRPORT CAMPUS LAND USE

Anne Arundel County describes the land use in the airport campus area as Transportation/Utility, Retail, and Industrial. Transportation/Utility areas include all runways, taxiways, safety areas, aircraft parking aprons, navigational and lighting aids, utilities, service roads, support facilities such as the Aircraft Rescue and Firefighting building, deicing operation areas, maintenance facilities, fuel farm, and undeveloped (forested) areas within the security fence. Retail areas include the main terminal building, with associated arrival and departure roadways and parking garages and the general aviation terminal. Industrial areas include cargo buildings.

3.1.2 SURROUNDING AREA LAND USE

For this EA, the discussion of land use near the campus area is focused on three (3) off-airport areas adjacent to individual airport development actions: Dorsey Road at the approach to Runway 33L; Aviation Boulevard at the approach to Runway 15L; and Aviation Boulevard at the approach to Runway 10.

The area located south of Dorsey Road at the approach to Runway 33L is owned by MAA. Anne Arundel County Land Use designation for this area is Recreation and Parks. Field observation of this area shows navigational and lighting aids to Runway 33L (mowed area), the Thomas A. Dixon Observation Area (parking), BWI Trail parking, and a golf driving range located on MAA property, leased to a private party. Anne Arundel County Land Use designation for the area east of the approach to Runway 33L is Single Family Dwelling, Vacant Land, and Industrial. Field observation of this area shows mostly vacant, forested land interspersed with single-family homes and an Industrial Complex lying north of Maryland Route 100 at the end of Park 100 Drive. Anne Arundel County Land Use designation for the area west of the approach to Runway 33L is Single Family Dwelling and Natural Open Space. Field observation of this area shows single-family dwellings interspersed with light industrial and forested open space.

The area located north of Aviation Boulevard at the approach to Runway 15L is predominantly owned by MAA. Anne Arundel County Land Use designation for this area is Open Space, Recreation and Parks, and Single Family Dwelling. Field observation of this area shows undeveloped areas of forest, mowed grass, and mixed single family dwellings.

The area located west of Aviation Boulevard on the Runway 10 approach is also predominantly owned by MAA. Anne Arundel County Land Use designation for this area is Natural Open Space. Field observation of this area shows undeveloped forests.

The *Anne Arundel County General Development Plan* (April 2009) indicates that as part of the County's goals they plan to encourage mixed use development north and west of the Airport as well as protect the future growth potential of the Airport. The BWI Marshall Business District (and vicinity) has been targeted as one of the primary growth areas for future economic development.

3.1.3 ZONING

Except for the BWI Marshall campus, the Anne Arundel County Zoning Ordinance and Map regulate development within the study area. **Exhibit 3.1-2** indicates the various existing zoning classifications for the area surrounding BWI Marshall. The zoning generally represents existing land uses in the area.

According to the Existing Zoning Map for Anne Arundel County, dated December 31, 2008, the Airport airside area is zoned Residential (R1). The land side area located south of Dorsey Road at the approach to Runway 33L is zoned Open Space (OS) with the adjoining areas being Industrial Park (W1) and Light Industrial (W2). The area located along the north of Aviation Boulevard at the approach to Runway 15L is

zoned OS and Highway Commercial (C4). The area located at the approach to Runway 10 west of Aviation Boulevard is zoned OS.

3.2 SOCIOECONOMIC CONTEXT

Socioeconomic impact considers the relocation of residences and businesses in and around the neighborhoods immediately surrounding the Airport. It also considers community disruption, including the alteration of surface transportation patterns, to social institutions and services in the region adjacent to the Airport. This section addresses social, economic, and demographic characteristics of the Airport neighborhood within the GSA.

3.2.1 COMMUNITY PROFILE

U.S. Census data[1] are presented below for the project area. The data is segregated by Census Tracts and Block Groups. Census Tract 7507, Block Group 1 covers the area south of Dorsey Road. Census Tract 7507, Block Group 2 covers the airport property, which is bounded on the north by Aviation Boulevard, I-195, Elkridge Landing Road, and the Light Rail System; on the east by Aviation Boulevard; on the south by Dorsey Road; and on the west by the Amtrak Line. Census Tract 7505.00, Block Group 2 includes the area off of the Runway 15L approach while Block Group 3, encompasses the area along I-195 at the approach to Runway 15R. Census Tract 7506.00, Block Group 2, covers the area to the west of the airport at the approach to Runway 10 (see **Exhibit 3.2-1**).

There are no hospitals, churches, childcare facilities, and/or schools within the GSA.

3.2.2 MINORITY AND LOW-INCOME POPULATIONS

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, directs every Federal Agency to develop an approach to address environmental justice concerns in its programs, policies, and regulations. The objective behind Executive Order 12898 is to avoid disproportionately high and adverse impacts on minority and low-income populations with respect to human health and environment.

On July 16, 1997, the U.S. Department of Transportation (USDOT) issued its final order on Environmental Justice as Order 5610.2 to comply with the Executive Order 12898. The USDOT Order generally describes the process that the Office of the Secretary and each Operating Administration will use to incorporate environmental justice principles (as embodied in the Executive Order) into existing programs, policies, and activities. The Order defines a Minority Population as “any readily identifiable group of minority persons who live in geographic proximity, and if circumstances warrant, geographically dispersed/transient persons (such as migrant workers or Native Americans) who will be similarly affected by a proposed DOT program, policy or activity.”

[1] Data was acquired from U.S. Census 2000 data issued by the U.S. Department of Commerce and published by the Maryland Department of Planning.

While the US Census Bureau conducts a national census every ten years, the data for the 2010 Census is not yet available to the level of detail needed for this analysis. For purposes of demographics and information per Census Block Group, the 2000 Census data will be used. To identify the current poverty threshold, the most current available data (2010) will be used as this information is updated annually.

The Council on Environmental Quality (CEQ), which has oversight of the Federal government's compliance with Executive Order 12898 and National Environmental Policy Act (NEPA), has determined that a minority population group exists if the affected area minority population exceeds 50 percent or the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate geographic analysis. In all of the Census Block Groups considered in this study (see **Table 3.2-1**), the minority population percentage is substantially less than 50 percent and therefore the Block Groups do not qualify as minority population groups.

TABLE 3.2-1
COMMUNITY PROFILE

BLOCK GROUP	TOTAL POPULATION	NON-MINORITY POPULATION	MEDIAN HOUSEHOLD INCOME ($)	AVERAGE HOUSEHOLD SIZE	% MINORITY	% LOW-INCOME
7507.00-1	913	683	58,958	2.56	25.2	3.5
7507.00-2	4	4	66,250	2.00	0	0
7508.01-5	95	83	51,364	2.63	12.6	11.7
7505.00-2	2443	2361	59,808	2.66	3.4	3.6
7505.00-3	178	175	40,729	2.78	1.7	0
7506.00-2	206	190	41,094	2.78	7.8	0
TOTAL	9079	8367				

Source: US Census Bureau, 2000

The U.S. Census Bureau uses the Office of Management and Budget, *Definition of Poverty for Statistical Purposes*, as published in *Statistical Policy Directive 14*, to set income "poverty" thresholds. Family size and composition are factors used to determine what portion of a population is low-income. If a family's total income is less than the poverty threshold, then that family, and every individual in it, is considered low-income. The poverty threshold for 2010, as established by the U.S. Census Bureau, was used to determine the low-income populations within this proposed project area. The average household size within the project area is 2.60 persons per household. The 2010 poverty threshold, for a three-person household, with one person under the age of 18, is $17,590. For the purposes of analysis, the threshold amount was compared to the median household income of each Block Group in the project area. According to the 2000 Census information, none of the Census Block Groups within the project area are considered low-income (see **Table 3.2-1**).

3.3 EXISTING NOISE EXPOSURE

3.3.1 INTRODUCTION

This section describes the methodology used to determine existing aircraft noise exposure and addresses the existing (2010) aircraft noise environment in the area surrounding BWI Marshall. The terms and metrics associated with aircraft noise used in the noise analysis are described in detail in **Appendix D**.

3.3.2 AIRCRAFT NOISE REGULATORY ENVIRONMENT AND NOISE DESCRIPTORS

Federal – FAA requires the analysis of noise exposure when development actions may change the cumulative noise exposure of individuals to aircraft noise in areas surrounding the airport. Common development actions that may change the cumulative noise environment include: change in runway configuration, aircraft operations and/or movements, aircraft types using the airport, or aircraft flight characteristics that may affect existing and future noise levels. Potential noise impacts associated with the proposed project are analyzed using the methodologies developed by the FAA and published in FAA Order 1050.1E, *Environmental Impacts, Policies and Procedures*, Change 1. In accordance with FAA Order 1050.1E, Change 1, Appendix A, Section 14.3 and 14.4c, a proposed action would be considered to have a significant impact with regard to aviation noise, when compared to the No Build Alternative for the same time frame, if it would:

- Cause noise sensitive areas located at or above DNL 65 dB to experience a noise increase of at least DNL 1.5 dB.
- Cause an increase of DNL 1.5 dB that introduces new noise sensitive areas to exposure levels of DNL 65 dB or more.

DNL is the standard metric designated by the FAA for determining cumulative exposure of individuals to noise. DNL is a 24-hour time-weighted average noise metric, expressed in dBA, that accounts for the noise levels of individual aircraft events, the number of times those events occur, and the time of day they occur. DNL is calculated based on noise levels and operational activity occurring during two time periods: daytime (7:00 a.m. to 9:59 p.m.) and nighttime (10:00 p.m. to 6:59 a.m.). To represent the added intrusiveness of sounds during evening and nighttime hours, DNL adds a weighting of 10 dBA to events occurring during the nighttime period, DNL is used in this EA for the discussion of noise conditions related to operations at BWI Marshall. Additional information regarding DNL is included in **Appendix D**.

State of Maryland – COMAR via the Maryland Environmental Noise Act of 1974 provides for the protection of citizens from the impact of transportation related noise. The aviation portion of the Act requires the MAA to create a certified Airport Noise Zone (ANZ) to control incompatible land development around BWI Marshall and a Noise Abatement Plan (NAP) to minimize the impact of aircraft noise on people living near the Airport. The MAA guidelines are similar to the FAA guidelines in that the ANZ is based on the DNL noise contour with 65 DNL delineating incompatible land uses.

3.3.2.1 Methodology

Noise analysis was conducted to develop current noise conditions for the Airport. This analysis includes maps depicting general and sensitive land uses within the noise impact area. Noise exposure tables were developed to evaluate land use information and population data, particularly the following:

- The number of residences or people living within each noise contour at or above 65 dB DNL.
- The locations and numbers of noise-sensitive land uses within each contour at or above 65 dB DNL.
- The area (in acres) of general land use classifications within the noise contours.

In accordance with guidance contained in FAA Order 1050.1E Change 1, detailed noise analyses were performed using the latest version of the FAA's Integrated Noise Model (INM) (Version 7.0b, released on September 30, 2009). The INM is FAA's standard noise modeling tool for predicting noise levels in the vicinity of airports. DNL contours of equal noise for the 65, 70, and 75 dBA levels were calculated based on the 2010 airport operating conditions. The data and methodologies used to develop the noise contours for the existing conditions are provided in **Appendix D**.

3.3.3 2010 (EXISTING) NOISE ENVIRONMENT

The existing noise exposure contour maps reflect annual conditions for calendar year 2010. A detailed description of the aircraft operations and airport operational characteristics is provided in **Appendix D**.

The aircraft operational levels were derived from historical activity and the BWI Marshall Terminal Area Forecast (TAF**). Table 3.3-1** shows the annual and average daily operations by major aircraft category.

TABLE 3.3-1
BWI MARSHALL 2010 OPERATIONS

Aircraft Category	Annual Operations		Average Daily Operations		Total Annual Operations	Total Daily Operations
	Day	Night	Day	Night		
Air Carrier (AC)	177,853	23,928	487	65	201,280	552
Air Taxi (AT)	38,899	5,080	107	14	45,593	125
General Aviation (GA)	19,163	3,818	52	10	21,866	60
Total Operations	235,915	32,827	646	90	268,742	736

Source: HMMH Integrated Noise Model Input Files provided by HMMH, FAA Terminal Area Forecast, and URS Analysis.

Note: Calendar Year 2010. Numbers may not add due to rounding.

Aircraft fleet mix categories were defined relative to types of aircraft (i.e., jet or propeller), as well as aircraft size and noise characteristics. These categories were determined from existing BWI Marshall INM input files. A detailed description of the fleet mix is provided in **Appendix D**.

For DNL metric calculations, a 24-hour day is segmented into day and night periods. Day is defined as 7:00 a.m. to 9:59 p.m; nighttime is defined as 10:00 p.m. to 6:59 a.m., Aircraft operations during the nighttime period are penalized 10 dBA. **Table 3.3-2** shows the distribution of annual operations by time of day. Operations by time of day for each INM aircraft type are provided in **Appendix D**.

TABLE 3.3-2
BWI MARSHALL
SUMMARY OF OPERATIONS BY TIME OF DAY (2010)

Aircraft Category	Annual Operations	
	Day	Night
Air Carrier (AC)	88%	12%
Air Taxi (AT)	91%	9%
General Aviation (GA)	83%	17%

Source: HMMH Integrated Noise Model Input Files provided by HMMH, FAA Terminal Area Forecast, and URS Analysis.

Note: Numbers may not add due to rounding

An additional important consideration in developing noise exposure contours is the percentage of time each runway is used. Wind speed and direction dictate the direction in which the runways are operated (north versus south). In general, aircraft operate into the wind – landing into the wind and departing into the wind. Aircraft operations are shifted to the runway end that favors the best operating conditions.
Other factors affecting runway use include but are not limited to the following:

- Wind speed and direction
- Required runway length for takeoff per aircraft type and weight
- Noise abatement procedures
- Airport operational efficiency
- Weather minimums
- Terrain and obstacle clearances.

The runway use at BWI Marshall was determined based on historical data from airport surveillance radar. **Table 3.3-3** summarized the runway utilization as a percentage of total operations. A description of the runway use assumptions per aircraft category is provided in **Appendix D**.

The location and use of aircraft flight tracks was identified using spatial data from the ANOMS system (Aircraft Noise and Operations Monitoring System) that identifies each individual aircraft arrival or departure. A full year of data was used to determine the baseline arrival and departure flight paths and flight path use. Standard INM inputs were used to determine arrival and departure profiles. INM input files, flight profiles, or other factors were not modified.

TABLE 3.3-3
BWI MARSHALL
RUNWAY UTILIZATION (2010)

	Total Operations	
	Day	**Night**
Runway 04	<0.1%	0.1%
Runway 10	14.7%	21.4%
Runway 15L	4.2%	5.2%
Runway 15R	14.8%	11.0%
Runway 22	0.1%	0.2%
Runway 28	31.6%	30.2%
Runway 33L	25.6%	24.0%
Runway 33R	8.9%	7.9%

Source: HMMH Integrated Noise Model Input Files provided by HMMH, FAA Terminal Area Forecast, and URS Analysis.

Note: Numbers may not add due to rounding

3.3.3.1 DNL Contours

Noise levels are commonly depicted as isopleths. These areas of equal value are depicted as DNL contours and present a graphical representation of the cumulative distribution of noise over the surrounding area. These values are based on average annual daily aircraft operations.

Based on the operational conditions presented above, noise contours were developed using the INM. Noise exposure for Existing Conditions (2010) aircraft operations at BWI Marshall is depicted on **Exhibit 3.3-1** as DNL 65, 70, and 75 dBA contours, superimposed over the local land use map. Noise sensitive land uses and general land uses within the existing DNL 65 dBA or greater noise contours are listed in **Table 3.3-4**.

As detailed in **Table 3.3-4** there are 190 acres of incompatible land uses in the environs of BWI Marshall as defined by incompatible land uses within the 65 and greater DNL noise contour. These are composed of 189 acres of single-family residential land uses and one acre of multi-family land uses affecting a total of 1,680 people.

TABLE 3.3-4
BWI MARSHALL 2010 EXISTING NOISE EXPOSURE

Land Use Classifications (Acres)		65 to 70 DNL	70 to 75 DNL	Over 75 DNL	TOTAL
Agriculture		0.5	0.0	0.0	**0.5**
MAA Owned Property		993.7	775.7	594.9	**2,364.3**
Cemetery		7.1	1.4	0.0	**8.5**
Commercial		190.4	0.0	0.0	**190.4**
Exempt Commercial		102.8	26.0	8.9	**137.7**
Forested Land		33.3	5.5	0.0	**38.8**
Industrial		391.9	36.7	0.0	**428.6**
Multi-Family Residential		1.0	0.0	0.0	**1.0**
Place of Worship		2.2	0.0	0.0	**2.2**
Recreation		5.6	0.0	0.0	**5.6**
Residential		131.5	15.1	0.0	**146.6**
School		9.3	0.0	0.0	**9.3**
Transient Lodging		224.0	55.3	2.0	**281.3**
	TOTAL	**2,093.3**	**915.7**	**605.8**	**3,614.8**
Number of Noise Sensitive Land Uses and Sites		65 to 70 DNL	70 to 75 DNL	Over 75 DNL	**TOTAL**
Residential	Single Family Dwellings	456	25	0	481
	Multiple Family Dwellings	24	0	0	24
Public Use	Churches, Auditoriums, and Concert Halls	1	0	0	1
	Historic	1	0	0	1
	Schools	1	0	0	1
	Hospitals and Nursing Homes	0	0	0	0
Population Estimates and Housing Unit Estimates		65 to 70 DNL	70 to 75 DNL	Over 75 DNL	**TOTAL**
Number of People		1,200	63	0	1,263
Number of Housing Units		480	25	0	505

Source: Adapted from the best available data: Anne Arundel County, MD; URS Analysis, 2011

3.3.3.2 Land Use Compatibility

As shown in **Exhibit 3.3-1** and **Table 3.3-4**, there are currently 190 acres of residential land use within the 65 DNL. These are defined by FAA as incompatible land uses.

3.3.4 EXISTING NOISE MANAGEMENT PROGRAMS

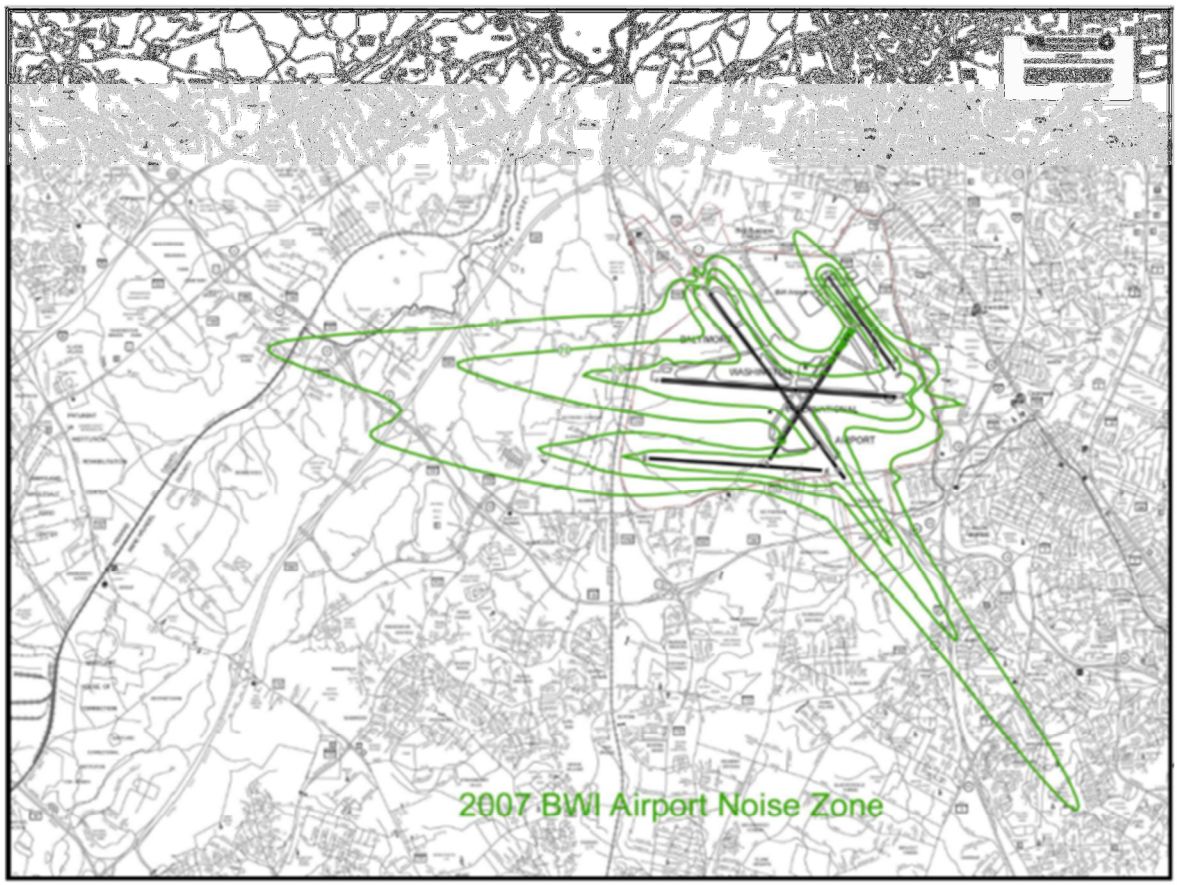
MAA administers a program at BWI Marshall to be in compliance with FAR Part 150, *Airport Noise Compatibility Planning*. As a part of BWI Marshall's Part 150 program, documentation of Noise Exposure Maps and a Noise Compatibility Program are submitted to FAA. This effort identifies noise sensitive land uses and attempts to reduce or eliminate conflicts between airport-generated noise and surrounding land uses. The most recent Part 150 Update of Noise Exposure Maps was submitted in December 2005 with an update of the Noise Compatibility Program submitted in August 2007. FAA has approved both elements of the current FAR Part 150 Update (April 2006 and February 2008, respectively).

The Code of Maryland Regulations via the Maryland Environmental Noise Act of 1974 (the "Act") provides for the protection of citizens from the impact of transportation related noise. The Maryland Aviation Administration (MAA) has a long history of comprehensive noise management programs. These programs can be categorized as Compatible Land Use Programs, Aircraft Operational Noise Management Programs, or Community Outreach Programs.

Compatible Land Use Programs – The aviation portion of the Act requires the MAA to create a certified Airport Noise Zone (ANZ) to control incompatible land development around BWI Marshall and a Noise Abatement Plan (NAP) to minimize the impact of aircraft noise on people living near the Airport. The MAA guidelines are similar to the FAA guidelines in that the ANZ is based on the DNL noise contour with 65 DNL delineating incompatible land uses. In 1976, the first ANZ and NAP were established. These programs are regularly reviewed and updated. The most recent update occurred November 6, 2007. The ANZ is shown in **Figure 3.3-1**.

The ANZ is determined by a composite of three noise contours: a base year contour, a five-year forecast, and a ten-year forecast. The largest of the three contours in any area around the Airport determines the Noise Zone, thereby offering protection within the largest of the existing or future noise exposure contours. The MAA uses the ANZ to control incompatible land development around the Airport. Other mechanisms that assist with compatible land uses in the vicinity of the airport include the Board of Airport Zoning Appeals (BAZA) and the requirement for Noise Zone Notification in real estate transactions.

BWI Marshall provides noise assistance programs to assist qualifying individuals and organizations with a means of improving their noise environment. These programs include the Voluntary Land Acquisition Program, Homeowners Assistance Program, and the School Soundproofing Program.



Aircraft Operational Noise Management Program – The ANZ is designed to ensure that land uses in the vicinity of BWI Marshall are compatible with aviation activities. The counterpart to the ANZ is the Noise Abatement Plan. The goal of the Noise Abatement Plan is to ensure that aircraft are operated in a manner that recognizes the sensitive land uses in the vicinity of the Airport. The following elements are included in the BWI Marshall Noise Abatement Plan:

NOISE ABATEMENT ELEMENTS	
Aircraft Noise Abatement Departure Procedures	• Noise abatement flight tracks which specify turn locations on all runways. • Limited use of Runway 4
Aircraft Noise Abatement Arrival Procedures	• VFR noise abatement arrival procedures
Preferential Runway Use System	• West operations are preferred for noise abatement. • Runway 10-28 is the preferred runway for noise abatement between the hours of 2300 and 0500 local time. • Limitation on the use of Runway 33R from 2300 to 0500 local time. • Practice landings and approaches by jet and turboprop aircraft are prohibited on all runways from 2300 to 0700 local time. • Noise Rule for runway 15L-33R
Continued Restricted Use of Runway 4-22	• In most cases, Runway 04-22 shall be closed to multi-engined aircraft from 2200 to 0700 local time.
Control of Ground Based Noise Sources	• Powerback Restrictions • Engine Maintenance Runup Restrictions • Tree Buffer Along East Airport Boundary
Airport Noise and Operations Monitoring System	• Continuously monitors noise levels in the airport area

Community Outreach Programs – BWI Marshall has an established citizen liaison program. The BWI Marshall Neighbor's Committee was founded by MAA in 1983 in response to citizen's concerns regarding aircraft noise and future airport growth and development. The BWI Marshall Neighbor's Committee currently consists of representatives from eleven communities surrounding the airport as well as airport users, pilots, and local, state, and federal officials.

BWI Marshall maintains a 24-hour noise hotline. Citizens can use this hotline to report loud noise events or other noise related concerns. Noise complaints can also be submitted online or via U.S. Mail. MAA publishes a Quarterly Noise Report. This report provides information regarding aircraft operations, long-term noise level trends, and the latest in Airport noise news.

3.4 AIR QUALITY

This section contains summary information pertaining to existing air quality conditions in Maryland (including the area surrounding BWI Marshall), including recent air quality monitoring data, relevant air quality regulations, and the governmental agencies involved in the management of this resource.

3.4.1 REGULATORY INFORMATION

This section briefly summarizes information that is considered important to understanding the regulatory framework associated with air quality management on a national level, in Maryland and the Baltimore area.

3.4.1.1 Air Quality Standards

To safeguard human health and environmental welfare against the harmful effects of outdoor air pollution, the U.S. Environmental Protection Agency (EPA) has issued National Ambient Air Quality Standards (NAAQS) under the Clean Air Act (CAA) that create threshold levels for ambient (i.e. outdoor) air concentrations of six "criteria" air pollutants. These air pollutants comprise carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), respirable particulate matter (PM_{10}), fine particulate matter ($PM_{2.5}$) and sulfur dioxide (SO_2). States have the prerogative to issue stronger standards than those listed in the CAA, however Maryland has opted to retain the NAAQS. A general description of EPA's "criteria" air pollutants is contained in **Table 3.4-1**, while the related NAAQS are listed in **Table 3.4-2**.

3.4.1.2 Air Quality Management Agencies

Under the authority of the CAA, the EPA promulgates national clean air regulations and sets air NAAQS. In Maryland, the responsibility of enforcing these regulations and ensuring that these standards are met falls upon the Maryland Department of Environment (MDE). Pursuant to this responsibility, the MDE prepares state-wide strategies and programs (called the State Implementation Plan – SIP) by which air quality goals and standards can be met. The local Metropolitan Planning Organization, the Baltimore Metropolitan Council (BMC), assists the MDE with SIP development and compliance with Transportation Conformity regulations as they pertain to air quality.

TABLE 3.4-1

EPA CRITERIA AIR POLLUTANTS

Pollutant	Characteristic
Carbon Monoxide (CO)	CO is a colorless, odorless, tasteless gas and is largely the product of incomplete combustion of fossil fuels from mobile sources (e.g., motor vehicles). Other sources include industrial processes and coal, kerosene, and wood-burning stoves in homes.
Lead (Pb)	Lead is one of the naturally occurring metal elements that are classified as a heavy metal and can be toxic if inhaled or ingested. The lead content of motor vehicle emissions, which was the major source of lead in the past, has significantly declined with the widespread use of unleaded fuel. Currently, smelters and battery plants are the major sources of lead emissions.
Nitrogen Dioxide (NO_2)	Current scientific evidence has concluded that short-term exposures to NO_2 concentrations cause respiratory irritation and asthma, especially to susceptible portions of the populations such as children, asthmatics and the elderly. Studies have also indicated that levels of NO_2 measured proximal to vehicular sources can be elevated by 2 to 3 times that of "background" levels.
Ozone (O_3)	O_3 is formed when nitrogen oxides and volatile organic compounds react in the presence of sunlight. O_3 is subject to long-range transport and is considered a "regional" pollutant. Volatile Organic Compounds (VOC) and oxides of nitrogen (NO_x) are considered precursors to O_3 formation at ground level, in stable atmospheric conditions, and in the presence of sunlight.
Particulate Matter (PM)	PM comprises very small particles of dirt, dust, soot, or liquid droplets called aerosols. A criteria air pollutant, the regulatory standard for PM is segregated by sizes (i.e., < 10 and < 2.5 microns as PM_{10} and $PM_{2.5}$, respectively). PM is formed as an exhaust product in the internal combustion engine or can be generated from the breakdown and dispersion of other solid materials (e.g., fugitive dust).
Sulfur Dioxide (SO_2)	Sulfur is a contaminant of fossil fuels. Emitted as a gas (sulfur dioxide, SO_2) or a solid (sulfates, SO_4), SO_x is an exhaust product of internal combustion engines. SO_x is measured in ambient air as SO_2; a "criteria" air pollutant. Coal-fired power plants are typically the largest sources of sulfur dioxide.

Source: KB Environmental Sciences, Inc., 2011.

TABLE 3.4-2
NATIONAL AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Period	Standard
Carbon monoxide (CO)	1-hour	35 ppm
	8-hour	9 ppm
Ozone (O_3)	1-hour	0.12 ppm
	8-hour (1997)	0.08 ppm
	8-hour (2008)[1]	0.075 ppm
Nitrogen dioxide (NO_2)	1-hour	100 ppb
	Annual	0.05 ppm
Sulfur dioxide (SO_2)	1-hour	75 ppb
	3-hour[2]	0.5 ppm
	24-hour	0.14 ppm
	Annual	0.03 ppm
Particulate matter (PM_{10})[3]	24-hour	150 $\mu g/m^2$
Fine particulate matter ($PM_{2.5}$)	24-hour	35 $\mu g/m^2$
	Annual	15 $\mu g/m^2$
Lead (Pb)	3-month[4]	0.15 $\mu g/m^2$

1 In 2008, the EPA promulgated a new, more stringent, standard for O_3 of 0.075 ppm. EPA is currently proposing to further lower this standard to a level between 0.06 and 0.07 ppm and will be finalized in late 2011.
2 The 3-hour SO_2 standard is a "secondary" standard.
3 EPA revoked the annual PM_{10} standard in 2006.
4 Corresponds to a rolling three month average or three years of monitoring data.

n/a = not applicable, ppm = parts per million, ppb = parts per billion, $\mu g/m^3$ = micrograms/cubic meter, mg/m^3 = milligrams/cubic meter

Source: US Environmental Protection Agency, 2011.

The Maryland Department of Transportation (MDOT) is involved in air quality management of Maryland's surface transportation facilities by means of coordination with the BMC and Federal Highway Administration (FHWA) in the development of Transportation Improvement Plans (TIPs) and adherence to the Transportation Conformity rules.

Finally, FAA is the primary agency involved in, and responsible for, ensuring that air quality impacts associated with proposed airport projects adhere to the reporting and disclosure requirements of NEPA as well as the General Conformity rule of the CAA.

Table 3.4-3 summarizes the federal, state and local agencies' roles and responsibilities with regards to air quality management in the Baltimore area and as it potentially applies to the assessment of the BWI Marshall ALP.

TABLE 3.4-3
AGENCIES INVOLVED WITH AIR QUALITY MANAGEMENT IN THE BALTIMORE AREA

Agency	Roles and Responsibilities
U.S. Environmental Protection Agency (EPA)	*Federal agency* – Sets national clean air policies under the federal CAA; promulgates the NAAQS; reviews and approves SIPs. Also regulates aircraft emissions. Maryland is under the jurisdiction of EPA's Region 3, headquartered in Philadelphia, PA.
Federal Aviation Administration (FAA)	*Federal agency* – Ensures that airport related developments comply with NEPA as well as the General Conformity Rule of the CAA. The FAA Eastern Regional Offices are located in Jamaica, NY.
Federal Highway Administration (FHWA)	*Federal agency* – Responsible for the approval of roadway projects under NEPA and the Transportation Conformity Rule of the CAA. This includes working with MDOT and BMC in establishing the TIP and RTP for the Baltimore area.
Maryland Department of the Environment (MDE)	*State agency* – Implements and enforces air quality programs state-wide including those pertaining to ambient air monitoring, stationary source permitting, smoke management, regional haze, and PSD. Also involved in the development of the SIPs in non-attainment areas in Maryland. The central regional offices are headquartered in Baltimore, MD.
Maryland Department of Transportation (MDOT)	*State agency* – Works with the FWHA and BMC to coordinate the Baltimore regional components of the TIP and RTP into the STIP. Headquartered in Hanover, MD.
Baltimore Metropolitan Council (BMC)	*Local agency* – The BMC assists the MDE in the SIP preparation process with regards to development of local control strategies for on-road and non-road mobile sources. Also involved in the development of the Baltimore area TIP/RTP. Headquartered in Baltimore, MD.

CAA = Clean Air Act, NAAQS= National Ambient Air Quality Standards, NEPA = National Environmental Policy Act, PSD = Prevention of Significant Deterioration, RTP = Regional Transportation Plan , SIP = State Implementation Plan, STIP = Statewide Transportation Improvement Plan, TIP = Transportation Improvement Plan

Source: KB Environmental Sciences Inc., 2011

3.4.1.3 Attainment / Non-attainment Designations

BWI Marshall is located in a six-county area of Maryland that is currently designated "non-attainment" for the EPA "criteria" pollutants O_3 and $PM_{2.5}$, (2008 and 1997 standards, respectively).[2] This signifies that past violations of the NAAQS for these criteria pollutants have occurred"[3]. Portions of the city of Baltimore are also included in a CO maintenance area, signifying that past infractions of the CO NAAQS have occurred but have since been remedied. However, BWI Marshall is not located within the boundaries of this maintenance area.

[2] The EPA criteria pollutants include carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particulate matter with diameters of 10 micrometers or less (PM_{10}), particulate matter with diameters of 2.5 micrometers or less ($PM_{2.5}$) and sulfur dioxide (SO_2)

[3] Both the Baltimore Ozone and Particulate Matter Non-attainment Areas encompass the six-county region of Carroll, Baltimore, Harford, Baltimore City, Howard and Anne Arundel Counties.

A summary of the NAAQS attainment designations for the area encompassing BWI Marshall is reported in **Table 3.4-4**

TABLE 3.4-4
ATTAINMENT / NON-ATTAINMENT DESIGNATIONS

Pollutant	Designations
Carbon monoxide (CO)	Attainment
Lead (Pb)	Attainment
Nitrogen dioxide (NO_2)	Attainment
Ozone (O_3), 8-Hour (1997, 2008)	Non-attainment (moderate)
Particulate matter (PM_{10})	Attainment
Particulate matter ($PM_{2.5}$) (1997)	Non-attainment
Sulfur dioxide (SO_2)	Attainment

Source: US EPA Greenbook Non-attainment Areas for Criteria Pollutants, 2011.

3.4.1.4 State Implementation Plans

The CAA requires individual states to develop, update and maintain a SIP that demonstrates compliance with the NAAQS. Common features of a SIP include attainment timeframes and milestones, area-wide emissions inventories and budgets, as well as emission control and mitigation strategies.

In June 2007 the MDE submitted to the EPA an eight-hour O_3 SIP detailing a current area-wide NO_x and VOC emissions inventory.[4,5] The emission control strategies target significant NO_x reductions from power plant sources under the MDE Healthy Air Act, as well as increased controls on VOC emissions resulting from solvent and paint use and fuel storage.

In March 2008, MDE issued its $PM_{2.5}$ SIP for the Baltimore non-attainment area, which included emissions inventories for years 2002 and 2009. The emissions-control measures proposed in the SIP include modifications to existing stationary sources, motor vehicle inspection and maintenance programs, and Tier 2 emissions standards for construction equipment.[6]

3.4.2 SOURCES OF AIRPORT AIR EMISSIONS

Airport-related sources of air emissions are typically classified into the six general source categories listed in **Table 3.4-5,** which provides a summary listing of these sources at airports (including BWI Marshall), the pollutants emitted, and their general characteristics.

[4] Volatile Organic Compounds (VOC) and NOx are considered ozone precursor pollutants.
[5] *Baltimore Nonattainment Area 8-Hour Ozone State Implementation Plan and Base Year Inventory.* SIP Number: 07-04. June 15, 2007
[6] *Baltimore Nonattainment Area PM2.5 State Implementation Plan and Base Year Inventory.* SIP Number: 08-04. March 24, 2008

TABLE 3.4-5
TYPICAL AIRPORT-RELATED SOURCES OF AIR POLLUTANT EMISSIONS

Sources	Pollutants	Characteristics
Aircraft	CO, VOC, NO_x, PM, SO_2	Exhaust products of fuel combustion that vary greatly depending on aircraft engine type, power setting, and period of operation. For airport air quality assessments, these emissions are confined to the typical landing and take-off cycle (i.e., landing, take-off, climb-out, and taxi/delay periods).
Motor vehicles	CO, VOC, NO_x, PM, SO_2	Exhaust products of fuel combustion from passenger, cargo, and employee traffic moving about the airport roadways and parking facilities. Emissions vary depending on vehicle type, fuel type, distance traveled, operating speed, ambient conditions (i.e., temperature), and roadway operating conditions (i.e., "stop-and-go" versus free-flow). Off-site airport-related motor vehicles traveling on public highways and roadways or using off-airport parking facilities are not included.
Ground support equipment (GSE) / Auxiliary Power Units (APUs)	CO, VOC, NO_x, PM, SO_2	Exhaust products of fuel combustion from service trucks, tow tugs, belt loaders, and other portable equipment. Emissions vary by engine and fuel types. Also includes exhaust emissions from aircraft on-board engines used for supplemental electricity and air conditioning. At BWI Marshall, SWA-operated aircraft gates furnish electricity and a/c to the aircraft, minimizing the use of aircraft APUs.
Fuel storage and transfer facilities	VOC	Formed from the evaporation and vapor displacement of fuel from storage tanks and fuel transfer facilities. Emissions vary with fuel usage, type of storage tank, refueling method, fuel type, vapor recovery systems, humidity, and ambient temperature.
Stationary source facilities	CO, VOC, NO_x, PM, SO_2	Exhaust products of fossil fuel combustion from boilers dedicated to indoor heating requirements; emergency power generators; food preparation; and maintenance activities (i.e., painting, solvent cleaning, etc.) for aircraft, buildings, and other infrastructure. These emissions are generally well controlled with operational techniques and post-burn or after-use collection methods.
Construction activities	CO, VOC, NO_x, PM, SO_2	Construction activities represent temporary sources of emissions primarily associated with the exhaust from construction equipment; dust generated during construction, demolition, and land clearing activities; and evaporative VOC from asphalt paving operations.

Source: KB Environmental Sciences, Inc., 2009.

3.4.3 AMBIENT AIR QUALITY MONITORING

The MDE maintains an air quality monitoring network composed of approximately 26 monitoring stations throughout Maryland, each one monitoring pollutant concentrations and meteorological data.

Within Anne Arundel County, three MDE $PM_{2.5}$ and O_3 monitors were active between the years of 2005 to 2008. The PM monitor closest to BWI Marshall is nine miles southeast and is located at the Anne Arundel County Public Works Building. The closest O_3 monitor to BWI Marshall is the Davidsonville Recreational Center located on Queen Anne Bridge Road, 11 miles due south. **Table 3.4-6** summarizes the concentrations of $PM_{2.5}$ and O_3 from these monitors.

TABLE 3.4-6
AMBIENT AIR QUALITY MONITOR VALUES,
ANNE ARUNDEL COUNTY, MD

Station[4]	Pollutant	Averaging Period	NAAQS	Year			
				2008	2009	2010	2011
Anne Arundel County Public Works Bldg. (9 miles SE)	$PM_{2.5}$	Annual[2] ($\mu g/m^3$)	15.0	12.6	11.1	11.0	10.8
		24-hour[3] ($\mu g/m^3$)	35	34.4	25.2	27.5	24.4
Davidsonville Recreational Center (11 miles S)	O_3	8-hour[1] (ppm)	0.075	0.081	0.070	0.087	Not available

1 To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm (effective May 27, 2008)
2 To attain this standard, the 3-year average of the weighted annual mean PM2.5 concentrations from single or multiple community-oriented monitors must not exceed 15.0 $\mu g/m^3$
3 To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 $\mu g/m^3$
4 Includes distance and direction from BWI-Marshall
ppm = parts per million, $\mu g/m^3$ = micrograms per cubic meter, N/A = not applicable, $PM_{2.5}$ = particulate matter with size diameters of 2.5 micrometers or less, O_3 = ozone

Source: U.S. Environmental Protection Agency AQS DataMart, accessed February 21, 2012.

3.5 WATER QUALITY

3.5.1 SURFACE WATER QUALITY

The study area lies within the Baltimore Harbor (Maryland 8-digit watershed code 02130903), and Patapsco River Lower North Branch (Maryland 8-digit watershed code 02130906) watersheds. Within the Baltimore Harbor watershed, the study area falls within two separate Maryland 12-digit sub-watersheds: 021309031008 and 021209031009. One Maryland 12-digit sub-watershed within the Patapsco River Lower North Branch watershed is located partially within the study area: 021309061011. Subwatershed boundaries are shown on **Exhibit 3.5-1**.

Based on U.S. Geological Survey (USGS) 1:24,000 scale quad map for Relay, Maryland, the following stream systems are present within the study area (although the majority of stream systems were not named on the USGS map). Jurisdictional wetlands also exist adjacent to many of these streams (see **Section 3.9 – Wetlands** for further discussion):

- *Cabin Branch* – located in the northeast portion of the study area, Cabin Branch drains parking and roadway facilities north of the airport. Much of Cabin Branch has been previously impacted by construction of the General Aviation complex and off-airport parking.
- *Muddy Bridge Branch* – located in the northeast portion of the study area, south of Cabin Branch, Muddy Bridge Branch drains the majority of the General Aviation complex. Much of Muddy Bridge Branch was previously impacted by the construction of Runway 15L-33R.
- *Irving Branch* – located in the eastern portion of the study area, Irving Branch drains areas in the vicinity of the 28 end of Runway 10-28.

- *Fork Branch* – located in the southern portion of the study area, Fork Branch drains the majority of the southeast portion of the study area, in the vicinity of the 33L end of Runway 15R-33L.
- *Clark Branch* – located in the southwest portion of the study area, Clark Branch drains the southwest portion of the airport, the majority of which is forested.
- *Hawkins Branch* – located in the western portion of the study area, Hawkins Branch drains the majority of the forested area south of Mathison Way.
- *Signal Branch* – located in the western portion of the study area, Signal Branch drains the majority of the Midfield Cargo Complex. Much of Signal Branch and its drainage area was impacted by the construction of the Midfield Cargo Complex.
- *Bowden Branch* – located in the western portion of the study area, Bowden Branch drains the portion of the airport near the 10 end of Runway 10-28.
- *Kitten Branch* – located in the northwest portion of the study area. Kitten Branch drains the majority of the BWI Marshall terminal area and runways.
- *Sachs Branch* – located in the northern portion of the study area before converging with Kitten Branch. Sachs Branch drains the majority of the northern portion of the study area.
- *Stony Run* – located west of BWI Marshall, Stony Run is fed by Clark Branch, Hawkins Branch, Signal Branch, Bowden Branch, Kitten branch, and Sachs Branch, in addition to numerous streams located outside of the study area.
- *Phelps Branch* – located in the southeast portion of the study area, Phelps Branch drains the southeast portion of the airport, the majority of which is forested.
- *King Branch* – located in the western portion of the study area, King Branch drains a portion of the northwest area of the airport, before draining into Stony Run.

The 2001 *Comprehensive Wetland Inventory, Baltimore/Washington International Airport* also identified several unnamed tributaries and ephemeral drainage channels. All previously identified streams are shown on **Exhibit 3.5-1** and detailed information for each system is included in **Appendix D.**

All of these streams are classified by the Maryland Department of Environment (MDE) as Use I streams. Use I waters are defined as being suitable for water contact sports; fishing and propagation of fish (excluding trout), other aquatic life and wildlife; and agricultural and industrial water supply.

Water quality criteria for Use I streams Code of Maryland Regulations (COMAR 26.08.02.03) require that:
- They do not contain sufficient quantities of pathogenic or harmful organisms to pose a public health hazard;
- The dissolved oxygen content be 5.0 milligrams per liter (mg/l) or greater;
- The maximum temperature of the water be less than 32 degrees Celsius (90 degrees Fahrenheit)
- Normal pH values may not be less than 6.5 or greater than 8.5.
- Turbidity may not exceed levels detrimental to aquatic life.

The MAA has developed and continued to maintain a comprehensive Stormwater Management (SWM) Plan since 1993. This plan's overall goal is to achieve and maintain in-stream water quality standards for each of the 13 headwater systems that originate on or receive drainage from the Airport. All SWM

facilities are designed for consistency with Maryland standards for both water quality (COMAR 26.08.02) and stormwater management (COMAR 26.17.02). In addition, MAA maintains an individual industrial Federal permit for compliance with National Pollutant Discharge Elimination System (NPDES) standards for water quality control as required by the FAA for airports of this size. The latest update of this permit (required every five years) was prepared for submission and acceptance by both Federal and State agencies in June 2009. The MAA will comply with the existing permit until a new permit is issued by MDE.

3.5.2 GROUNDWATER QUALITY

Details on the groundwater quality around BWI Marshall, as identified below, are included in the Anne Arundel County *Master Plan for Water Supply and Sewerage Systems 2007-2010*. The principal source of groundwater near the study area is the Patuxent formation of the Potomac Group of aquifers. The Patuxent formation ranges between 100 and 300 feet thick and consists of sand, gravel, and variegated clay. The Patuxent aquifer dips toward the southeast at a rate of 85 to 90 feet per mile. The Patuxent aquifer outcrops in bands several miles wide roughly parallel to the Fall Line along Anne Arundel County's western and northwestern boundary (Anne Arundel County *Master Plan for Water Supply and Sewerage Systems 2007-2010*). The formation crops out in a narrow belt in the northwestern part of the County. The recharge area in Anne Arundel County consists of approximately 10 square miles of a 120-square mile total outcrop area. In 2007, the Maryland Geological Survey estimated that as much as 16 million gallons per day (mgd) could be withdrawn from the Patuxent aquifer in Anne Arundel County. The Patapsco, Magothy, and Aquia aquifers are also used as for water supply in Anne Arundel County. The majority of the study area is located in the recharge area for the Patapsco aquifer.

None of the aquifers underlying the study area are designated as "sole-source" aquifers by the U.S. Environmental Protection Agency (EPA). EPA defines a sole- or principal-source aquifer as one which supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer. The only sole-source aquifers in Maryland are the Maryland Piedmont aquifer in Montgomery, Howard, and Carroll Counties, and the Maryland Poolsville aquifer extension of the Maryland Piedmont aquifer in Montgomery County.

Groundwater quality within the vicinity of the study area varies from different areas within the same aquifer. Some of the groundwater in the County may be used without treatment although high mineral content may cause some groundwater to need treatment before use. No Federal or State standards have been established for raw groundwater (i.e., pre-extraction). There are standards that apply to a public drinking water source, but these are applied within the water distribution system, not in the ground. However, there are regulations concerning discharge of pollutants to groundwater. The MDE - Water Management Administration is responsible for the regulation of these discharges (Anne Arundel County Master Plan for Water Supply and Sewage Systems, 2007-2010).

The Anne Arundel County Department of Health has identified three potential groundwater problem areas within the County. These problem areas are due to salt water intrusion, elevated radium, and elevated nitrate levels:

1. Annapolis Neck
2. Gambrills Area
3. Northern Anne Arundel County (generally, all areas north of Maryland Route 50)

The study area is located within the Northern Anne Arundel County problem area. New and replacement wells in this area are required to be installed to a minimum well depth as determined by the Anne Arundel County Department of Health, and meet gross alpha and Radium 226/228 drinking water standards. Owners of private wells are encouraged to test their water supply for gross alpha particles. Where levels are found above the drinking water standards, a water treatment unit or a replacement well in a deeper aquifer is recommended.

BWI Marshall receives its water supply from Anne Arundel County. The county uses deep water wells in the Patapsco, Patuxent, and Aquia aquifers, as well as purchasing water from Baltimore City. One county well field is located southeast of the airport, along Dorsey Road adjacent to I-97. This well field is the Dorsey Road Water Treatment Plant (WTP) and it has seven production wells drawing from the Patuxent aquifer and is slated for future capital improvements in its current location. At the current withdrawal rates, there is a cone of depression around the Dorsey well field (Anne Arundel County *Master Plan for Water Supply and Sewerage Systems 2007-2010*).

Though served by Anne Arundel County water supplies, the wastewater collection system at the airport is the property of MAA and wastewater is conveyed to Baltimore County for treatment (Anne Arundel County *Master Plan for Water Supply and Sewage Systems, 2007-2010*).

There is one public water supply well located in the vicinity of the study area, at the Fleck Machine Company, Inc. on Ridge Road. The MDE has classified this well as a Non-transient Non-community Water System. The source of this well is the Patuxent aquifer. The County has established a wellhead protection zone 1,000 feet in radius around the well. No other wellhead protection zones are located in the vicinity of the study area. Other commercial and residential developments within the study area rely upon municipal water supplies.

3.6 DEPARTMENT OF TRANSPORTATION, SECTION 4(f) LANDS

Section 4(f) of the Department of Transportation (DOT) Act, which is codified and renumbered as Section 303(c) of 49 U.S.C., provides that the Secretary of Transportation will not approve any program or project that requires the use of any publicly owned land from a public park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance or land from an historic site of national, state, or local significance as determined by the officials having jurisdiction thereof, unless there is no feasible and prudent alternative to the use of such land and such program, and the project includes all possible

planning to minimize harm resulting from the use. The policies Section 4(f) engendered are widely referred to as "Section 4(f)" matters.

3.6.1 PUBLIC PARK AND RECREATION AREAS

There are three resources within the study area that qualify for protection under the provisions of Section 4(f). They are described below and their locations shown on **Exhibit 3.6-1**.

3.6.1.1 Thomas A. Dixon Observation Area – Friendship Park

This area, located south of the approach end of Runway 33L, is on airport property and MAA manages it for recreational use as an area for the public to observe aircraft arrivals and departures, a children's playground, and for automobile parking to access the BWI Trail. The Observation Area is accessed from Dorsey Road (Maryland Route 176) between Route 170 and Aviation Boulevard and provides paved parking for approximately 75 vehicles.

3.6.1.2 BWI Trail

The BWI Trail is a recreational trail encircling the BWI Marshall campus that is available to the public for bicycling, walking, running, and other such activities. The trail, completed in 1999, is 12.5 miles long and provides bicycle access to the Baltimore & Annapolis Trail (B&A Trail) which extends through most of Anne Arundel County. Most of the trail has an asphalt surface; however, wooden boardwalks are used in environmentally sensitive areas to protect natural features. Most of the trail is on MAA-owned property, but MAA will relocate the trail for airport projects. . The trail has been built and maintained through a public/private cooperative effort that includes the Anne Arundel County Department of Recreation and Parks, the MAA, the State Highway Administration, the BWI Airport Neighbors Committee, Maryland Department of Natural Resources (MDNR), and the Mass Transit Administration. Automobile parking for Trail users is primarily located at the Thomas A. Dixon Observation Area.

3.6.1.3 Andover Park

Andover Park is a local park maintained by the Anne Arundel County Department of Recreation and Parks that includes baseball fields, picnic areas, and other multipurpose fields. The park is located north of the BWI Marshall campus with the entrance to the park located on Andover Road.

3.6.2 WILDLIFE MANAGEMENT AREAS

There are no wildlife management areas within the study area for the proposed improvements.

3.6.3 HISTORIC AND ARCHAEOLOGICAL SITES

The Benson-Hammond House, a National Register listed site (see **Section 3.7**), lies within the Generalized Study Area in the northeast corner of the BWI Marshall campus, just south and west of Aviation Boulevard. The viewshed for the historic site includes the airport runways, terminal and other aviation related structures on the Airport.

3.7 HISTORICAL, ARCHITECTURAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

Under Section 106 of the National Historic Preservation Act of 1966 (as amended), the FAA must, prior to expenditure of funds or issuance of a license or permit for the undertaking, take into account the effect any project may have on any property listed or eligible for listing in the National Register of Historic Places. Historic structure and archeology surveys and analyses was undertaken in July 2006, April and May 2009, and February 2011, in accordance with FAA Order 1050.1E, Change 1, Section 106 of the National Historic Preservation Act of 1966, and 36 CFR Part 800, Protection of Historic and Cultural Properties, the procedures of the Advisory Council on Historic Preservation for implementing the Act.

3.7.1 AREA OF POTENTIAL EFFECT

For above-ground historic structures, an APE is defined as "the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist" (36 CFR § 800.16[d]). It includes potential direct or indirect impacts to historic resources from project activities, such as acquisition of property, property easements, and/or visual and audible effects.

The proposed APE for above-ground historic structures as defined herein is based on a visual survey of the study area and background research. The APE includes all areas of potential ground disturbance, including access roads and staging areas. This APE is based on the potential for the project to affect the viewshed of historic properties, although other possible effects, such as noise, were considered in delineating the APE. The APE for historical resources in the GSA and the APE for archaeological resources is defined by the LODs for the proposed improvements.

3.7.2 HISTORIC STRUCTURES RECONNAISSANCE SURVEY

Historical Background - Background research was conducted at the Maryland Historical Trust (MHT) in Crownsville and at the Enoch Pratt Free Library and the Maryland Historical Society, both in Baltimore. The goal of the research was to develop a comprehensive context for the historical development of the generalized study area and to make use of previous studies of historic resources in the APE.

A Comprehensive Historic Preservation Plan (HPP) was prepared for BWI in 1995 to assist in compliance with the National Historic Preservation Act (NHPA) (Brown, et al., 1995). The HPP focused primarily on

archeological considerations, having determined that there was only one National-Register eligible historic property (above-ground structure) within the airport property (Benson-Hammond House, AA-118). In addition to the HPP, historic maps, the MHT Library, Maryland Inventory of Historic Properties (MIHP), and Determination of Eligibility (DOE) forms were consulted as part of the preliminary study.

Identification Method and Results - A review of MHT files and reports revealed that there is one previously identified above-ground historic resource located within the APE.[7] Friendship Cemetery was identified as part of the 1995 HPP (Brown, et al., 1995). The cemetery, established in 1907, was historically associated with the Friendship Episcopal Methodist Church, which was built in 1901 and razed in 1948. Friendship Cemetery remains the only active cemetery on the BWI property; however, the tall metal entry that carried its name across the arch has been removed and a chain-link perimeter fence with gate has been installed.

The proposed APE was observed during a reconnaissance survey conducted in December 2008. It was noted that, with the exception of the Friendship Cemetery, there are no above-ground structures 50 years of age or older located within the APE. In addition, the areas of proposed improvements will take place adjacent to existing post-1975 development. The Benson-Hammond House (AA-118) is located approximately 4,800 feet northeast from the closest area of proposed construction and is, therefore, located outside of the APE for the project. Friendship Cemetery, which does not contain the grave of any person of historical importance, does not contain exceptional significance to be considered eligible under National Register of Historic Places (National Register) Criteria Considerations A (religious property deriving primary significance from architectural or artistic distinction or historical importance) or D (cemetery which derives its primary significance from graves of persons of transcendent importance, from age, from distinctive design features, or from association with historic events) was considered not eligible as part of the 1995 HPP. The cemetery has not achieved significance since the previous evaluation and remains not eligible for listing in the National Register.

3.7.3 ARCHAEOLOGICAL ASSESSMENT

The purpose of the archeological assessment is to evaluate known archeological resources and the potential for additional archeological sites in or near the study area. The assessment represents an initial stage in the identification of sites that may require evaluation for eligibility for listing in the NRHP.

The HPP identifies Archaeological Sensitivity Zones (see **Exhibit 3.7-1**):

- Previously Evaluated (No Additional Archaeological Study Required)
- No Probability for Sites
- High Probability for Historic Sites
- High Probability for Prehistoric Sites (Buried Deposits)
- Moderate to Low Probability for Prehistoric & Historic Sites
- National Register-Eligible Site

[7] Hangar # 1 (AA-0030) was determined not eligible in 1994 and has since been concealed/demolished as a result of the construction of the International Terminal in 1997.

A Phase IB Archaeological Survey was performed in all low, moderate, and high probability areas within the DSA. This survey did not identify any significant archaeological resources present in these areas. The survey report and addendum were reviewed and accepted by the MHT (see **Appendix D**).

3.8 FISH, WILDLIFE, AND PLANTS

3.8.1 FOREST RESOURCES

The Maryland General Assembly passed the Maryland Forest Conservation Act (FCA) in 1991 to preserve the State's forest resources and other sensitive areas during development activities. The Act requires identification of existing forest stands, protection of the most desirable forest stands, and establishment of new areas where new forests can be planted. The FCA requires that prior to the approval of any public or private subdivision, project plan, grading permit, or sediment control permit on a unit of land 40,000 square feet or greater, applicants shall submit a Forest Stand Delineation (FSD) and a Forest Conservation Plan (FCP). These documents must be approved by the Maryland Department of Natural Resources (MDNR) before approval can be granted (*State Forest Conservation Technical Manual, Third Edition*, 1997). The FCA has an exemption that includes "areas under Federal Aviation Administration restrictions", such as Part 77 obstructions. Also removing FAR Part 77 obstructions is exempt from the mitigation requirements of the FCA. The provisions of the Forest Conservation Act of 1991 can be found in the Annotated Code of Maryland (Natural Resources Article, Title 5, Subtitle 16) and the Code of Maryland Regulations (COMAR Title 08, Subtitle 19, Forest Conservation).

To comply with the provisions of the Maryland Forest Conservation Act (FCA), MAA completed a *Forest Stand Delineation Report for BWI Airport* (Greiner, 1994), which was approved by MDNR in April 1995. This report identified 110 individual forest stands, totaling 768 total acres. The FSD was updated in 2003, to include the airport and some additional off-site properties that were acquired by MAA. The updated *Forest Stand Delineation Report for BWI Airport* (Straughan, 2003) identified 123 forest stands, 8 afforestation areas, and 4 off-site mitigation areas totaling 985 acres. As part of the FSD, MAA characterized all forest stands present on BWI Marshall and adjacent MAA owned lands, and documented their size, topography, canopy, dominant/co-dominant species, understory species, and herbaceous species. Of the identified forest stands, 27 are located within the proposed limits of disturbance of the project areas. In addition, two afforestation areas and two off-site forested areas are located within the proposed limits of disturbance. The majority of the affected areas on BWI Marshall consist of heterogeneous mixtures of deciduous and coniferous species, composed primarily of oak-hickory, maple-tulip, and Virginia pine.

MAA also prepared the *Reforestation Master Plan for BWI Airport* (Greiner, 1998) to summarize potential impacts to forested areas on BWI Marshall as a result of planned future development, and identify conservation and reforestation efforts in anticipation of future development. *The Reforestation Master Plan for BWI Airport* was later updated in 2003. The Reforestation Master Plan (RMP) serves as a tool to track forest impacts and previous mitigation efforts. As development occurs, MAA can calculate the required reforestation acreage for each project and determine whether previous mitigation measures will

be sufficient or additional mitigation will be required. A revised RMP is currently in progress and will be coordinated with MDNR as part of FCA compliance.

MAA also prepared the *Forest Maintenance Plan for BWI Airport* (Straughan, 2004) to establish in detail the MAA's plans to manage and maintain its forest resources, while complying with pertinent environmental regulations and aviation safety and security mandates. The Forest Maintenance Plan (FMP) was updated in February 2009 (MDNR approval June 2009). The 2009 FMP Update included additional offsite MAA owned parcels (80) that were not documented by any of the previous reports. In total, the 2009 FMP Update identified 254 forest stands, 66 afforestation areas, and 4 mitigation sites totaling 1,204 acres. All forested areas in the vicinity of the Airport are shown on **Exhibit 3.8-1**.

3.8.2 RARE, THREATENED, AND ENDANGERED SPECIES

Section 7(c) of the Endangered Species Act of 1973 (16 USC 1531 *et seq*.) requires that the potential impacts to rare, threatened, and endangered (RTE) species of flora and fauna and their critical habitats be identified to avoid adverse impacts to these species. Consultation with the U.S. Fish and Wildlife Service (USFWS) and the MDNR was conducted to determine the potential for RTE species to occur within or in close proximity to the study area.

There is a large Sensitive Species Project Review Area (SSPRA) near the BWI Amtrak station, within the floodplain and wetlands associated with Stony Run (see **Exhibit 3.8-2**). SSPRAs are designated by the MDNR, and generally contain habitat for RTE species and rare natural community types. The area near the BWI Amtrak Station is a pitch pine-red maple swamp which is a rare community in the Upper Coastal Plain. Four rare plants have been identified in this area:

- Swamp Pink *(Helonias bullata)*: a state listed endangered and Federally listed threatened perennial herb with basal evergreen leaves that occurs in bogs and swamps;
- Giant Cane *(Arundinaria gigantea)*: a state listed tall grass that is almost woody that occurs in swamps and bogs;
- Bog Fern *(Thelypteris simulata)*: a state listed threatened deciduous fern that occurs in bogs and swamps; and
- Clammyweed (*Polanisia dodecandra)*: a state listed endangered annual herb that occurs in uplands.

Mapping obtained from the MDNR indicates that potential Forest Interior Dwelling Species (FIDS) habitat is present within the western portion of the study area, within the floodplain and wetlands associated with Stony Run (see **Exhibit 3.8-2**). Potential FIDS habitat is defined as a forest tract that is either greater than 50 acres in size and containing at least 10 acres of forest interior habitat (forest greater than 300 feet from the nearest forest edge), or riparian forests associated with perennial streams that are, on average, at least 300 feet in total width and greater than 50 acres in total forest area.

3.8.3 HAZARDOUS WILDLIFE ATTRACTANTS

FAA AC 150/5200-33B, *Hazardous Wildlife Attractants on or Near Airports,* provides guidance on certain land uses, including recommendations to discourage the placement of new storm water management facilities, wetlands, streams or forest, that have the potential to attract hazardous wildlife on or near public-use airports. As part of this AC, the FAA recommends that airport operators should ensure that water management facilities should be designed for a maximum 48-hour detention period and that plant species known to attract potentially hazardous wildlife are not used on the airport. Operators of airports should develop a Wildlife Hazard Assessment (WHA) and Wildlife Hazard Management Plan (WHMP) to protect aviation safety.

MAA has engaged the United States Department of Agriculture, Animal and Plant Health Inspection Services, Wildlife Services (USDA-WS), who acts an agent for FAA through a Memorandum of Understanding, to comply with this AC. In additional to conducting a Wildlife Hazard Assessment, preparing the subsequent *Wildlife Hazard Management Plan (WHMP) for BWI* in 2002 and updating the plan annually, USDA-WS has two wildlife biologists at BWI Marshall to help manage habitat on and around the airfield to discourage hazardous wildlife from using the area and consult with MAA on wildlife management strategies.

3.9 WETLANDS

Wetlands are areas characterized by hydric soils, hydrophytic vegetation, and frequent flooding or inundation during the growing season. They are included in the broad definition of "Waters of the United States," which includes lakes, rivers, streams, mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, and natural ponds.

3.9.1 FEDERAL AND STATE REGULATIONS

Federal and State of Maryland regulations address activities conducted in wetlands and Waters of the US in order to minimize the continuing degradation of these resources and achieve a "no net loss" policy. Maryland's Nontidal Wetland Protection Act (1991) is based on Section 404 of the Clean Water Act (CWA), and the US Army Corps of Engineers' (COE) implementation regulations (33 CFR, Parts 320-330). In addition, Executive Order 11990 directs all Federal agencies to avoid then minimize the destruction, loss and degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands and waters of the U.S. The Maryland Department of the Environment (MDE) - Wetland and Waterways Division is tasked with administering Section 404 of the CWA at the state level and coordinates with the COE to determine the jurisdictional status of wetlands and waterways (Code of Maryland Regulations [COMAR] 26.23 and 26.24). The Wetland and Waterways Program encompasses two regulatory divisions: the Nontidal Wetlands and Waterways Division and the Tidal Wetlands Division. Tidal wetlands do not exist within the study area of this EA. Maryland Nontidal law is somewhat broader in its jurisdiction and differs from Federal law through its regulation of the following: isolated wetlands; the alteration of vegetation and hydrology; and the inclusion of a 25-foot wetland buffer. In addition, the

regulated wetland buffer is increased to 100 feet for "Nontidal Wetlands of Special State Concern." These wetlands are those designated by the State as having exceptional ecological or educational value of statewide significance. Nontidal Wetlands of Special State Concern (WSSC) are present within the General Study Area along Stony Run west of the Amtrak Line (see **Appendix E**).

3.9.2 WETLAND DELINEATION

MAA continuously updates the wetland inventory for BWI Marshall and closely coordinates with both the MDE and COE regarding the jurisdictional status of their wetland resources. A preliminary Jurisdictional Determination was performed by COE and MDE in January 2011. Boundaries of jurisdictional wetlands are depicted on **Exhibit 3.9-1**.

3.9.3 RESULTS

All known wetland areas and Waters of the US are shown on **Exhibit 3.9-1**. Detailed information on the wetlands and waterways is included in **Appendix D**. Wetland and upland data sheets are included in **Appendix D** within the *Wetland Identification and Delineation Report* as prepared by URS/A. D. Marble in October 2008. Additional wetlands (17 total) have been delineated by MAA and surveyed by URS within the project study area. MAA staff assisted Straughan Environmental Services, Inc. in completing wetland delineations for remaining areas not identified in earlier delineation efforts. These additional wetland areas were identified using the Atlantic and Gulf Coastal Plain Region Wetland Determination Data Forms, flagged and surveyed, with the effort completed in March 2009.

3.10 FLOODPLAINS AND FLOODWAYS

Executive Order 11988, Floodplain Management, defines floodplains as the "lowland and relatively flat areas adjoining inland and coastal waters including flood prone areas of offshore islands, including at a minimum, the area subject to a one percent or greater chance of flooding in a given year." The Order directs Federal agencies to take action to reduce the risk of flood loss, minimize the impact on human safety, health, and welfare, and restore and preserve the natural and beneficial values served by floodplains. The State of Maryland regulates construction activities within floodplains under COMAR 26.17.04 (*Construction on Nontidal Waters and Floodplains*).

The Federal Emergency Management Agency (FEMA) has adopted the 100-year floodplain as the base flood for floodplain management. This is a flood having a one (1) percent chance of occurring in any given year. Flood Insurance Rate Maps (FIRM) show the floodplain areas and define those areas in terms of Zones.

As defined in the *Floodplain Management Plan Five-Year Work Plan* (MDE 2004):

> "The State of Maryland passed the Flood Control and Watershed Management Act of 1976 to provide the foundation for watershed planning for flood management. Five goals were established: (1) reduction of existing flood hazards; (2) prevention of future flood hazards; (3) adequate emergency

preparedness; (4) preservation of the environmental quality of watersheds; and (5) reduction of economic and social losses. The Act also stated the need for better coordination among agencies having flood hazard mitigation responsibilities. It mandated the development of a list of priority watersheds to be studied for the 100-year flood and the preparation of local flood management plans."

3.10.1 PRELIMINARY RESEARCH

Flood areas within and adjacent to the Airport were extracted from FIRM of Anne Arundel County, Community-Panel Number 240008 005 C, dated May 2, 1983.

Several existing plans were also used in determination of floodplain limits and conditions. They include: *A Comprehensive Stormwater Management Plan*, as prepared by Greiner, Inc. in 1993; *Documentation of Existing Stream Conditions*, as prepared by Straughan Environmental Services, Inc. in 2000; and *A Comprehensive Stormwater Management Plan Update* as prepared by URS in 2004. In addition, MAA performed floodplain studies for Signal, Hawkins, and Clark Branches in April 1996.

The Airport, as shown in the aforementioned reports, is divided into eighteen (18) Drainage Sub-Areas:

Tributary to Sachs Branch	Tributary (south of Runway 4)
Sachs Branch	Tributary (south of Runway 33L)
Kitten Branch	Tributary (south of Runway 33L)
King Branch	Fork Branch
Tributary to King Branch	Phelps Branch
Bowden Branch	SE Corner
Signal Branch	Irving Branch
Hawkins Branch	Tributary to Irving Branch
Clark Branch	Tributary to Clark Branch

3.10.2 RESULTS

According to the FIRM of Anne Arundel County, Community-Panel Number 240008 005 C, dated May 2, 1983, a floodplain area exists along Kitten Branch. **Exhibit 3.10-1** shows the floodplains areas at BWI Marshall, defined as Zone A (areas of 100-year flood; base flood elevations and flood hazard factors not determined), begins northwest of the Runway 10-28 intersection with Runway 15R-33L and running in a northwesterly direction parallel with Runway 15R-33L to Aviation Blvd. From Aviation Blvd, the floodplain continues off airport property to its junction with Stony Run. All other drainage areas are labeled as Zone C (areas of minimal flooding).

Floodplain boundaries for Signal, Hawkins and Clark Branches were computed in April of 1996 by Greiner, Inc. The 100-year limits were computed through use of Version 1.1 of HEC-RAS computer model developed by the Hydrologic Engineering Center of the U.S. Army Corps of Engineers. The

floodplain boundaries of Hawkins and Clark Branches converge near their outfalls along Aviation Blvd. The floodplain boundary of Signal Branch crosses at or near the intersection of Aviation Blvd. and Mathison Way.

3.11 COASTAL RESOURCES

The FAA is required to comply with the regulations set forth in the Coastal Zone Management Act of 1972 (CZMA), as amended through Public Law (PL) 104-105, The Coastal Zone Protection Act of 1996. The CZMA requires that each state with coastal boundaries establish a Coastal Zone Management Program (CZMP), which in Maryland, is administered by the MDE and MDNR. These governing agencies are charged with identifying land uses which, individually or cumulatively, may cause or contribute significantly to the degradation of coastal waters where there is a failure to attain or maintain applicable water quality standards or protect designated uses, as determined by the state pursuant to the water quality planning process or coastal waters that are threatened by reasonably foreseeable increases in pollution loading from new or expanding sources.

The CZMP identifies all of Anne Arundel County, as part of Maryland's Coastal Zone.

3.12 WILD AND SCENIC RIVERS

The Wild & Scenic Rivers Act of October 2, 1968 declared that certain selected rivers of the United States, possessing outstandingly remarkable scenic, recreational, geologic, fish, wildlife, historic, cultural and other similar values, will be preserved in free-flowing condition, and that they and their immediate environments, shall be protected for the benefit and enjoyment of present and future generations. The US Department of the Interior (DOI) maintains a national inventory of river segments, which appear to qualify for inclusion in the National Wild and Scenic River System. The State of Maryland has no rivers on this list.

The State of Maryland created the Scenic and Wild Rivers System by an Act of the General Assembly in 1968. The Program maintains a State inventory of rivers, which possess remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values. Nine rivers have been designated as "Scenic". These rivers are not near the airport and are not affected by this project.

3.13 FARMLANDS

The Farmland Protection Policy Act (FPPA), Public Law 97-98, 7 USC 4201-4209, was enacted as part of the Agriculture and Food Act of 1981 to minimize the extent to which federal programs contribute to unnecessary and irreversible conversion of farmland to nonagricultural uses. Important farmlands include all pasturelands, croplands, and forestlands that are considered to be Prime, Unique, and Statewide or Locally Important lands. As part of the FPPA, the United States Department of Agriculture (USDA) - Natural Resource Conservation Service (NRCS) has defined Prime Farmland as land that has chemical and physical characteristics, which support food production, feed, and fiber production. Statewide

important soils are soils that are among the most productive soils in the State for agriculture and forestry. Unique soils are classified as soils that are unique to the region and are used for specific agriculture or industrial purposes. The FPPA does not apply to land that is already committed to urban development, which would include development of the airport, regardless of whether it has been classified as Prime or Statewide Important farmland by the NRCS.

States have gone further to protect soils of importance by designating statewide important and unique soils. Statewide important soils are soils that are among the most productive soils in the state for agriculture and forestry, in addition to being best suited for construction and recreational development. Unique soils are classified as soils that are unique to the region and are used for specific agricultural or industrial purposes.

A review of the Anne Arundel County soil data (USDA Natural Resource Conservation Service, Web Soil Survey 2.1, February 2009) indicates that much of the soil within the study area is designated as prime farmland or statewide and locally important (see **Exhibit 3.13-1**). According to this resource, soils within the study area have been classified as prime farmland soils include Alloway-Sassafras complex, 2 to 5 percent slopes (AfB), Downer-Hammonton complex, 2 to 5 percent slopes (DvB), Sassafras fine sandy loam, 2 to 5 percent slope (SaB), and Woodstown sandy loam, 2 to 5 percent slopes (WdB). Other prime farmland, but only if irrigated, includes Galestown loamy sand, 0 to 5 percent slopes (GaB).

Other soils within the study area are classified as farmland of statewide importance. They include Downer-Hammonton complex, 5 to 10 percent (DvC), Downer-Phalanx complex, 5 to 10 percent slopes (DxC), Patapsco-Evesboro-Fort Mott complex, 0 to 5 percent slopes (PeB), and Patapsco-Fort Mott complex, 5 to 10 percent slope (PfC).

3.14 HAZARDOUS MATERIALS AND SOLID WASTE

3.14.1 DEFINITION AND POLICY

The U.S. EPA oversees the primary laws and has developed regulations governing the handling and disposal of hazardous materials, chemicals, substances and wastes. The two statutes of most relevance to this EA are the *Resource Conservation and Recovery Act (RCRA)* and the *Comprehensive Environmental Response, Compensation* and *Liability Act (CERCLA).*

40 CFR part 261, subpart C*,* defines hazardous wastes as solid wastes that are ignitable, corrosive, reactive, or toxic (sometimes called “characteristic wastes”). In addition, subpart D contains a list of specific types of solid wastes that the EPA has deemed hazardous (sometimes called “listed wastes”).

Section 101(14) of CERCLA [42 U.S.C. § 9601(14)] defines hazardous substances, in a broad sense, as hazardous wastes, hazardous air pollutants, hazardous substances designated as such pursuant to the Clean Water Act and the Toxic Substances Control Act and elements, compounds, mixtures, solutions, or substances listed in 40 CFR part 302 that pose substantial harm to human health or environmental

resources. Pursuant to CERCLA, hazardous substances do not include any petroleum or natural gas substances and materials.

3.14.2 HAZARDOUS MATERIALS ASSESSMENT

The existing facilities and land uses at BWI Marshall are typical of a commercial airport. These uses generally involve the servicing and refueling of aircraft; aircraft deicing facilities; ground vehicle operations; the passenger terminal, control tower and operations center; parking lots or garages; general aviation facilities; fire and rescue facilities; and aircraft maintenance facilities. From the standpoint of hazardous materials, the most notable among these land uses are the bulk fuel storage and distribution facilities.

RCRA and CERCLA generally focus attention on the use, storage, and disposal of hazardous materials and the environmental threats caused by mishandling these materials. For environmental analysis purposes, the primary objectives are to identify and evaluate sites, facilities, or properties where hazardous materials (including previous environmental contamination) could hinder or affect the proposed projects.

For the purpose of this assessment, the identification of sites known, suspected, or with potential, to contain hazardous materials was accomplished by: (1) a visual survey of existing conditions; (2) a database search of regulatory agency records; and (3) the review of other available documents, historical aerial photographs, and information.

Five (5) sites have been identified by MAA as areas of interest (*Baltimore/Washington International Thurgood Marshall Airport Long Range Needs Assessment*, September 2008) (see **Exhibit 3.14-1**):

- The BWI Fuel Farm
- The BWI Field Maintenance Fuel Tanks
- The BWI Old Car Rental QTA Site
- The Old Utility Building and Fuel Farm
- The English Road Gas Station

Based on research for this study, the predominant source of hazardous wastes or other regulated substances are associated with storage facilities. Typically, these facilities contain underground storages and/or above ground storage tanks. The contents include various forms of aviation fuels, motor vehicle fuels, new and waste oils, etc.

It is also likely that smaller amounts of other petroleum products, waste materials, and other chemicals are stored in various locations throughout the airport. Typical hazardous waste and other wastes generated by MAA include:

WASTE DESCRIPTION	GENERATED BY
Waste paint	FMx and BMx
Waste paint related material	FMx and BMx
Mercury from Mercury lamps	BMx
Waste sodium hydroxide solution	FMx
Waste solids containing gasoline	FMx
Waste flammable liquid – gasoline and diesel mixture	Fire and Rescue
Batteries wet filled with acid	Auto Shop
Waste combustible liquid – petroleum Naptha	FMx and BMx
Polychlorinated Biphenyl (PCB) – light ballast	BMx
Waste corrosive liquid – hydrochloric acid	Auto Shop
OTHER WASTES	
Used oil	Auto Shop
Oil and water	Auto Shop and FMx
Grease	Auto Shop
Used antifreeze	Auto Shop
Absorbent (Speedy Dri)	Auto Shop and FMx
Absorbent booms and pads	FMx
Non PCB light ballast	BMx
Crushed fluorescent tubes and lamps	BMx

FMx = Field Maintenance; BMx = Building Maintenance
Source: Baltimore/Washington International Thurgood Marshall Airport Environmental Compliance Book, Weston Solutions, Inc. March 2004

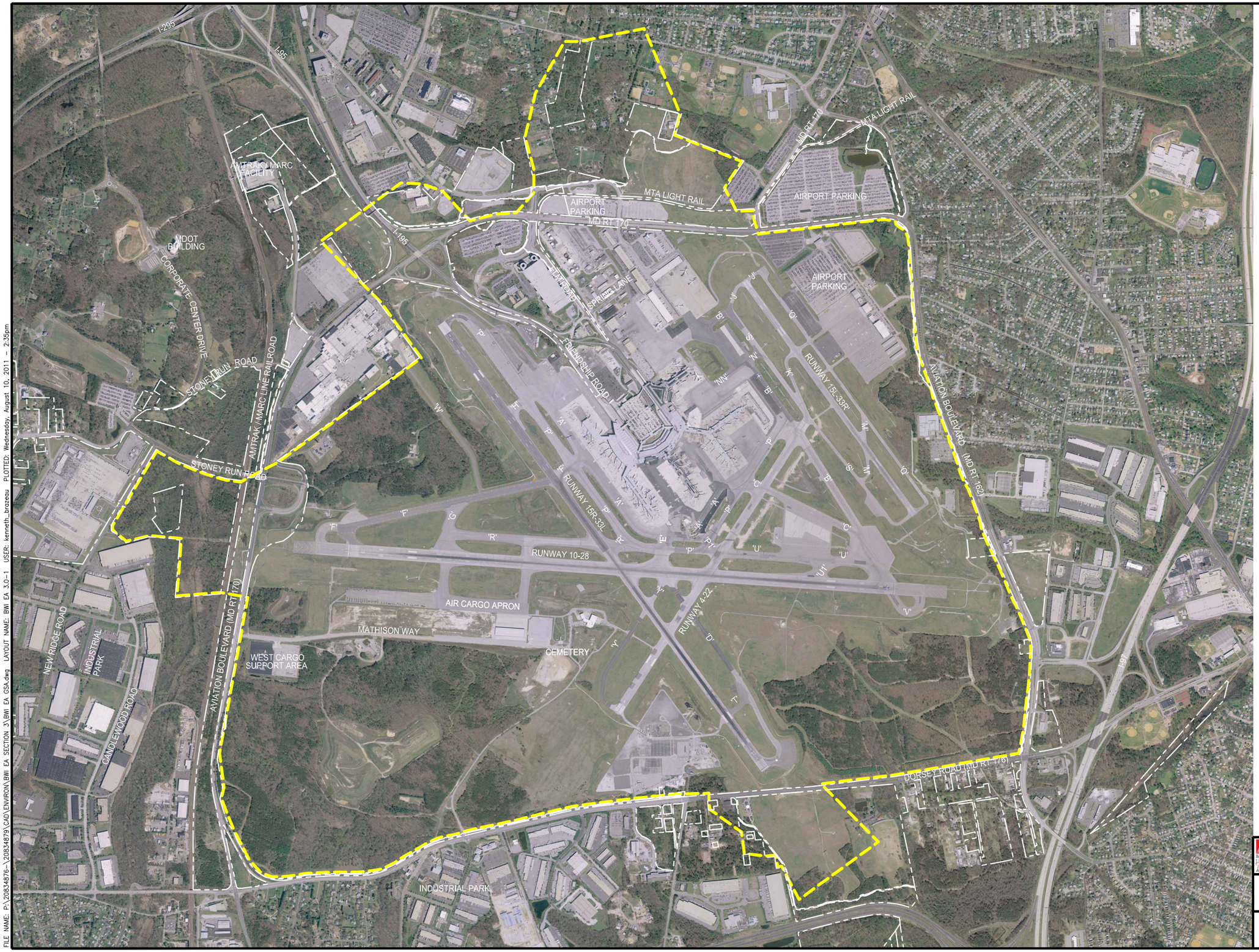
A search of Federal and state regulatory databases did not reveal any sites or facilities in the vicinity that are included on the National Priority List (NPL). The RCRA listing of Hazardous Waste Facilities that generate, manage, ship and/or receive hazardous waste materials includes Northrop Grumman Systems Corporation. Northrop Grumman Systems Corporation adjoins the airport along the northwesterly property line near the approach to Runway 15R. Similarly, there are no reported landfills, large-scale industrial or chemical facilities, or sites of widespread contamination in the vicinity of the airport.

3.14.3 SOLID WASTE ASSESSMENT – NON-HAZARDOUS

Other solid waste, not determined to be hazardous, that is generated or found within the Airport property may include, but is not limited to, non-hazardous scrap, paper, aluminum, plastic, textiles, rubber, construction and demolition debris, and natural wood wastes.

Solid waste is collected in front-end containers located on the airfield and cargo area along with recycling containers located within the terminal building for recycling by passengers and tenants. The recycling containers in the terminal are bright, multi-compartment containers that have space for both trash and various recyclables.

MAA maintains an active program for recycling of non-hazardous solid waste, and most recently, has been achieving a 31 percent recycling rate. The major commodity in recycling has been corrugated boxes. Other recyclables include newspapers, bottles and cans coming off aircraft, paper products, aluminum, plastic bottles, scrap metal and tires.



LEGEND

AIRPORT PROPERTY LINE

GENERALIZED STUDY AREA

800 0 800 1600

SCALE IN FEET

Environmental Assessment
for Proposed Airport Improvements

GENERALIZED STUDY AREA

Scale: AS SHOWN

Exhibit: 3.0-1

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LEGEND

- RETAIL
- OFFICE
- TRANSPORTATION/UTILITY
- GOVERNMENT/INSTITUTIONAL
- INDUSTRIAL
- TOWNHOUSE
- SINGLE FAMILY DWELLING
- MULTIPLE FAMILY DWELLING
- RECREATION AND PARKS
- AGRICULTURAL
- NATURAL OPEN SPACE
- WATER
- VACANT

Source: BWI Marshall Master Plan, 2010

N

BWI Baltimore/Washington International Thurgood Marshall Airport

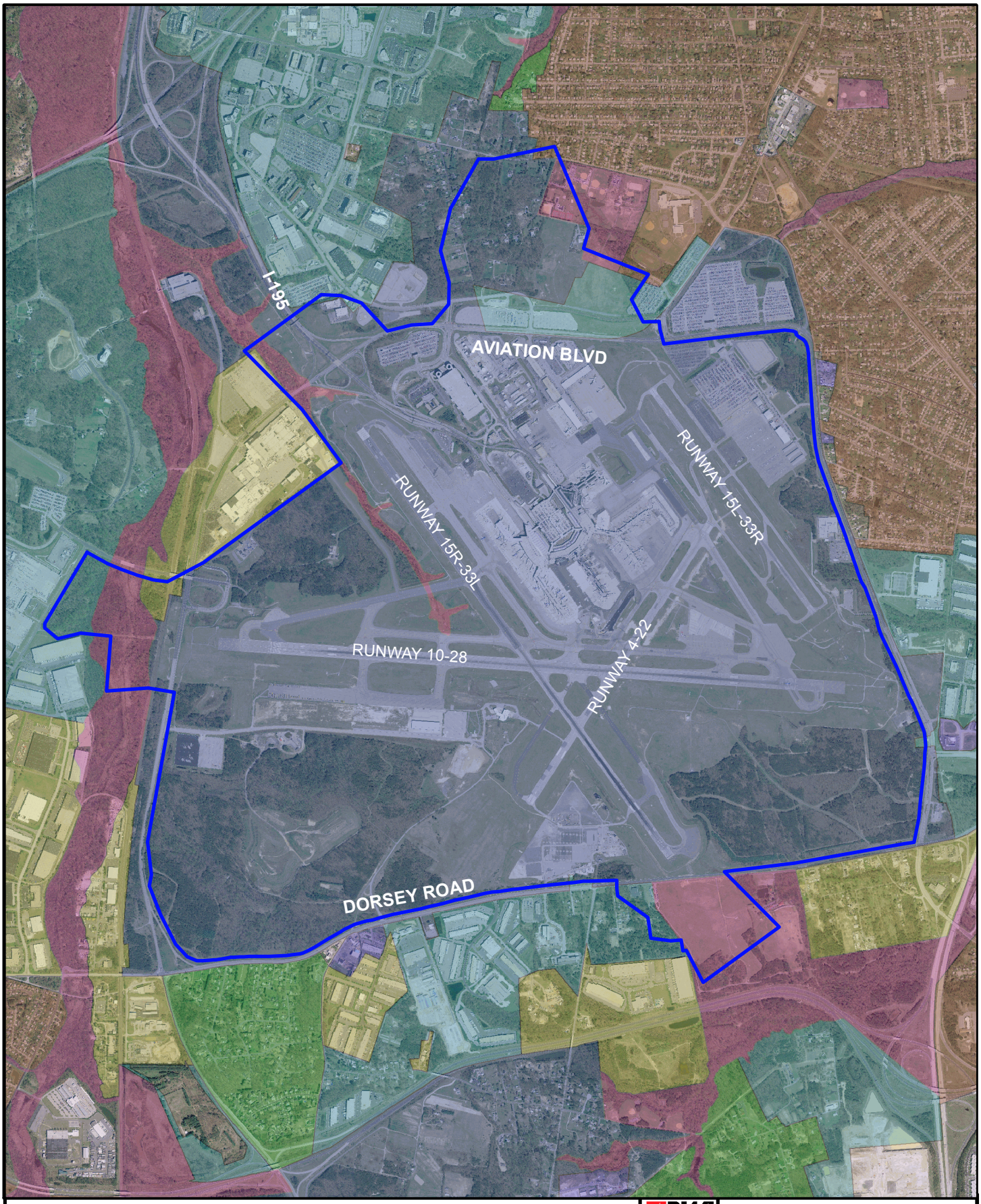
Environmental Assessment
for Proposed Airport Improvements

EXISTING LAND USE

URS AVIATION

Scale: NOT TO SCALE

Exhibit: 3.1-1



LEGEND

- GENERALIZED STUDY AREA
- INDUSTRIAL PARK
- LIGHT INDUSTRIAL
- HIGHWAY COMMERCIAL
- OPEN SPACE
- RESIDENTIAL (1 DWELLING PER ACRE)
- RESIDENTIAL (2.5 DWELLINGS PER ACRE)
- RESIDENTIAL (5 DWELLINGS PER ACRE)

Source: Anne Arundel County, 2008

N

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall

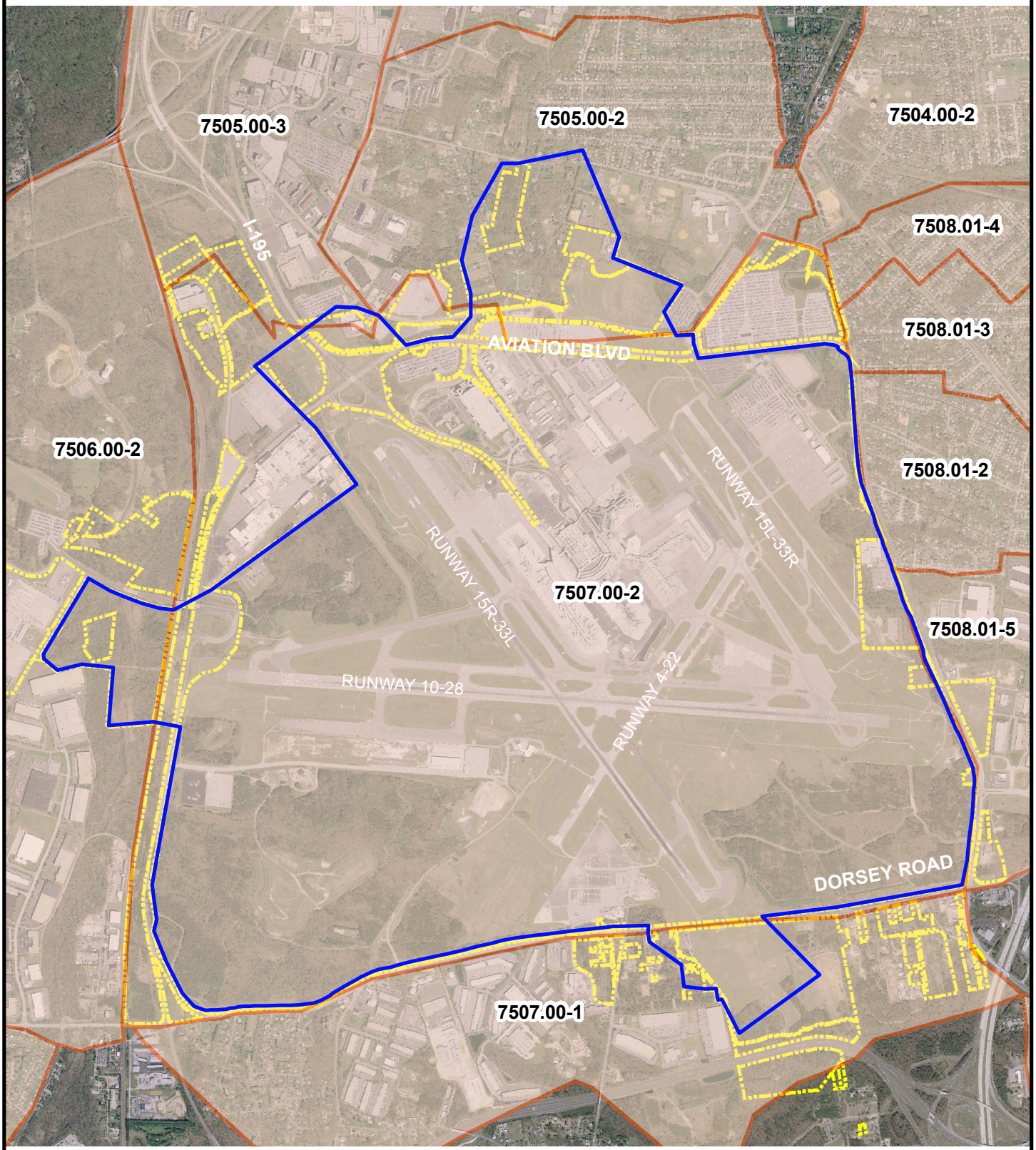
Environmental Assessment
for Proposed Airport Improvements

EXISTING ZONING

URS AVIATION

Scale: NOT TO SCALE

Exhibit: 3.1-2



LEGEND

- AIRPORT PROPERTY LINE
- GENERALIZED STUDY AREA
- CENSUS TRACT BLOCK GROUPS

SOURCE: US CENSUS BUREAU (2000)

N

BWI Baltimore/Washington International Thurgood Marshall Airport

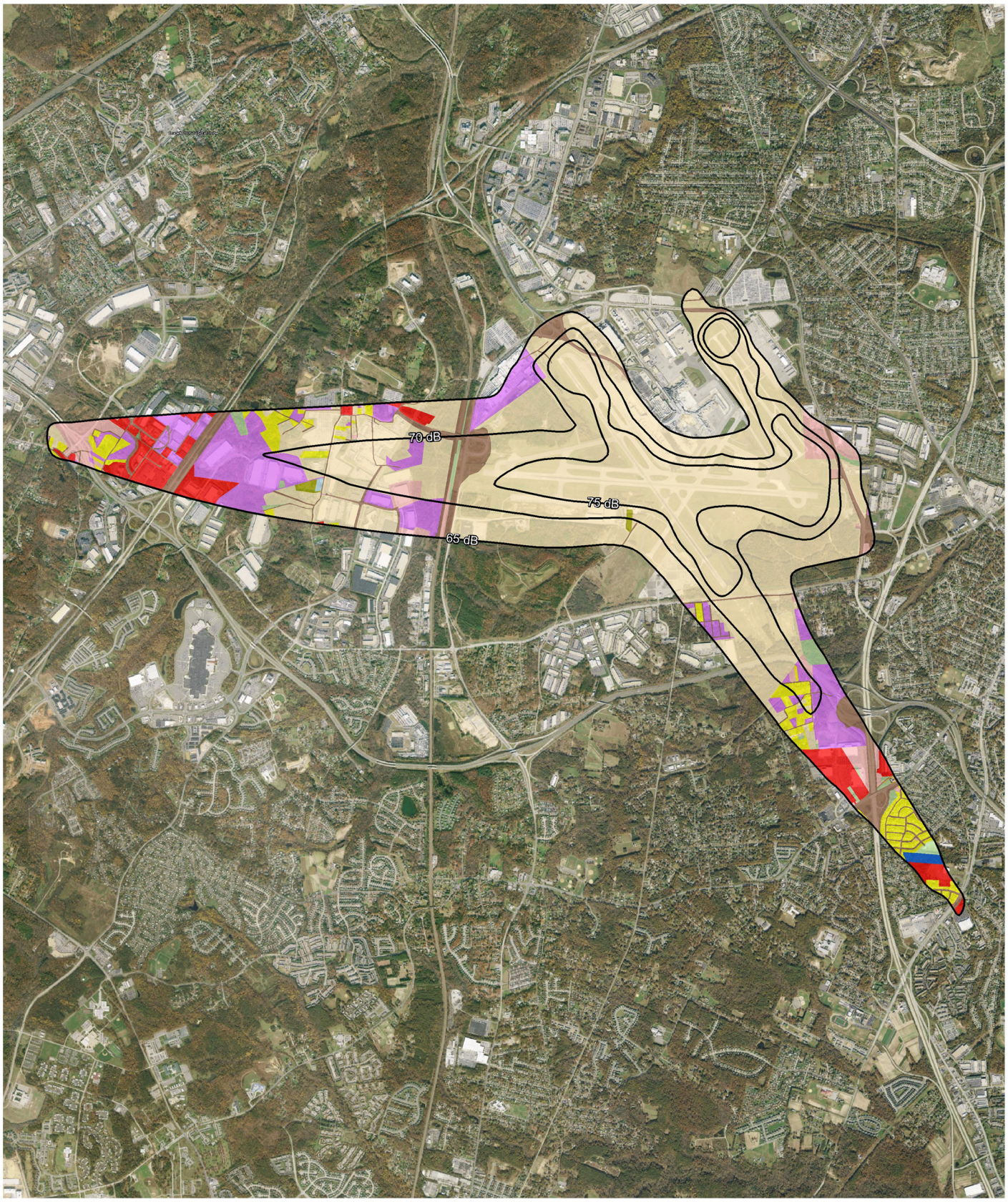
Environmental Assessment
for Proposed Airport Improvements

CENSUS TRACT BLOCK GROUPS

URS AVIATION

Scale: NOT TO SCALE

Exhibit: 3.2-1



Legend

- BWI Owned Property
- Residential
- Multi-Family Residential
- Transient Lodging
- School
- Place of Worsihp
- Library
- Recreation
- Agriculture
- Forested Land
- Cemetery
- Commercial
- Exempt Commercial
- Industrial

BWI Baltimore/Washington International Thurgood Marshall Airport

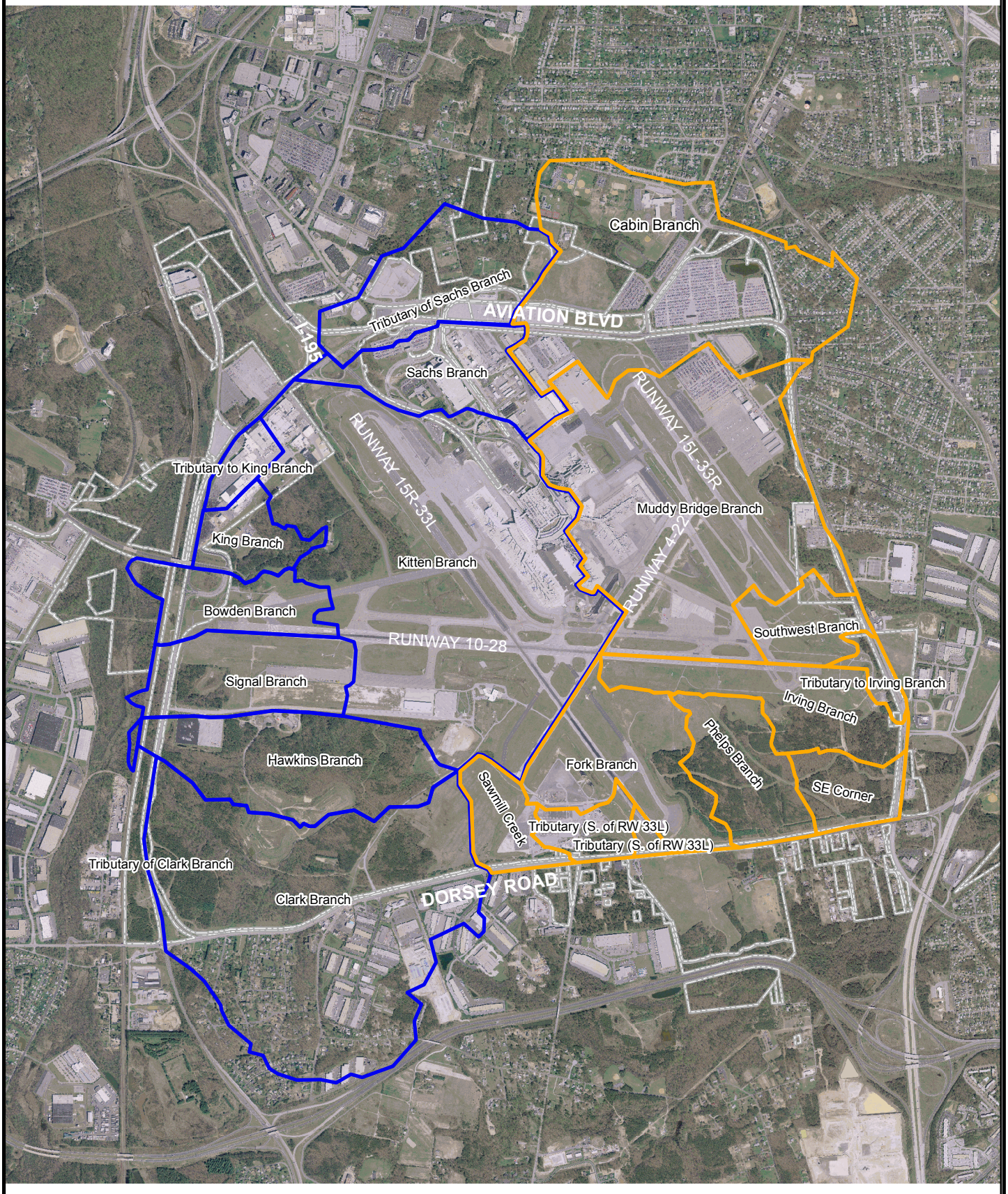
Environmental Assessment
for Proposed Airport Improvements

EXISTING CONDITIONS (2010)
NOISE CONTOURS

URS Aviation

Scale: **Not To Scale**

Exhibit: **3.3-1**



LEGEND

- AIRPORT PROPERTY LINE
- SAWMILL CREEK WATERSHED
- STONY RUN WATERSHED

N

0 1,300 2,600 Feet

Source: Maryland Aviation Administration

BWI Baltimore/Washington International Thurgood Marshall Airport

Environmental Assessment for Proposed Airport Improvements

SUBWATERSHED BOUNDARIES

URS AVIATION

Scale: AS SHOWN

Exhibit: 3.5-1

ANDOVER PARK
BENSON-HAMMOND HOUSE
THOMAS A. DIXON OBSERVATION AREA - FRIENDSHIP PARK
I-295
I-195
MDOT BUILDING
CORPORATE CENTER DRIVE
STONEY RUN ROAD
AMTRAK / MARC LINE RAILROAD
AMTRAK / MARC FACILITY
AIRPORT PARKING
MTA LIGHT RAIL
MD RT 170
MD RT 176
TURNPIKE SPRING LANE
FRIENDSHIP ROAD
RUNWAY 15L-33R
RUNWAY 15R-33L
RUNWAY 10-28
RUNWAY 4-22
AIR CARGO APRON
MATHISON WAY
CEMETERY
WEST CARGO SUPPORT AREA
AVIATION BOULEVARD (MD RT 170)
AVIATION BOULEVARD (MD RT 162)
DORSEY ROAD (MD RT 176)
NEW RIDGE ROAD
INDUSTRIAL PARK
CANDLEWOOD ROAD
INDUSTRIAL PARK
I-97

LEGEND
- BWI TRAIL
- AIRPORT PROPERTY LINE
- GENERALIZED STUDY AREA
- NATIONAL REGISTER-ELIGIBLE SITE

SOURCE: ANNE ARUNDEL COUNTY RECREATION AND PARKS (2011)

800 0 800 1600
SCALE IN FEET

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment for Proposed Airport Improvements

SECTION 4 (f) LANDS

URS AVIATION

Scale: AS SHOWN

Exhibit: 3.6-1

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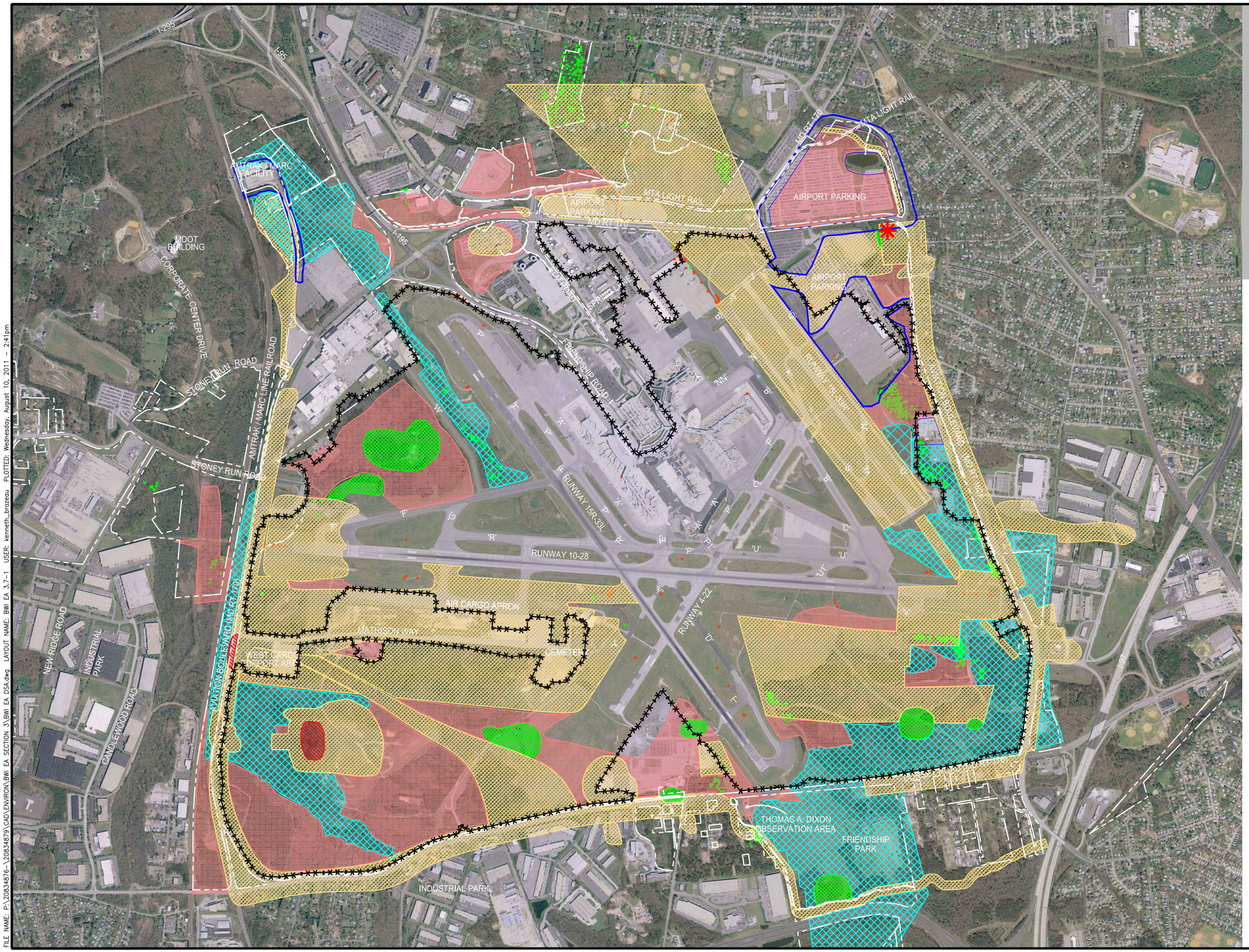

LEGEND

- AIRPORT PROPERTY LINE
- PREVIOUSLY EVALUATED - NO ADDITIONAL ARCHAEOLOGICAL STUDY REQUIRED
- NO PROBABILITY FOR SITES
- HIGH PROBABILITY FOR HISTORIC SITES
- HIGH PROBABILITY FOR PREHISTORIC SITES (BURIED DEPOSITS)
- MODERATE TO LOW PROBABILITY FOR PREHISTORIC & HISTORIC SITES
- NATIONAL REGISTER-ELIGIBLE SITE
- NATIONAL REGISTER SITE

SOURCE: URS CORPORATION, 1999

800 0 800 1600
SCALE IN FEET

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment
for Proposed Airport Improvements

ARCHAEOLOGICAL POTENTIAL ZONES

URS AVIATION

Scale: AS SHOWN

Exhibit: 3.7-1

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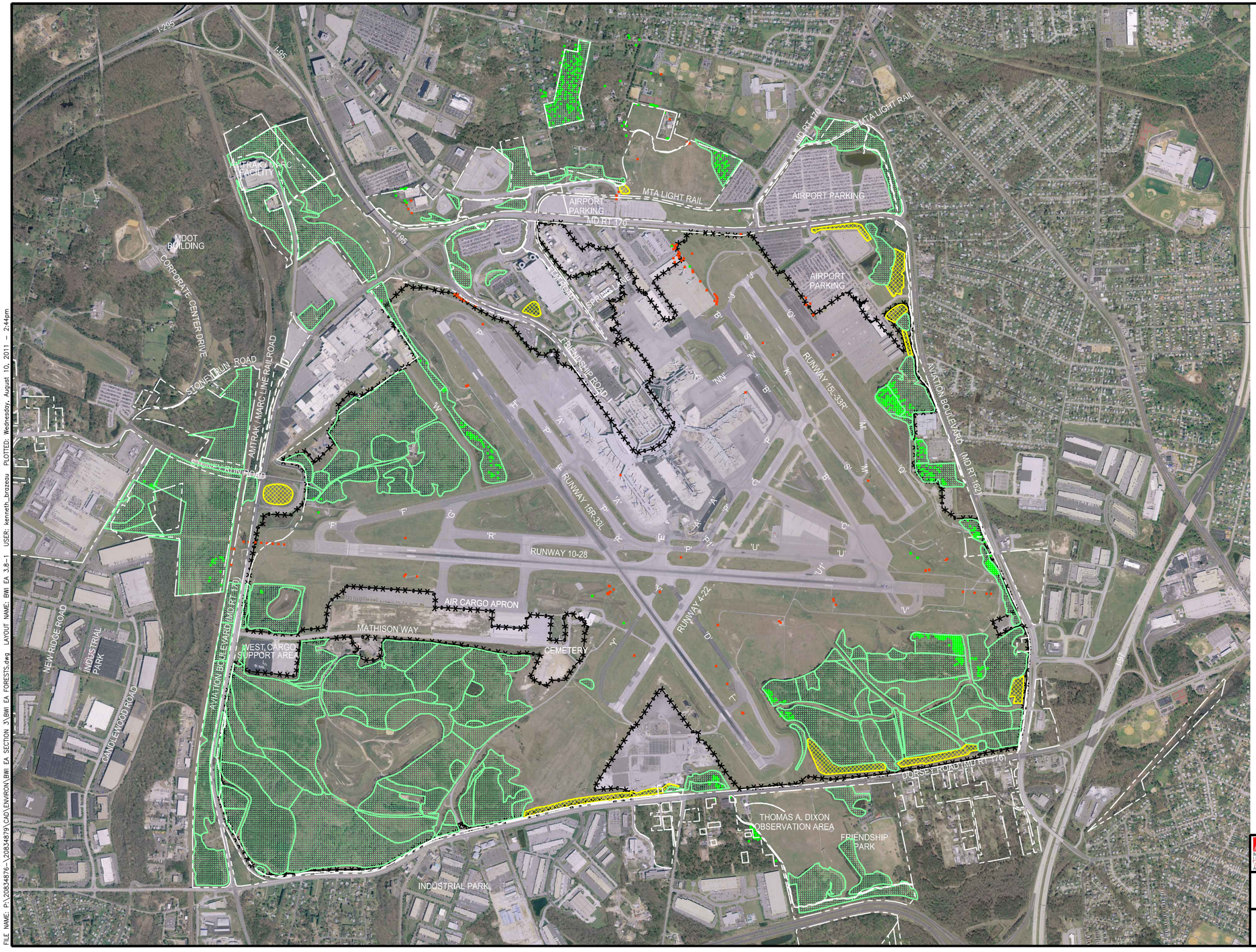

LEGEND

- AIRPORT PROPERTY LINE
- AFFORESTATION AREAS
- FOREST STANDS

800 0 800 1600

SCALE IN FEET

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment
for Proposed Airport Improvements

EXISTING FORESTS

URS AVIATION

Scale: AS SHOWN

Exhibit: 3.8-1

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LEGEND

- AIRPORT PROPERTY LINE
- SENSITIVE SPECIES PROJECT REVIEW AREA (SSPRA)
- FOREST INTERIOR DWELLING SPECIES HABITAT

N

0 1,200 2,400 Feet

Source: BWI Marshall Long-Range Needs Assessment, 2007 and Maryland Department of Natural Resources, 2003

BWI Baltimore/Washington International Thurgood Marshall Airport

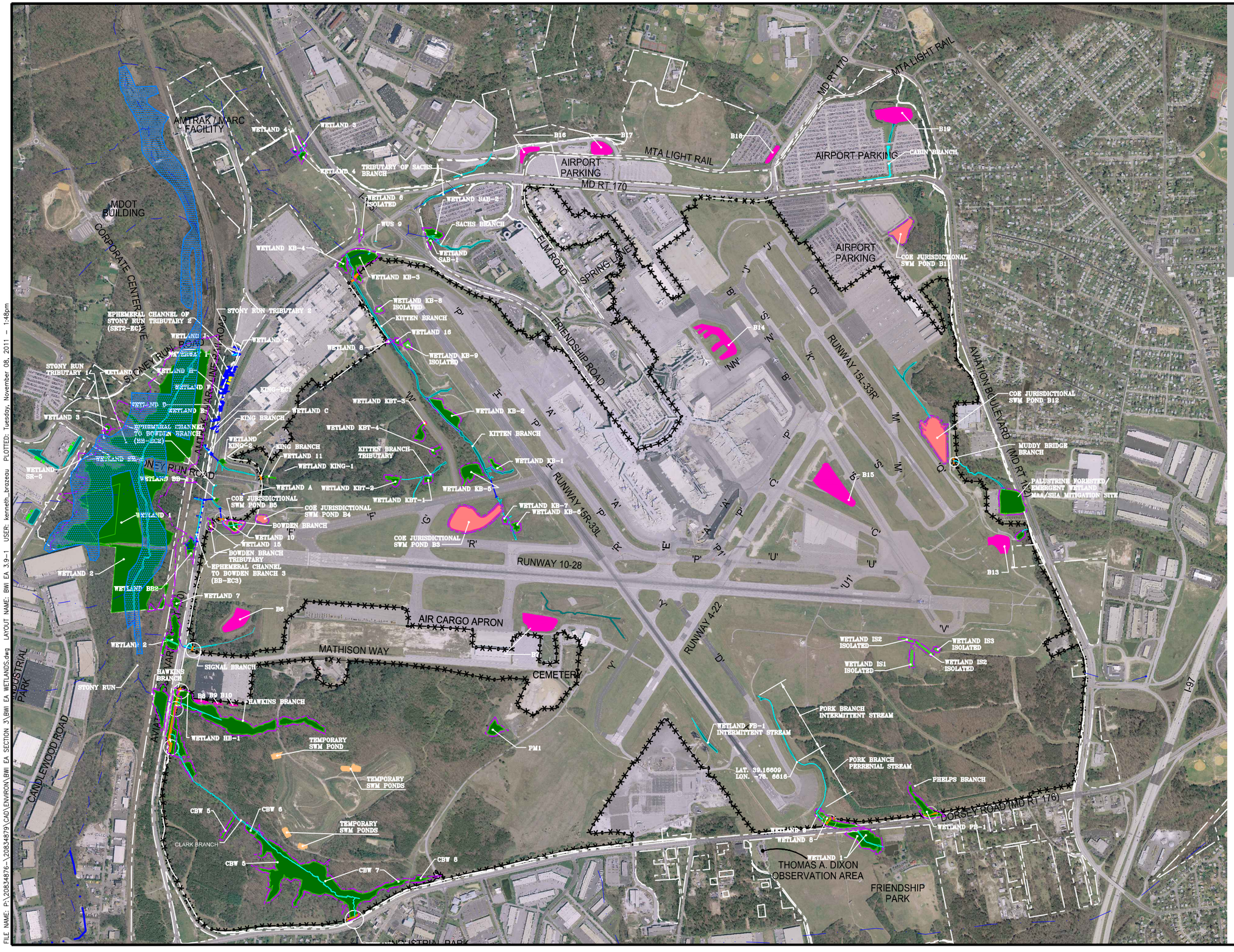
Environmental Assessment for Proposed Airport Improvements

FIDS HABITAT AND SSPRA

URS AVIATION

Scale: AS SHOWN

Exhibit: 3.8-2



LEGEND

AIRPORT PROPERTY LINE

ENVIRONMENTAL FEATURES LEGEND

- STORMWATER MANAGEMENT POND
- COE JURISDICTIONAL POND
- TEMPORARY STORMWATER MANAGEMENT FACILITY
- WETLANDS OF SPECIAL STATE CONCERN
- WATERS OF THE U.S.
- STREAMS
- WETLANDS WITH 25' BUFFER
- WETLAND MOWING AREAS

700 0 700 1400
SCALE IN FEET

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment
for Proposed Airport Improvements

WETLANDS AND WATERWAYS

URS AVIATION

Scale: AS SHOWN

Exhibit: 3.9-1

FILE NAME: P:\20834876-\20834879\CAD\ENVIRON\BWI EA SECTION 3\BWI EA WETLANDS.dwg LAYOUT NAME: BWI EA 3.9-1 USER: kenneth_brazeau PLOTTED: Tuesday, November 08, 2011 – 1:48pm

LEGEND

- STREAMS
- FLOODPLAIN LIMITS
- AIRPORT PROPERTY LINE

Source: FEMA 1993

N

0 1,500 3,000 Feet

BWI Baltimore/Washington International Thurgood Marshall Airport

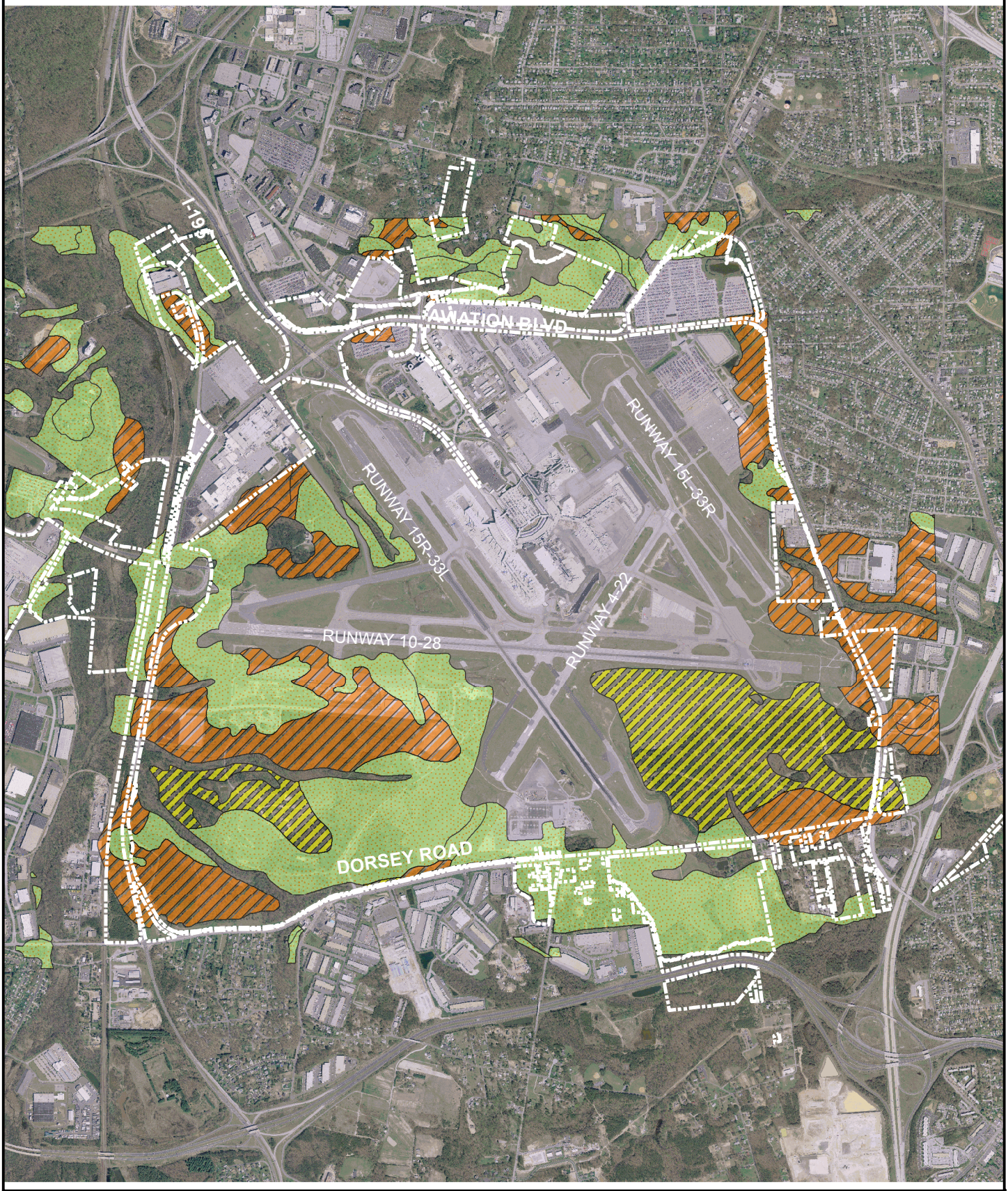
Environmental Assessment for Proposed Airport Improvements

EXISTING FLOODPLAINS

URS AVIATION

Scale: AS SHOWN

Exhibit: 3.10-1



LEGEND

- FARMLAND OF STATEWIDE IMPORTANCE
- PRIME FARMLAND
- PRIME FARMLAND IF IRRIGATED
- AIRPORT PROPERTY LINE

Source: Natural Resource Conservation Service

N

0 1,300 2,600 Feet

BWI Baltimore/Washington International Thurgood Marshall Airport

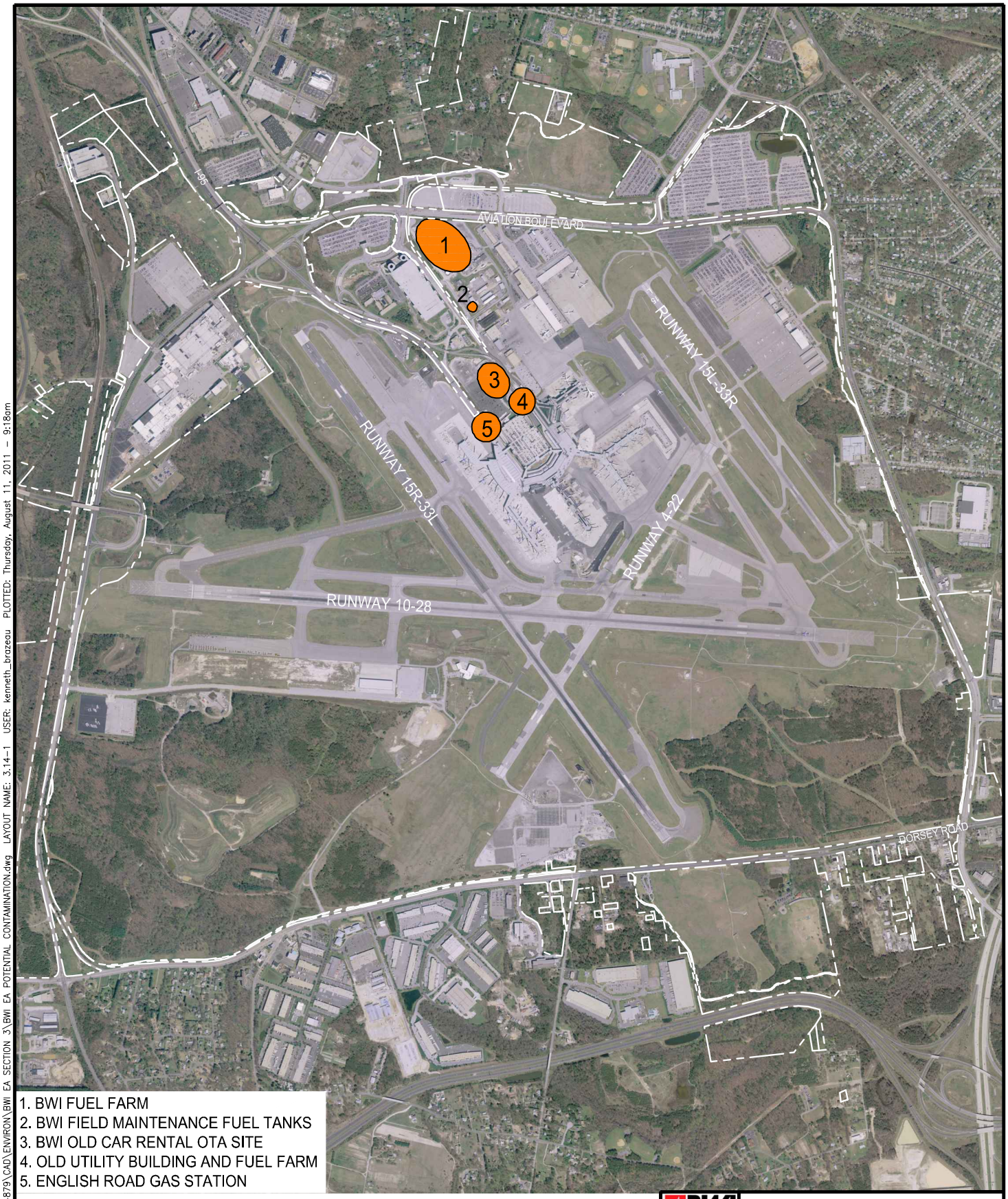
Environmental Assessment for Proposed Airport Improvements

PRIME AND UNIQUE FARMLANDS

URS Aviation

Scale: AS SHOWN

Exhibit: 3.13-1



1. BWI FUEL FARM
2. BWI FIELD MAINTENANCE FUEL TANKS
3. BWI OLD CAR RENTAL OTA SITE
4. OLD UTILITY BUILDING AND FUEL FARM
5. ENGLISH ROAD GAS STATION

LEGEND:

AIRPORT PROPERTY LINE

AREA OF POTENTIAL HAZARDOUS CONTAMINATION

1000 0 1000 2000
SCALE IN FEET

SOURCE: MARYLAND AVIATION ADMINISTRATION, 2007

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment for Proposed Airport Improvements

AREAS OF POTENTIAL HAZARDOUS CONTAMINATION

URS AVIATION

Scale: AS SHOWN

Exhibit: 3.14-1

FILE NAME: P:\20834876-\20834879\CAD\ENVIRON\BWI EA SECTION 3\BWI EA POTENTIAL CONTAMINATION.dwg LAYOUT NAME: 3.14-1 USER: kenneth_brazeau PLOTTED: Thursday, August 11, 2011 - 9:18am

SECTION 4
ENVIRONMENTAL CONSEQUENCES

4.0 INTRODUCTION

This section presents an assessment of the environmental impacts associated with the proposed project alternatives that are included in **Section 2 – Alternatives**. For each proposed airport improvement that has more than one Build Alternative and the potential to have environmental impacts, the anticipated impacts associated with each have been evaluated and included in this section. For those projects with only one Build Alternative, the anticipated impacts for only that one alternative are presented. The Sponsor's Preferred Alternative for each proposed airport improvement is identified for those projects having more than one Build Alternative. Further, for a specific resource category where the potential impacts would be the same independent of which Build Alternative is selected, the potential impacts, or lack thereof, are discussed wholly. In addition, mitigation strategies are described to avoid and minimize the identified impacts, where appropriate.

4.0.1 RESOURCE CATEGORIES

In accordance with FAA Order 1050.1E, Change 1*, Environmental Impacts: Policies and Procedures*, FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions*, and the FAA's *Environmental Desk Reference for Airport Actions*, the following environmental resource categories were assessed:

- Noise
- Compatible Land Use
- Socioeconomic Impacts, Environmental Justice, and Children's Environmental Health and Safety Risks
- Secondary (Induced) Impacts
- Air Quality
- Water Quality
- Department of Transportation Act: Section 4(f)
- Historical, Architectural, Archaeological, and Cultural Resources
- Fish, Wildlife, and Plants
- Wetlands
- Floodplains
- Coastal Resources
- Wild and Scenic Rivers
- Farmlands
- Light Emissions and Visual Impacts
- Natural Resources and Energy Supply
- Hazardous Materials, Pollution Prevention, and Solid Waste
- Construction Impacts
- Cumulative Impacts

The following resource categories were determined not to be affected by the proposed projects at BWI Marshall and, as such, no further impact analyses were conducted beyond the evaluations provided below:

- **Environmental Justice:** The proposed projects would have no impact on the economic development or health and safety of the communities that exist in the vicinity of the Airport.

- **Children's Environmental Health and Safety Risks:** The proposed projects would not expose children to, be in contact with, or ingest substances that would affect their health and safety.

Air Quality: This analysis involved the evaluation of the U.S. EPA criteria pollutants and their precursors, including volatile organic compounds (VOC), nitrogen oxides (NO_x), sulfur dioxide (SO_2), carbon monoxide (CO), and particulate matter (PM_{10} and $PM_{2.5}$) associated with the Proposed Airport Improvements at BWI Marshall.

As discussed previously in **Section 3.4 – Air Quality**, BWI Marshall is located in Anne Arundel County, which is part of the six-county Baltimore area ozone (O_3) and $PM_{2.5}$ non-attainment areas. Because of these designations, the applicability of the federal Clean Air Act (CAA) General Conformity Rule has been evaluated. Based upon the results of this assessment, the construction-related emissions are within the General Conformity Rule "de-minimis" levels for $PM_{2.5}$, including precursors NO_x and SO_2, as well as the ozone (O_3) precursors of NO_x and VOCs. Therefore, the proposed improvements discussed in this EA are automatically assumed to conform to the State Implementation Plans (SIP) for $PM_{2.5}$ and O_3 and no further assessment is necessary.

Because there are no anticipated changes to aircraft operations (e.g., number of operations, fleet mix, delay periods) or motor vehicle traffic attributable to the implementation of the proposed airport improvements, air emissions associated with the operation of the airport are expected to remain unchanged. However, air quality impacts from the proposed projects would occur during construction of the improvements; therefore, the air quality analysis performed for construction related impacts is discussed in **Section 4.14.3**.

- **Wild and Scenic Rivers:** There are no rivers within the GSA that are included in the Federally-designated Wild and Scenic Rivers System. The Severn River, located approximately six miles southeast of BWI Marshall, is a state-designated Scenic River and is the closest such resource to the Airport. Therefore, none of the proposed projects would affect any Federally- or State- protected Wild or Scenic Rivers.

- **Farmlands:** No agricultural zoned areas, existing agricultural land uses, or farmlands are located within the vicinity of the proposed projects. Therefore, no farmlands would be converted to non-agricultural use and the proposed improvement projects would not be subject to the provisions of the FPPA.

- **Natural Resources and Energy Supply:** Energy requirements associated with projects involving the expansion of airfield and landside facilities normally fall into two categories: those related to increased consumption from stationary facilities (i.e., additional buildings requiring heating, cooling, and other energy consuming systems) and those involving substantial increases in aircraft and ground vehicle movement and their related fuel consumption. Increases in energy consumption directly and indirectly caused by the planned capital improvement projects would be accommodated

by the proposed expansion of the Central Utility Plant. However, the anticipated increase in consumption is not expected to be significant. The proposed projects would not involve the use of any unusual or scarce materials and would not cause a demand for the use of any unusual natural resource or the use of any resource that is in short supply. In addition, there are no known deposits of valuable natural resources located on or in the vicinity of the Airport that would be affected by the proposed projects.

4.1 NOISE

This section addresses the future (2015) aircraft noise environment related to the No Build and proposed Build Alternatives in the area surrounding BWI Marshall, and the methodology used to determine future aircraft noise exposure. The terms and metrics associated with aircraft noise used in the noise analysis are described in detail in **Appendix E**.

4.1.1 IMPACT POTENTIAL – BUILD ALTERNATIVES

The proposed Build Alternatives would slightly alter the operational conditions at the Airport as aircraft currently arriving or departing Runway 4-22 would use alternate runways. Given the number of operations and types of aircraft operating from Runway 4-22 (Group C-III or smaller), this change is not significant in terms of noise exposure. All other assumptions remain the same as those defined for the 2010 existing conditions, except the location of the takeoff and landing points on Runway 15R-33L.

When compared to the No Build Alternative, the Build Alternatives would not cause additional sensitive areas located at or above 65 dB DNL to experience a noise increase of at least DNL 1.5 db, therefore, there would be no significant noise impact.

4.1.2 METHODOLOGY

Noise analysis was conducted to reflect forecast conditions for the Build Alternatives and the No Build Alternative. This analysis includes maps depicting general and sensitive land uses within the noise impact area and generalized flight tracks. Noise exposure tables were developed to evaluate land use information and population data including the following:

- The number of residences or people living within each noise contour at or above 65 dB DNL.
- The locations and numbers of noise-sensitive land uses within each contour at or above 65 dB DNL.
- The area (in acres) of general land use classifications within the noise contours.

In accordance with guidance contained in FAA Order 1050.1E, Change 1 detailed noise analyses were performed using the latest version of the FAA's Integrated Noise Model (INM) (Version 7.0b, released on September 30, 2009). The INM is FAA's standard noise modeling tool for predicting noise levels in the

vicinity of airports. DNL contours of equal noise for the 65, 70, and 75 dBA levels were calculated based on the FAA TAF for the 2015 timeframe.

The data and methodologies used to develop the noise contours for the existing condition are provided in **Appendix E**.

4.1.2.1 Operations

The future noise environment for BWI Marshall was analyzed based on FAA TAF forecasted operational conditions for 2015. These forecasted operational conditions are summarized in **Table 4.1-1**. A detailed description of the aircraft operations and airport operational characteristics is provided in **Appendix E**. Fleet mix, time of day, and arrival and departure procedures remain the same as under existing conditions. Under the proposed Build Alternatives, Runway 4-22 would be closed and converted to a taxiway. This affects less than one percent of total operations. Operations currently assigned to Runway 4-22 would be proportionally allocated to the remaining runways. The runway use, flight tracks and flight track use, for 2015 No Build are identical to existing conditions.

4.1.2.2 Thresholds of Significance

The threshold of significance is defined in FAA Order 1050.1E, Change 1 which states that a significant noise impact would occur if analysis shows that the proposed Build Alternatives will cause noise sensitive areas to experience an increase in noise of 1.5 dB DNL or more at or above 65 dB DNL when compared to the No Build Alternative for the same timeframe. Therefore, the potential noise impact analysis evaluated whether or not the proposed project 65 dB DNL contour within noise-sensitive areas would experience a 1.5 dB DNL increase.

TABLE 4.1-1
EXISTING AND FORECAST AIRCRAFT OPERATIONS

Aircraft Category	Annual Operations	
	Existing 2010	TAF 2015
Air Carrier (AC)	201,280	236,718
Air Taxi (AT)	45,593	49,016
General Aviation (GA)	21,866	21,332
Total Operations	268,742	307,066

Source: HMMH Integrated Noise Model Input Files provided by HMMH, FAA Terminal Area Forecast, URS Analysis, 2011.

4.1.3 YEAR 2015

Build Alternatives – The data and methodologies used to develop the noise contours for the existing condition are provided in **Section 3.2** and **Appendix E**. The DNL contours for the proposed Build Alternatives are presented in **Exhibit 4.1-1** and the associated estimated noise exposure levels are presented in **Table 4.1-2**. A detailed discussion of land uses within the GSA is provided in **Section 4.2**, Compatible Land Use, of this EA.

As shown in **Exhibit 4.1-1**, the most identifiable aspect of the proposed Build Alternatives with regard to noise exposure is a slight reduction or shortening of the 65 DNL contour in the arrival corridor to Runway 33L. The proposed Build Alternative would relocate the arrival threshold of Runway 33L by 500 feet to the northwest. Runway 33L is the primary arrival runway and this relocation correspondingly translates the 65 DNL contour resulting in a slight noise benefit in the Runway 33L arrival corridor.

No Build Alternative – The data and methodologies used to develop the noise contours for the existing condition are provided in **Appendix E**. The DNL contours are presented in **Exhibit 4.1-2** and estimated noise exposure levels are presented in **Table 4.1-3**. A detailed discussion of land uses within the Generalized Study Area (GSA) is provided in **Section 4.2**, Compatible Land Use, of this EA.

4.1.4 COMPARISON OF THE BUILD AND NO BUILD ALTERNATIVES

Under both future years considered in this EA, when compared to the No Build Alternative, the Build Alternatives would not cause sensitive areas located at or above 65 dB DNL to experience a noise increase of at least DNL 1.5 dB. Therefore, the proposed Build Alternatives would not result in a significant noise impact.

4.1.5 MITIGATION MEASURES

The proposed Build Alternatives would not result in significant noise impacts. Therefore, noise mitigation is not required.

TABLE 4.1-2
2015 PROPOSED BUILD ALTERNATIVE NOISE EXPOSURE

Land Use Classifications (Acres)		65 to 70 DNL	70 to 75 DNL	Over 75 DNL
Agriculture		1.0	0.1	0.0
MAA Owned Property		1015.9	804.3	667.1
Cemetery		5.5	3.0	0.0
Commercial		269.9	1.5	0.0
Exempt Commercial		133.7	31.6	6.4
Forested Land		37.5	5.6	0.0
Industrial		388.0	90.6	0.0
Multi-Family Residential		3.0	0.0	0.0
Place of Worship		4.3	1.2	0.0
Recreation		6.1	0.0	0.0
Residential		189.1	20.6	0.0
School		10.1	0.0	0.0
Transient Lodging		266.5	59.5	1.3
Number of Noise Sensitive Land Uses and Sites		65 to 70 DNL	70 to 75 DNL	Over 75 DNL
Residential	Single Family Dwellings	591	30	0
	Multiple Family Dwellings	108	0	0
Public Use	Churches, Auditoriums, and Concert Halls	1	0	0
	Historic	1	0	0
	Schools	1	0	0
	Hospitals and Nursing Homes	0	0	0
Population Estimates and Housing Unit Estimates		65 to 70 DNL	70 to 75 DNL	Over 75 DNL
Number of People		1,747	78	0
Number of Housing Units		699	31	0

Source: Adapted from the best available date: Anne Arundel County, MD; URS Analysis, 2011

TABLE 4.1-3
2015 NO BUILD ALTERNATIVE NOISE EXPOSURE

Land Use Classifications (Acres)		65 to 70 DNL	70 to 75 DNL	Over 75 DNL
Agriculture		1.2	0.2	0.0
MAA Owned Property		1005.0	825.6	662.3
Cemetery		6.4	2.2	0.0
Commercial		272.6	1.3	0.0
Exempt Commercial		137.6	32.1	8.6
Forested Land		41.2	5.7	0.0
Industrial		394.4	88.3	0.0
Multi-Family Residential		7.3	0.0	0.0
Place of Worship		3.3	0.8	0.0
Recreation		6.4	0.0	0.0
Residential		190.0	19.8	0.0
School		11.8	0.0	0.0
Transient Lodging		264.7	65.7	2.3
Number of Noise Sensitive Land Uses and Sites		65 to 70 DNL	70 to 75 DNL	Over 75 DNL
Residential	Single Family Dwellings	626	30	0
	Multiple Family Dwellings	213	0	0
Public Use	Churches, Auditoriums, and Concert Halls	1	0	0
	Historic	1	0	0
	Schools	1	0	0
	Hospitals and Nursing Homes	0	0	0
Population Estimates and Housing Unit Estimates		65 to 70 DNL	70 to 75 DNL	Over 75 DNL
Number of People		2,097	75	0
Number of Housing Units		839	30	0

Source: Adapted from the best available data: Anne Arundel County, MD; URS Analysis, 2011

4.2 COMPATIBLE LAND USE

As discussed in FAA Order 1050.1E, Change 1, Appendix A, Section 4, the compatibility of existing and planned land use in the vicinity of airports is usually associated with the extent of the Airport's future noise impacts. If the noise analysis conducted in support of a project concludes that there are no significant impacts, the same conclusion can generally be drawn regarding the compatibility of land use in the areas around the airport. Alternately, where the noise analysis indicates that significant impacts would occur to noise sensitive land uses within areas exposed to DNL 65 dB or higher, then impacts on compatible land use must be addressed. As discussed in **Section 4.2.2**, a proposed project would be considered to have a significant impact on a noise-sensitive use when compared to the No Build Alternative for the same time frame, if it would cause:

- Noise-sensitive areas exposed to DNL 65 dB or higher to experience a noise increase of at least DNL 1.5 dB; or

- An increase of DNL 1.5 dB that introduces new noise-sensitive areas to exposure levels of DNL 65 dB or more.

4.2.1 IMPACT POTENTIAL – BUILD ALTERNATIVES

The MAA, in accordance with 49 USC 47107(a)(10), formerly Section 511(a)(5) of the *Airport and Airway Improvement Act of 1982*, coordinates with the local land use authorities and other appropriate agencies to promote existing and future compatible land use in the vicinity of the Airport. The MAA requests these governing agencies consider existing and planned land use and adopt zoning laws and other measures, to the extent reasonable, to restrict the use of land adjacent to or in the immediate vicinity of the Airport to activities and purposes compatible with normal airport operations.

For each alternative, existing and future land uses on and adjacent to the Airport were examined to determine their compatibility with the proposed projects. None of the proposed projects have the potential for disruption of communities, relocation of as a result of property acquisition, and induced socioeconomic impacts. As discussed in **Section 4.1**, the proposed threshold displacements would cause only minor changes to noise exposure near the Airport, none of which would affect existing noise-sensitive areas. The proposed projects would not cause disruption of communities (see **Section 4.3**), relocation as a result of property acquisition (see **Section 4.3**), or induce socioeconomic impacts (see **Section 4.4**).

Table 4.2-1 shows the Federal Land Use Compatibility Guidelines included under 14 CFR Part 150, *Airport Noise Compatibility Planning*, which establish noise criteria for various types of land uses. Under the federal guidelines, residential uses and schools are incompatible with noise levels of DNL 65 dB. Other noise-sensitive facilities, such as churches and hospitals, are considered compatible within the DNL 65 dB contour if noise attenuation can be added to the design of the building that would result in a noise level reduction of 25 dB. No incompatible land uses have been identified under the proposed Build Alternatives. Therefore, no significant impacts are anticipated.

4.2.2 IMPACT POTENTIAL – NO BUILD ALTERNATIVE

The No Build Alternative does not involve the construction, modification, or relocation of any new or existing facilities at BWI Marshall nor affect aircraft operating at the Airport; therefore, there would be no land use compatibility issues with the No Build Alternatives for any of the proposed projects.

TABLE 4.2-1
LAND USE COMPATIBILITY WITH YEARLY DAY-NIGHT AVERAGE SOUND LEVELS

Land use	Yearly day-night average sound level (L_{dn}) in decibels					
	Below 65	65–70	70–75	75–80	80–85	Over 85
Residential						
Residential, other than mobile homes and transient lodgings	Y	N(1)	N(1)	N	N	N
Mobile home parks	Y	N	N	N	N	N
Transient lodgings	Y	N(1)	N(1)	N(1)	N	N
Public Use						
Schools	Y	N(1)	N(1)	N	N	N
Hospitals and nursing homes	Y	25	30	N	N	N
Churches, auditoriums, and concert halls	Y	25	30	N	N	N
Governmental services	Y	Y	25	30	N	N
Transportation	Y	Y	Y(2)	Y(3)	Y(4)	Y(4)
Parking	Y	Y	Y(2)	Y(3)	Y(4)	N
Commercial Use						
Offices, business and professional	Y	Y	25	30	N	N
Wholesale and retail—building materials, hardware and farm equipment	Y	Y	Y(2)	Y(3)	Y(4)	N
Retail trade—general	Y	Y	25	30	N	N
Utilities	Y	Y	Y(2)	Y(3)	Y(4)	N
Communication	Y	Y	25	30	N	N
Manufacturing and Production						
Manufacturing, general	Y	Y	Y(2)	Y(3)	Y(4)	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y(6)	Y(7)	Y(8)	Y(8)	Y(8)
Livestock farming and breeding	Y	Y(6)	Y(7)	N	N	N
Mining and fishing, resource production and extraction	Y	Y	Y	Y	Y	Y
Recreational						
Outdoor sports arenas and spectator sports	Y	Y(5)	Y(5)	N	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts and camps	Y	Y	Y	N	N	N
Golf courses, riding stables and water recreation	Y	Y	25	30	N	N

*The designations contained in this table do not constitute a Federal determination that any use of land covered by the program is acceptable or unacceptable under Federal, State, or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities. FAA determinations under part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise compatible land uses.

Key to Table 1 SLUCM=Standard Land Use Coding Manual.

Y (Yes)=Land Use and related structures compatible without restrictions.

N (No)=Land Use and related structures are not compatible and should be prohibited.

NLR=Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.

25, 30, or 35=Land use and related structures generally compatible; measures to achieve NLR of 25, 30, or 35 dB must be incorporated into design and construction of structure.

(1) Where the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NLR) of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a NLR of 20 dB, thus, the reduction requirements are often stated as 5, 10 or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.

(2) Measures to achieve NLR 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(3) Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(4) Measures to achieve NLR 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal level is low.

(5) Land use compatible provided special sound reinforcement systems are installed.

(6) Residential buildings require an NLR of 25.

(7) Residential buildings require an NLR of 30.

(8) Residential buildings not permitted.

Source: 14 CFR Part 150, Appendix A, Table 1 (January 1998).

4.3 SOCIOECONOMIC IMPACTS

An analysis of potential socioeconomic impacts was performed to determine whether the proposed projects would cause relocation of residences without sufficient available replacement housing; extensive relocation of community businesses creating a severe economic hardship for the community; disruption of local traffic patterns that would substantially reduce the Level of Service of roads serving the Airport and its surrounding communities; or a substantial loss in community tax base.

4.3.1 IMPACT POTENTIAL – BUILD ALTERNATIVES

None of the proposed Build Alternatives would cause the relocation of residences; disruption of local traffic patterns that would substantially reduce the Level of Service of roads serving the Airport and its surrounding communities; or a substantial loss in community tax base. FAA has determined the threshold of significance for socioeconomic impacts to be when there are significant impacts to other categories such as noise, land use, or direct social impacts. There are minimal impacts, if any, to each of these categories, therefore significant impacts to socioeconomics are not anticipated.

The improvements proposed to the Terminal exit roadway would increase traffic flow, as detailed in the *Feasibility Study for Arrivals Level Exit Road Improvements at BWI* (January 2007).

Several of the Build Alternatives would require land acquisition mostly in the form of avigation easements, as discussed below.

4.3.1.1 Compliance with Runway Protection Zone Requirements

Runway 15R End – Build Alternative

With the proposed threshold displacement of 300 feet as discussed in **Section 2.1.1** for the proposed Runway 15R safety area improvements, several non-airport owned properties, totaling 3.3 acres, would be located within the RPZ to Runway 15R (refer back to **Exhibit 2.8-1**). Specifically, the proposed Runway 15R RPZ contains three parcels within the controlled activity area requiring acquisition of avigation easements. Each of the three parcels currently contains automobile parking outside of the Central Portion of the RPZ. A fourth parcel, currently owned by MAA and leased for flight kitchen activities, is also located within the controlled activity area. FAA Advisory Circular 150/5300-13 states that automobile parking lots may be permitted within an RPZ if they are located outside of the central portion. Therefore, it is anticipated that the automobile parking lots can remain in use if the Airport acquires avigation easements in these areas. The portion of the Flight Kitchen located within the RPZ would need to be demolished. The loss of space demolished within the RPZ would be replaced on the east side of the existing structure.

Runway 33L End – Build Alternative

With the proposed threshold displacement of 500 feet, one non-airport owned property, totaling 0.1 acres, would be located within the RPZ to Runway 33L (refer back to **Exhibit 2.8-1**). Therefore, this displacement would require the acquisition of an avigation easement for one parcel of non-MAA owned property that is currently undeveloped located within the former Arundel Manor subdivision, along the southwest edge of the RPZ to Runway 33L.

Runway 10 End – Build Alternative

The Runway 10 RPZ contains one parcel requiring acquisition of property interest from Anne Arundel County, located adjacent to the Aviation Boulevard and Stoney Run Road interchange. This area of land contains 8.1 acres of land that is currently undeveloped (refer back to **Exhibit 2.8-1**). The MAA proposes to acquire property interests in this parcel for RPZ purposes and so that existing airport structures would be located on MAA property (see **Section 2.1.2**). The proposed acquisition of 8.1 acres would be negotiated with Anne Arundel County and take into consideration prior arrangements made in the 1980s when the Stoney Run Road interchange was constructed.

4.3.1.2 Obstruction Removal

Approximately 507 trees and approximately 113 man-made objects have been identified on the current FAA-approved ALP (February 2011) as obstructions to the 14 CFR Part 77 surfaces of the Runways 15R-33L and 10-28 (refer back to **Exhibit 2.9-1**). The majority of these obstructions are located on either MAA-owned property or parcels which MAA currently has avigation easements for tree removal. Additional avigation easements would be obtained for removal of the remaining off-Airport obstructions, as necessary.

4.3.2 IMPACT POTENTIAL – NO BUILD ALTERNATIVE

Because the No Build Alternative does not involve the construction, modification, or relocation of any new or existing facilities at BWI Marshall; affect aircraft operating at the Airport; or require land acquisition, there would be no socioeconomic impacts attributable to this alternative.

4.3.3 MITIGATION MEASURES

All of the property acquisitions and avigation easements would be performed to ensure conformance with Public Law 91-646, the *Uniform Relocation Assistance and Real Property Acquisition Policy Act of 1970* (Uniform Act), and FAA Advisory Circular 150/5100-17, *Land Acquisition and Relocation Assistance for Airport Improvement Program Assisted Projects*. Before initiating negotiations, the property desired to be acquired would be appraised. The owner or owner's representative would be given the opportunity to accompany the appraiser during the appraiser's inspection of the property. A fair market price will then be established by the Airport, which it believes is adequate compensation for the property. The amount would not be less than the approved appraised value of the property. A written offer would then be

presented to the owner to acquire the property for the full amount believed to be just compensation. The date that this written offer is presented is defined in the Uniform Act as the "initiation of negotiations."

4.4 SECONDARY (INDUCED) IMPACTS

The analysis of potential secondary (induced) impacts is intended to determine whether the proposed projects would cause shifts in patterns of population movements and growth, public service demands, and changes in business and economic activity to the extent influenced by airport development.

4.4.1 IMPACT POTENTIAL – BUILD ALTERNATIVE

As stated in FAA Order 1050.1E, Change 1, Appendix A, Section 15, induced impacts would normally not be significant except where there are also significant impacts in other impact categories, especially noise, land use, or direct social impacts. Implementing any of the Build Alternatives would lead to only minor impacts as discussed in these categories. None of the Build Alternatives would increase the potential for shifts in patterns of population movement and growth, public service demands, or result in substantial changes in business and economic activity. However, a temporary increase in economic activity in both the construction and building material supply sectors of the local economy is anticipated with either Build Alternatives. These jobs generated by construction activities would be of a relatively short duration; however, the proposed projects could potentially stimulate secondary economic impacts through increased aviation-related employment opportunities as the Airport continues to improve its facilities.

4.4.2 IMPACT POTENTIAL – NO BUILD ALTERNATIVE

Because the No Build Alternative does not involve the construction, modification, or relocation of any new or existing facilities at BWI Marshall nor affect aircraft operating at the Airport, there would be no secondary impacts directly attributable to this alternative.

4.5 WATER QUALITY

An assessment of available water quality data was completed for the watersheds within the study area, which include the Baltimore Harbor and Patapsco River Lower North Branch watersheds. Both of these watersheds are listed as Category 5 Waters on the *Integrated Report of Surface Water Quality in Maryland* [303(d) list] (Maryland Department of the Environment 2010). Category 5 Waters are those that are impaired, and do not attain water quality standards. A total maximum daily load (TMDL) or other acceptable pollution abatement initiative is required for these waters. A TMDL is an estimate of the maximum amount of a pollutant, from point and non-point sources, that a water body can receive without violating ambient water quality standards.

Maryland Biological Stream Survey (MBSS) and Stream Waders data was available for only one of the stream systems directly impacted by this project: Fork Branch. The Fork Branch site (BALT-119-R-2004),

which is located outside the BWI Marshall property, was surveyed in both the spring and summer of 2004. Results of this survey, and adjacent surveys of Deep Run and Stony Run suggest that water quality, aquatic habitat, and living resources in all the waterways in the study area have been impacted by development and land use practices, and are typical of sub-watersheds in developed suburban areas throughout the Patapsco and Baltimore Harbor watersheds.

Data from Anne Arundel County, the U.S. Environmental Protection Agency, and the MDE was used in determining the availability and quality of groundwater in the study area. No Federal or State standards have been established for raw groundwater; however, there are standards that apply to water supply systems that utilize groundwater resources. No sole or principal source aquifers are located within the project area; however, Anne Arundel County has drinking water wells and a groundwater drinking water treatment plant along the southeast portion of BWI Marshall, on the east side of Aviation Boulevard.

4.5.1 IMPACT POTENTIAL – BUILD ALTERNATIVES

Several streams would be impacted by one or more of the proposed improvements. Construction at and around waterway crossings could cause permanent impacts if existing crossings are widened or reinforced. These impacts would occur through permanent alteration of the stream channel, resulting in alteration of hydrology at the site, as well as upstream and/or downstream locations. Such hydrological changes may destabilize the channel and stream banks, increase erosion and sediment loads in the stream, and affect water quality and aquatic habitats that support macroinvertebrates and fish. Additional stormwater considerations will need to be made to account for the approximately 275 acres of ground disturbance for grading within the safety areas for Runways 15R-33L, 10-28, and 15L-33R. Temporary impacts to water quality during construction may occur due to stream diversion, erosion, or vegetation removal.

Water quality impacts associated with the Build Alternatives would be expected due to runoff associated with the proposed areas of additional impervious surface. Based on preliminary plans, new impervious surfaces would total approximately 40 acres and pavement removal will be approximately 32 acres for a net increase in impervious of approximately 8 acres (see **Table 4.5-1**). Stormwater treatment will be required for the increased impervious area as well as to address project phasing and the TMDL requirements that will be imposed on the Airport. Proposed areas of impervious to be removed are shown in **Table 4.5-2**.

Table 4.5-3 presents the proposed impacts for those projects to be located in or adjacent to existing streams. The impacts are presented by project alternative per stream. A discussion of each proposed project and the anticipated impacts follows the table. Impacts to existing streams will be refined and minimized to the extent practicable during the final design of the project.

TABLE 4.5-1
PROPOSED IMPERVIOUS AREAS

Proposed Project	Area of New Impervious (Acres)
Runway to Taxiway Separation Deficiency	
Runway 15R-33L 35-Foot Shoulders	11.4
Taxiway D and Runway 33L End Hold Pad	8.5
Engineering Brief No. 75 Taxiway Modifications	10.6
Perimeter Roadway Improvements	
Runway 15R End	2.6
Runway 33L End	2.9
Runway 10 End	1.1
Runway 15L End	1.3
Airfield Pavement Improvements	1.4
TOTAL	**39.8**

Source: URS, 2011

TABLE 4.5-2
PROPOSED IMPERVIOUS AREAS TO BE REMOVED

Proposed Project	Area of Impervious (Acres)
Runway to Taxiway Separation Deficiency	3.9
RSA Improvements	0.7
Engineering Brief No. 75 Taxiway Modifications	23.6
Perimeter Roadway Improvements	1.2
Runway 4-22 Improvements	2.5
TOTAL	**31.9**

Source: URS, 2011

TABLE 4.5-3
STREAM IMPACTS

Proposed Improvements	Fork Branch (linear feet)		Kitten Branch (linear feet)	
	Temp.	Perm.	Temp.	Perm.
Runway 15R-33L Safety Area Improvements Build Alternative	0	0	0	50
Runway 10-28 Safety Area Improvements Build Alternatives 1 and 2	0	0	0	60
Runway to Taxiway Separation Deficiency Build Alternative 1	300 (Int.) 350 (Per.)	900 (Int.) 700 (Per.)	0	0
Runway to Taxiway Separation Deficiency Build Alternative 2	200 (Int.) 100 (Per.)	1,020 (Int.) 1,130 (Per.)	0	0
Runway 15R Glide Slope Relocation[1] Build Alternative 1	0	0	400	1,200
Runway 15R Glide Slope Relocation[2] Build Alternative 2	0	0	460	1,200
Runway 15R Glide Slope Relocation[3] Build Alternative 3	0	0	350	1,300
Runway 33L Glide Slope Relocation Build Alternatives 1 and 2	0	650 (Int.) 0 (Per.)	0	0

Temp. – Temporary; Perm. – Permanent; Int. – Intermittent; Per. – Perennial

Source: ADCI, 2011

NOTES: 1. Floodplain impacts would be 53,500 square feet of temporary and 227,100 square feet of permanent.

2. Floodplain impacts would be 53,500 square feet of temporary and 232,000 square feet of permanent.

3. Floodplain impacts would be 50,800 square feet of temporary and 237,900 square feet of permanent.

Runway 15R-33L Safety Area Improvements – As a connected action to the 300-foot threshold displacement for the Runway 15R end, the MALSR towers need to be relocated and one of these towers would be located within a wetland buffer area, although there would be no streams impacted (see **Exhibit 4.5-1**). Additionally, for the necessary safety area grading in the area on the southwest side of Runway 15R-33L north of the Taxiway F intersection, an existing outfall pipe draining from the terminal area to Kitten Branch would be extended (see **Exhibit 4.5-2**). Approximately 50 linear feet of the stream would be placed into the extended outfall pipe so that the ground can be graded to meet FAA design standards. There are no options to avoid the impacts to this tributary of Kitten Branch, as the existing drainage structures must be relocated to outside the extents of the RSA.

Runway 10-28 Safety Area Improvements – There are two components associated with the Runway 10-28 safety area improvements. The first component is necessary grading within the limits of the RSA for the entire length of Runway 10-28 (see **Exhibit 2.1-3**). Approximately 60 linear feet of the headwaters

to Kitten Branch would be placed into a pipe so that the ground can be graded to meet FAA design standards (see **Exhibit 4.5-3**). Kitten Branch is a perennial stream that ranges in width from six to 15 feet with a depth that ranges from several inches to pools of several feet. Kitten Branch is located parallel to Runway 15R. In addition, the existing swales and inlets within the RSA limits would be relocated to outside the RSA.

The second component is the proposed relocation of the Runway 28 localizer to outside the Runway 10 end safety area. There are two alternatives proposed for relocating the existing Runway 28 localizer outside of the Runway 10 end safety area:

1. Place the localizer on top of a platform on a 20-foot high retaining wall
2. Place the localizer on the ground on a 30-foot high retaining wall

Exhibit 4.5-4 shows each of the Build Alternatives. An area of grading would be necessary for the relocation of the Runway 28 localizer; however, there are no stream impacts associated with this relocation for either Build Alternative.

Runway to Taxiway Separation Deficiency – To meet the FAA design criteria for runway to taxiway separation on the Runway 33L end, Taxiway D would be relocated to a separation of 550 feet. As a connected action to this taxiway relocation, the Runway 33L hold pad would be relocated to join the proposed relocated Taxiway D and expanded to meet FAA design standards. There are two alternatives presented for this hold pad relocation and expansion:

1. Place Fork Branch in an angled culvert under the proposed hold pad (partial).
2. Place Fork Branch in a multi-angled culvert around the edge of the proposed hold pad.

A perimeter roadway is also proposed around the Runway 33L end and the proposed roadway alignments coincide with the hold pad alternatives. There are also impacts associated with the construction of the perimeter roadway as well as the proposed hold pad, but these impacts are presented together as the projects would be built within the same timeframe and geography.

Under Build Alternative 1, approximately 2,100 linear feet of Fork Branch (915 linear feet of perennial and 1,185 linear feet of intermittent) would be impacted to allow for the construction of the relocated Runway 33L end hold pad and 2,150 linear feet (1,130 linear feet of perennial and 1,020 linear feet of intermittent) would be impacted under Build Alternative 2 (see **Exhibits 4.5-5** and **4.5-6**). The relocation of the hold pad could not be constructed in another location as the parallel taxiway used to access the hold pad is located on the right side of the Runway 33L approach. An option to eliminate the Runway 33L hold pad was also considered, but this hold pad is necessary so that air traffic control personnel can hold aircraft at the Runway 33L end to optimize the operational capacity of the airfield. In addition, the proposed perimeter roadway could not be aligned to avoid Fork Branch while remaining outside the RSA and runway and taxiway OFAs as well as clearing the Part 77 obstruction surfaces.

The proposed Runway 33L hold apron would allow aircraft movement outside of the parallel taxiway OFA to allow other aircraft to proceed to the runway end for departure. The hold apron allows for aircraft to reach the end of the runway whereas a bypass taxiway would not allow an aircraft to have use of the full runway length.

Runway 15R Glide Slope Relocation – The existing Runway 15R Glide Slope is located on the right side of the Runway 15R approach at a runway separation less than the FAA design standard of 400 linear feet. The Glide Slope must be relocated to a standard separation as well as a new location in conjunction with the 300-foot threshold displacement associated with the Runway 15R-33L Safety Area improvements and the 3-foot shift for runway to taxiway separation. In order to provide standard grading for the proposed grading plane for the glide slope, earth fill would be required in the Kitten Branch stream channel resulting in potential impacts to the stream. There are three alternatives presented for the proposed grading necessary for the relocation of the Runway 15R Glide Slope to meet FAA design standards:

1. Two retaining walls (200-foot and 275-foot long) as well as a 575-foot long culvert
2. Place a portion of Kitten Branch in a 850-foot long culvert (following a temporary stream diversion) win conjunction with a 200-foot long retaining wall to allow for the perimeter service roadway
3. Place a portion of Kitten Branch in a 875-foot long culvert with a 200-foot long retaining wall to allow for the perimeter service roadway

A perimeter roadway is also proposed around the Runway 15R end and the proposed roadway alignments coincide with the Runway 15R Glide Slope alternatives. For the installation of the perimeter service roadway, a 200-foot long retaining wall would be necessary under all three Build Alternative scenarios. There are also impacts associated with the construction of the perimeter roadway as well as the proposed Glide Slope and associated grading, but these impacts are presented together as the projects would be built within the same timeframe and geography.

Under Build Alternative 1, a 30-foot high retaining wall (275 feet long) would be constructed to allow for the grading required to support the Glide Slope resulting in approximately 330,000 cubic yards of fill while requiring approximately 575 feet of Kitten Branch to be placed into a box culvert (see **Exhibit 4.5-7**). Build Alternative 2 would place a portion of Kitten Branch in a box culvert to also allow for the grading required to support the Glide Slope function and impacting approximately 1,200 linear feet of Kitten Branch including approximately 335,000 cubic yards of fill (see **Exhibit 4.5-7**). Kitten Branch would be temporarily diverted while the in-stream culvert is constructed with Kitten Branch eventually being placed in the box culvert in its original stream channel location. Build Alternative 3 would also place a portion of Kitten Branch in a box culvert to allow for the Glide Slope grading and would impact approximately 1,300 linear feet of Kitten Branch and require approximately 345,000 cubic yards of fill (see **Exhibit 4.5-8**). Under Build Alternative 3, the box culvert would not be located in the current stream channel, therefore, the culvert can be constructed then divert Kitten Branch into the culvert. There are no options available

that would allow for the relocation of the Runway 15R Glide Slope to a standard location to meet FAA design standards and the purpose and need for the project while avoiding impacts to Kitten Branch.

Runway 33L Glide Slope Relocation – The existing Runway 33L Glide Slope is located on the right side of the Runway 33L approach at a runway separation less than the FAA design standard of 400 feet. The Glide Slope must be relocated to a standard separation as well as a new location in conjunction with the 500-foot threshold displacement associated with the Runway 15R-33L Safety Area improvements. Operationally, the Glide Slope cannot be relocated to a standard separation on the right side of the Runway 33L approach without impacting the use and function of Taxiway D; therefore, the Glide Slope would be relocated to the left side of the Runway 33L approach at a standard separation. The Glide Slope would be placed in an existing infiltration trench requiring the loss in function to the trench to be replaced. There are two alternatives presented for the replacement of the infiltration trench:

1. Replace the infiltration area to the north
2. Replace the infiltration area to the west

The proposed impacts to Fork Branch (intermittent) would be the same under Build Alternatives 1 and 2. Approximately 650 linear feet of Fork Branch (intermittent) would be impacted as a result of the grading of the Glide Slope Critical Area for the relocation of the Runway 33L Glide Slope (see **Exhibits 4.5-9** and **4.5-10**). There are no feasible alternatives to completely avoid impacts to Fork Branch while meeting FAA design standards and the purpose and need for the project without impacting the operation and function of the existing parallel taxiway on the Runway 33L end (Taxiway D).

4.5.2 IMPACT POTENTIAL – NO BUILD ALTERNATIVE

Because the No Build Alternative does not involve construction, modification, or relocation of any new or existing facilities at BWI Marshall, there would be no water quality impacts directly attributable to this alternative.

4.5.3 MITIGATION MEASURES

Pursuant to Section 404 of the CWA and the Maryland Nontidal Wetlands Protection Act, a Joint Federal/State Permit for the Alteration of any Floodplain, Waterway, Tidal or Nontidal Wetland in Maryland would be obtained from the COE and MDE prior to the disturbance of any surface water resources. The permitting process would ensure that water quality concerns are addressed, and all measures to avoid and minimize impacts are incorporated in to the final design of the proposed project.

As discussed in **Section 1.0**, MAA has been coordinating with the COE and MDE regarding the complexity of the proposed projects and seeking continued guidance and support through the Section 404 permitting process of the CWA (as amended) for unavoidable impacts to wetlands and waters of the U.S. As a result of this coordination, MAA anticipates obtaining authorization under one permit to construct these proposed projects.

Water quality and associated aquatic resources would be protected by the Use I in-stream time of year work restriction, which protect the spawning and nursery periods of migratory fish. Generally, no in-stream work is permitted in Use I streams from March 1 to June 15, inclusive, during any year.

Short-term construction impacts and long-term effects related to increased paved surfaces would be minimized by strict adherence to erosion and sediment control procedures. An Erosion and Sediment Control Plan would be developed during the final design phase in accordance with MDE guidelines, and implemented to avoid and/or minimize erosion and sedimentation. Appropriate drainage, infiltration, and sediment control measures would be planned and implemented to minimize disturbance to the area and reduce the risk of contamination to water resources.

Long-term impacts would also be avoided and minimized through strict adherence to the *Maryland Stormwater Management Guidelines for State and Federal Projects*, dated April 15, 2010. Design shall be in compliance with the Stormwater Management Regulations (COMAR 26.17.02), the *Maryland Stormwater Design Manual, Volumes I and II* and its latest Supplement. These regulations require the use of Environmental Site Design (ESD) to the Maximum Extent Practicable. The Chapter 5 supplement to the Design Manual details methods of providing ESD. The revised stormwater management guidelines provide information necessary for submittal of stormwater management plans to the MDE Water Management Administration for review and approval, including an additional requirement of a Stormwater Management Concept Report. These regulations would be complied with during the design of the project to accommodate additional stormwater runoff.

MAA is proposing to provide compensatory mitigation through a stream restoration off-site due to wildlife hazard attractant concerns as defined in FAA AC 150/5200-33B, *Hazardous Wildlife Attractants on or Near Airports*. MAA has prepared a Preliminary Draft Compensatory Mitigation Plan (CMP) in accordance with the Final Rule on Compensatory Mitigation for Losses of Aquatic Resources. Authorization of impacts would not be granted until the COE approves the Final CMP (see **Appendix B**).

4.6 DEPARTMENT OF TRANSPORTATION ACT: SECTION 4(f) LANDS

To comply with the provisions of the Department of Transportation Act, Section 4(f), publicly owned lands of a public park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance, or historic sites of national, state, or local significance in the vicinity of the proposed projects were identified (see **Section 3.6**). The Act provides that the Secretary of Transportation will not approve of any program or project that requires the use of a Section 4(f) resource unless there is no feasible and prudent alternative to the use of such resource, and the project includes all possible planning to minimize harm resulting from use.

4.6.1 IMPACT POTENTIAL – BUILD ALTERNATIVES

The EA investigated the direct and indirect impacts of the proposed projects upon resources such as parks, recreation areas, wildlife refuges, and historic structures, which are protected under Section 4(f) of the DOT Act of 1966. The proposed projects that have the potential to directly or indirectly impact Section 4(f) resources are noted below.

4.6.1.1 Runway Safety Area Improvements for Runway 15R-33L

With the displacement of the 33L end threshold of 500 feet, a portion of the parking area for the Thomas A. Dixon, Jr. Observation Area would lie within the controlled activity area of the RPZ on the Runway 33L end (refer back to **Exhibit 2.8-1**). Although parking facilities are discouraged within the RPZ, they are permitted within the controlled activity areas. Therefore, there would be no physical or constructive use of the Thomas A. Dixon, Jr. Observation Area or its parking areas as no changes to the area or its viewshed would occur. In addition, there would be no impacts to the BWI Trail.

4.6.1.2 Obstruction Removal

Approximately 507 trees and 113 man-made objects that have been identified as obstructions to the 14 CFR Part 77 surfaces of the two primary runways at BWI Marshall (Runways 10-28 and 15R-33L) would need to be removed.

Areas of obstruction removal are located near the BWI Trail as well as the Thomas A. Dixon Observation Area. While most of these trees are located on MAA-owned property, the tree removal would alter the viewshed of both the Observation Area and the BWI Trail. The change in the viewshed would not be a constructive use because the attributes of the Observation Area or use of the BWI Trail would not be impacted as the uses are for viewing planes and recreation / exercise, respectively, and the trees are not an attribute of the 4(f) resources. There is no physical use of the 4(f) properties because the proposed airport improvements do not contemplate physical taking of the land within these 4(f) properties.

Additionally, 2.35 acres of trees need to be removed on the Runway 33L end to allow clear line-of-sight to the proposed Runway 33L hold pad.

4.6.2 IMPACT POTENTIAL – NO BUILD ALTERNATIVE

Because the No Build Alternative does not involve the construction, modification, or relocation of any new or existing facilities at BWI Marshall nor affect the operational characteristics of the Airport, there are no impacts to Section 4(f) properties.

4.7 HISTORICAL, ARCHITECTURAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

The APE for both historical and archeological resources was defined for this undertaking as the area of direct effect resulting from the proposed projects. The APE generally follows the limits of disturbance for the proposed improvements. The MHT concurred with the delineation of the APE on June 14, 2010 (see **Appendix G**).

4.7.1 IMPACT POTENTIAL – BUILD ALTERNATIVES

4.7.1.1 Historic Resources

A review of MHT files and reports revealed that there are no previously identified above-ground historic resources located within the APE. The APE was observed during reconnaissance surveys conducted in December 2008 and May 2011, during which these findings were confirmed. It was noted that there are no above-ground structures 50 years of age or older located within the APE. Two previously identified resources, the Benson-Hammond House (AA-118) and Friendship Cemetery are both located outside of the APE for the project (refer back to **Exhibit 3.7-1**).

Coordination with MHT has determined that no above-ground historic properties would be affected by the proposed improvements.

4.7.1.2 Archaeological Resources

A Phase IB Archaeological Survey was performed in all moderate and high probability areas within the proposed limits of disturbance in April and May of 2009, and an addendum to the Phase IB Archeological Survey was prepared in February 2011. The methods used in this survey included documentary and map research, review of pertinent historic and archeological literature, visual inspection of the APE, and systematic subsurface investigation of undisturbed locations. A total of 291 shovel test pits (STPs) were excavated at various intervals in 16 distinct test areas according to their potential for the presence of cultural resources. In total, 71.9 acres were subjected to subsurface investigations.

The results of the Phase IB Archeological Surveys indicate that areas of archaeological sensitivity exist within several portions of the APE (refer back to **Exhibit 3.7-1** and see **Appendix G**). As a result of the Phase IB surveys, two historic sites have been documented within and in direct proximity to the APE for the proposed improvements: the T. W. Cole site (survey areas 5 and 6) and the Jas. Phelps site (survey areas 9A and 10). The artifacts recovered from both sites consist of collections of temporally mixed objects dating from the late nineteenth and early twentieth century. The artifact locations were widespread and the deposits were substantially disturbed at some locations. No prehistoric sites were identified during the Phase IB surveys.

No substantial features were identified in association with the artifact assemblages at either of the documented sites. The spatial patterning of positive STPs (i.e., those that yielded artifacts) does not reveal a concentration of artifacts at either site location. The individual STPs containing artifacts lacked the integrity of context necessary to recommend further evaluation at the Phase II level. However, archaeological features associated with both sites may be present outside the limited areas investigated during this Phase IB survey.

The possibility that either of these individual sites may be eligible for inclusion to the National Register of Historical Sites cannot be determined on the basis of these Phase IB investigations. However, it would appear that the portions of the sites within the proposed project areas do not contain intact deposits and, therefore, no additional investigations are recommended. The MHT concurred with the findings of the original Phase IB Archeological Survey on January 28, 2010, and the Supplemental Phase IB Survey Report on April 12, 2011, and no additional archeological investigations are warranted for the proposed improvements (see **Appendix G**). No archeological resources will be impacted by the proposed projects.

4.7.2 IMPACT POTENTIAL – NO BUILD ALTERNATIVE

Because the No Build Alternative does not involve construction, modification, or relocation of any new or existing facilities at BWI Marshall nor affect aircraft operating at the Airport, there would be no impacts to historic or archaeological resources attributable to this alternative.

4.8 FISH, WILDLIFE, AND PLANTS

4.8.1 FOREST RESOURCES

Forest resources were identified as part of the most recent approved *Forest Stand Delineation Report for BWI Airport* (Straughan Environmental Services Inc., 2003), and supplemental field work initiated as part of the *Updated Forest Maintenance Plan for BWI Airport* (URS / A.D. Marble & Company, 2009). In these forest resource documents, all forest stands present on BWI Marshall and adjacent MAA-owned lands are characterized, and their size, topography, canopy, dominant/co-dominant species, understory species, and herbaceous species documented. The limits of the forest resources were then compared with the proposed limits of disturbance for each of the proposed projects.

4.8.1.1 Impact Potential – Build Alternatives

Several forest stands will be impacted by one or more of the proposed projects. The majority of the affected areas on BWI Marshall consist of heterogeneous mixtures of deciduous and coniferous species, composed primarily of oak-hickory, maple-tulip, and Virginia pine.

Table 4.8-1 presents the proposed impacts for those projects to be located in or adjacent to existing forest stands. The impacts are presented by project alternative and divided into forest stands and afforestation areas. A discussion of each proposed project and the anticipated impacts follows the table. Impacts to existing forest stands will be refined and minimized to the extent practicable during the final design of the project.

TABLE 4.8-1
FOREST IMPACTS

Proposed Improvements	Forest Stands	Afforestation Areas
Obstruction Removal and Line-of-Sight Clearance Build Alternative	Obstruction Removal 507 trees Line-of-Sight Clearance 2.35 acres	0
Runway to Taxiway Separation Deficiency Build Alternatives 1 and 2	3.50 acres	0.28 acres
Runway 15R Glide Slope Relocation Build Alternatives 1, 2, and 3	2.16 acres	0

Source: ADCI, 2011

Obstruction Removal and Line-of-Sight Clearance – To meet the requirements of CFR Part 77, there are individual trees that need to be removed. In addition, to comply with FAA Order 6480.4A, *Airport Traffic Control Siting*, an area of trees must also be removed east of the Runway 33L end to allow for clear line-of-sight from the existing ATCT to the existing and proposed Runway 33L hold pad. Approximately 500 trees would be removed as a part of the obstruction removal (see **Exhibit 4.8-1**). In addition, approximately 2.35 acres of trees would be removed for the line-of-sight clearance (see **Exhibit 2.9-1**). The trees within wetland or wetland buffer areas will be removed manually, with no heavy equipment in the wetland or wetland buffer, and the felled trees will be left on site.

Runway to Taxiway Separation Deficiency – As discussed in **Section 4.5.1**, there are two Build Alternatives associated with the proposed relocated and expanded Runway 33L end hold pad as a connected action to the relocation of Taxiway D. In addition, a perimeter roadway is proposed around the Runway 33L end. The impacts for the relocated taxiway, hold pad, and perimeter roadway are not separated by project as these projects would be built within the same timeframe and geography.

The proposed forest impacts are the same under both Build Alternatives 1 and 2 (see **Exhibits 4.5-5** and **4.5-6**). Approximately 3.50 acres of existing forest stands and 0.28 acres of existing afforestation areas would need to be removed. The relocation and expansion of the hold pad could not be constructed in another location as the parallel taxiway used to access the hold pad is located on the right side of the Runway 33L approach. An option to eliminate the Runway 33L hold pad was also considered, but this hold pad is necessary so that air traffic control personnel can hold aircraft at the Runway 33L end to

optimize the operational capacity of the airfield. In addition, the Long Range Needs Assessment (2008) indicated an existing and future need for the Runway 33L end hold pad. The proposed perimeter roadway is aligned to keep the roadway adjacent to the main airfield while remaining outside of the RSAs and OFAs. There are no feasible alternatives to minimize the proposed impacts to existing forest stands while meeting FAA design standards and the purpose and need for the project. The proposed roadway has been design to minimize forest impacts while remaining outside of the proposed Taxiway Object Free Area.

Runway 15R Glide Slope Relocation – As discussed in **Section 4.5.1**, there are three Build Alternatives associated with the proposed grading of the Glide Slope Critical Area for the relocation of the Runway 15R Glide Slope. In addition, a perimeter roadway is proposed around the Runway 15R end. The impacts for the relocated Glide Slope and proposed perimeter roadway are not separated by project as these projects would be designed and built within the same time period and geography.

Under all three Build Alternatives, approximately 2.16 acres of existing forest stand removal would be required (see **Exhibits 4.5-7** and **4.5-8**). There are no other feasible alternatives to minimize the proposed impacts to existing forest stands while meeting FAA design standards and the purpose and need for the project.

4.8.1.2 Impact Potential – No Build Alternative

Because the No Build Alternative does not involve construction operations, modification to, or relocation of any new or existing facilities at BWI Marshall nor affect aircraft operating at the Airport, there would be no impacts to forest resources directly attributable to this alternative.

4.8.1.3 Mitigation Measures

As part of FCA compliance, it is anticipated that all forest impacts associated with the Build Alternatives would be mitigated at a 1:1 ratio with the exception of tree removal required for FAR Part 77 purposes, which are exempt from the provisions of the FCA, and certain existing afforestation areas, which may require a higher mitigation ratio. Under FCA, "linear projects that involve no change in land use may not be subject to afforestation requirements." All tree clearing activities for obstruction removal would be performed selectively with only trees that penetrate the FAR Part 77 surfaces being removed. Trees would be flush cut to existing grade; stumps would remain. The trees within wetland or wetland buffer areas will be removed manually, with no heavy equipment in the wetland or wetland buffer, and the felled trees will be left on site. MAA will consider updating their existing Forest Maintenance Plan when the obstruction removal occurs.

Because of wildlife hazard concerns and the potential for obstructions to regulated aviation airspace, all mitigation would be accomplished off-site, by planting, preservation, fee-in-lieu, or other methods. MAA

would continue to coordinate with the MDNR, as necessary, to fulfill regulatory requirements pursuant to the FCA.

4.8.2 RARE, THREATENED, AND ENDANGERED SPECIES

The Federal Endangered Species Act (16 U.S.C. Sec. 1531-1544) requires the conservation of threatened and endangered species. Under Section 7 of this Act, all Federal agencies must ensure that actions do not jeopardize the continued existence of any listed species or adversely modify or destroy any of their critical habitats.

The MDNR Wildlife and Heritage Service, MDNR Environmental Review Unit, and the FWS were contacted to determine if any rare, threatened or endangered species are located within the study area. Based on coordination with these agencies, the federally threatened swamp pink (*Helonias bullata*) has been documented to occur in the project area, within the Nontidal Wetlands of Special State Concern (WSSC) along Stony Run (see **Appendix B**). There are other protected species located within the vicinity of the Airport (Giant Cane, Bog Fern, and Clammyweed), as discussed in **Section 3.8.2**, however, these species are not located within the proposed project areas and, therefore, would not be impacted.

4.8.2.1 Impact Potential – Build Alternatives

West of Aviation Boulevard in the approach to the Runway 10 end, a community of the federally-endangered swamp pink is known to exist within the WSSC. The only project with potential impacts to this protected species is the obstruction removal located west of Aviation Boulevard in the 100-foot buffer to the WSSC associated with Stony Run. Although swamp pink has been documented to occur within the limits of the WSSC, it is not located within the proposed limits of disturbance associated with obstruction tree clearing in the approach to Runway 10. The proposed improvements would include the removal of 12 individual trees, near the AMTRAK train tracks east of the wetland within the wetland buffer, and near New Ridge Road on the west of the wetland also within the wetland buffer. The trees will be removed manually, with no heavy equipment in the wetland or wetland buffer, and the felled trees will be left on site. Given the limited scope of work, and the distance of this project from the documented site of swamp pink, the MDNR concluded via letter dated January 14, 2011, that no impacts to swamp pink will result (see **Appendix B**). Therefore, the proposed projects will not result in any impacts to rare, threatened, or endangered species, and no further surveys or coordination would be required. It should be noted that due to the swamp pink's Federally-threatened species designation, its location will not be provided on a graphic.

4.8.2.2 Impact Potential – No Build Alternative

Because the No Build Alternative does not involve construction operations, modification to, or relocation of any new or existing facilities at BWI Marshall nor affect aircraft operating at the airport, there would be no impacts to rare, threatened, or endangered species directly attributable to this alternative.

4.9 WETLANDS

Wetland delineations were conducted for the study area in accordance with the *U.S. Army Corps of Engineers Wetlands Delineation Manual*, *Technical Report Y-87-1* (Environmental Laboratory 1987), and *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region* (Environmental Laboratory, 2008). The limits of the identified wetlands were then compared to the limits of disturbance for each of the proposed projects. A preliminary JD of the delineated wetlands was performed in January 2011. MAA will continue to work with the COE and MDE throughout the project to further avoid and minimize impacts to wetlands and waters of the U.S.

4.9.1 IMPACT POTENTIAL – BUILD ALTERNATIVES

Several wetlands and wetland buffers would be unavoidably impacted as a result of the proposed improvements. **Table 4.9-1** details the proposed impacts to wetlands and wetland buffers. A discussion of each proposed project and the anticipated impacts follows the table. For the purposes of this document, it is assumed that all wetlands located within the limits of disturbance (a worst case scenario) will be impacted by the proposed project; however, these impacts will be avoided or minimized to the extent practicable during final design.

TABLE 4.9-1
WETLANDS AND WETLAND BUFFER IMPACTS[a]

Proposed Improvements	Wetlands (square feet)		Wetland Buffer (square feet)	
	Temp.	Perm.	Temp.	Perm.
Runway to Taxiway Separation Deficiency Build Alternatives 1 and 2	2,400	2,600	8,100	6,100
Runway 15R Glide Slope Relocation Build Alternatives 1, 2, and 3	275	11,228	3,400	32,200
Runway 28 Glide Slope Relocation Build Alternative	0	0	0	0
Runway 15R-33L Safety Area Improvements Build Alternative	0	0	4,000	900
Runway 10-28 Safety Area Improvements Build Alternative 1	0	0	0	850
Runway 10-28 Safety Area Improvements Build Alternative 2	0	0	2,000	1,000
Obstruction Removal and Line-of-Sight Clearance Build Alternative	315[b]	0	945[b]	0

Temp. – Temporary; Perm. – Permanent

Source: ADCI, 2011

NOTE: a: Impact numbers have been rounded for ease of discussion; actual numbers presented in subsequent tables.

b: Forested wetland would be converted to lower growing species.

Runway to Taxiway Separation Deficiency – As discussed in **Section 4.5.1**, there are two Build Alternatives associated with the placement of Fork Branch in a culvert under the proposed Runway 33L end hold pad as a connected action to the relocation of Taxiway D and the Runway 33L hold pad. In addition, a perimeter roadway is proposed around the Runway 33L end. The impacts for the relocated taxiway, hold pad, and perimeter roadway are not separated by project as these projects would be built within the same timeframe and geography.

The proposed impacts to wetlands and wetland buffers would be the same under both Build Alternatives (see **Exhibits 4.5-5** and **4.5-6**). Approximately 2,600 square feet of Wetland 8/9 and 6,100 square feet of its associated wetland buffer would be permanently impacted as a result of the perimeter roadway construction. The proposed perimeter roadway could not be aligned to avoid this wetland while remaining outside the RSA and runway and taxiway OFAs as well as clearing the Part 77 obstruction surfaces.

Runway 15R Glide Slope Relocation – As discussed in **Section 4.5.1**, there are three Build Alternatives associated with the proposed grading of the Glide Slope Critical Area for the relocation of the Runway 15R Glide Slope (see **Exhibit 4.5-7**). In addition, a perimeter roadway is proposed around the Runway

15R end. The impacts for the relocated Glide Slope and proposed perimeter roadway are not separated by project as these projects would be designed and built within the same time period and geography.

Under all three Build Alternatives, the proposed wetland and wetland buffer impacts are the same (see **Table 4.9-2**).

TABLE 4.9-2
WETLAND AND WETLAND BUFFER IMPACTS (PERMANENT AND TEMPORARY)
RUNWAY 15R GLIDE SLOPE RELOCATION ALL BUILD ALTERNATIVES*

Wetland Name	Type	Wetland Area (square feet)	Wetland Buffer Area (square feet)	Wetland Impact Area (square feet)	Wetland Buffer Impact Area (square feet)
8	PEM	75	5,111	75	5,036
16	PEM	1,556	7,171	1,556	2,593
KB-2	PEM	59,616	38,015	275	2,593
			Subtotal	**1,906**	**14,800**
KB-8 (isolated)	PSS	4,002	9,554	4,002	9,554
KB-9 (isolated)	PSS	5,595	11,205	5,595	11,205
			Subtotal (Isolated)	**9,597**	**20,759**
			TOTAL	**11,503**	**35,559**

Source: ADCI, 2011

*NOTE: Impact numbers in Table 4.9-1 have been rounded for ease of discussion; actual numbers presented herein.

Wetland 8 is located west of Runway 15R, along an existing airport service road. Wetland 16 is located adjacent to Sanitary Sewer Manhole #7 between the proposed perimeter road and Kitten Branch. Wetland KB-2 is located west of Runway 15R, inside the airport security fence. This wetland is associated with Kitten Branch. Wetland KB-8 is located west of Runway 15R, along an existing service road. Wetland KB-8 is an isolated wetland that is regulated by MDE, but not COE. Wetland KB-9 is located west of Runway 15R, along an existing service road. Wetland KB-9 is an isolated wetland regulated by MDE, but not COE.

There are no feasible alternatives to completely avoid impacts to existing wetlands and wetland buffers while meeting FAA design standards and the purpose and need for the project.

Runway 28 Glide Slope Relocation – The existing Runway 28 Glide Slope is located on the left side of the Runway 28 approach at a runway separation less than the FAA design standard of 400 feet (see **Exhibit 4.9-1**). The Glide Slope must be relocated to a standard separation. There is only one Build Alternative proposed for the relocation of the Glide Slope. While the proposed Glide Slope Critical Area would encroach upon existing wetlands and their associated buffers, the proposed grading has been refined to avoid impacts to these areas.

Runway 15R-33L Safety Area Build Alternative – As discussed in **Section 4.5.1**, for the necessary safety area grading in the area on the southwest side of Runway 15R-33L north of the Taxiway F intersection, an existing outfall pipe draining from the terminal area to Kitten Branch would be extended. Approximately 4,000 square feet of the buffer associated with Wetland KB-1 would be impacted (temporary) (see **Exhibit 4.5-2**). In addition, approximately 900 square feet of the buffer associated with Wetland 6 (an isolated wetland) would be permanently impacted by the installation of the relocated MALSR as a result of the Runway 15R 300-foot shift for the RSA improvements (see **Exhibit 4.5-1**). There are no feasible alternatives to completely avoid impacts to existing wetlands and wetland buffers while meeting FAA design standards and the purpose and need for the project.

Runway 10-28 Safety Area Build Alternative – As discussed in **Section 4.5.1**, there are two components associated with the Runway 10-28 safety area improvements: grading within the RSA for the entire length of Runway 10-28; and relocation of the Runway 28 localizer to outside the Runway 10 safety area. There are no impacts to wetlands or wetland buffers associated with the necessary grading for the Runway 10-28 safety area. However, to relocate the Runway 28 localizer outside the RSA on the Runway 10 end, there would be grading necessary to support the localizer on top of a retaining wall under the two alternatives. Approximately 850 square feet of wetland buffer associated with Wetland 15 would be permanently impacted under Build Alternative 1. Under Build Alternative 2, approximately 1,000 square feet of the wetland buffer associated with Wetland 10 would be permanently impacted (see **Exhibit 4.5-4**).

Obstruction Removal and Line-of-Sight Tree Removal – As discussed in **Section 4.8.1.1**, in order to meet FAA design standards for CFR Part 77, several areas of forest stands and individual trees must be removed as they are considered obstructions to navigable airspace. Approximately 315 square feet of wetlands and 945 feet of wetland buffers would be permanently impacted as a result of this tree removal (see **Exhibit 4.8-1**). **Table 4.9-3** details the proposed wetland impacts by wetland.

TABLE 4.9-3
WETLAND AND WETLAND BUFFER IMPACTS (TEMPORARY ONLY)
OBSTRUCTION REMOVAL BUILD ALTERNATIVE

Wetland Name	Type	Wetland Area (square feet)	Wetland Buffer Area (square feet)	Wetland Impact Area (square feet)	Wetland Buffer Impact Area (square feet)
2	PFO	615,537	681,374	0	756
KB-5	PFO	49,265	33,757	315	189
			TOTAL	315	945

NOTE: The proposed impacts detailed herein are under the jurisdiction of MDE only.

Wetland 2 is a PFO, PEM and PSS wetland system located west of Aviation Boulevard, just south of Wetland 1. This wetland is designated as a WSSC by the MDE and MDNR. Wetland KB-5 is located near the intersection of Runway 15R and Taxiway F. This wetland is associated with Kitten Branch.

There are no feasible alternatives to completely avoid impacts to existing wetlands and wetland buffers while meeting FAA design standards and the purpose and need for the project. The trees will be removed manually, with no heavy equipment in the wetland or wetland buffer, and the felled trees will be left on site.

4.9.2 IMPACT POTENTIAL – NO BUILD ALTERNATIVE

Because the No Build Alternative does not involve construction, modification, or relocation of any new or existing facilities at BWI Marshall, there would be no impacts to wetlands directly attributable to this alternative.

4.9.3 MITIGATION MEASURES

Pursuant to Section 404 of the CWA and the Maryland Nontidal Wetlands Protection Act, a Joint Federal/State Permit for the Alteration of any Floodplain, Waterway, Tidal or Nontidal Wetland in Maryland would be obtained from the COE and MDE prior to the disturbance of any wetland resources. The permitting process would ensure that proper avoidance, minimization, and mitigation requirements are addressed, and all measures to avoid and minimize impacts are incorporated into the final design of the proposed project.

As discussed in **Section 1.0**, MAA has been coordinating with the COE and MDE regarding the complexity of the proposed projects and seeking continued guidance and support through the Section 404 permitting process of the CWA (as amended) for unavoidable impacts to jurisdictional wetlands and their buffers and to facilitate the filing of the Joint Permit Application (JPA). As a result of this coordination, it has been agreed that MAA would obtain authorization through MDE for removal of vegetative obstructions within wetlands and their associated buffers. Authorization for these activities by COE is not required under Section 404 of the CWA, as amended. For all other impacts to wetlands and their associated buffers, MAA anticipates obtaining authorization under one permit each from the COE and MDE to construct these proposed projects.

Coordination with the COE and MDE is ongoing and numerous mitigation strategy meetings have been held with MAA. During coordination with the COE and MDE, MAA is proposing wetland mitigation on off-site MAA-owned property in conjunction with stream restoration activities to avoid creating potential wildlife hazard attractants. MAA would also need to coordinate the use of MAA-owned property for the mitigation proposed with the FAA. Compensatory mitigation would be required for unavoidable adverse impacts to wetland resources, in accordance with the *U.S. Army Corps of Engineers Compensatory Mitigation for Losses of Aquatic Resources* rule (33 CFR 325 and 332).

MAA has prepared a Preliminary Draft CMP in accordance with the Final Rule on Compensatory Mitigation for Losses of Aquatic Resources (see **Appendix B**). In the CMP, MAA proposed to provide

approximately 3,834 linear feet of stream restoration and 1,635 square feet of palustrine emergent wetland creation to compensate for unavoidable permanent impacts to federally jurisdictional resources. Additionally, 19,200 square feet of palustrine forested wetland creation will be incorporated into the restoration reach as mitigation for unavoidable impacts to state jurisdictional resources. Kitten Branch, downstream of the BWI Marshall campus, provides opportunities for both stream restoration and wetland creation. It affords over 4,000 linear feet of stream restoration and numerous locations in which riparian planting, wetland enhancement, and control of invasive vegetation could be implemented. This portion of Kitten Branch is entirely on MAA-owned property. USDA Wildlife Services has provided concurrence that due to the proposed nature of the restoration activities, no increased risk to aviation will occur despite the proximity of the proposed mitigation areas to approach/departure airspace. Both USACE and MDE have provided concurrence that restoration of these areas would satisfy compensatory mitigation needs for the projects and replace lost functions and values associated with impacted areas.

Authorization of impacts would not be granted until the COE approves the Final CMP. As all of the proposed impacts to wetlands and their associated buffers can be adequately mitigated to meet COE and MDE requirements, the wetland impact is not considered significant. The function and value lost as a result of the proposed impacts would be reclaimed through the proposed mitigation and would be accomplished under the supervision of the appropriate regulatory agencies (COE and MDE).

4.10 FLOODPLAINS AND FLOODWAYS

Executive Order 11988 directs Federal agencies to take action to avoid and minimize the risk of flood loss; minimize the impacts of floods on human safety, health, and welfare, and restore and preserve the natural and beneficial values served by floodplains. Agencies are required to make a finding that there is no practicable alternative before taking action that would encroach on a base floodplain based on a 100-year flood. Impacts to the 100-year floodplain can occur in two forms: directly through the changes to volumetric capacity of the floodplain or indirectly through an increase in the total volume of water arriving at and being conveyed by the floodplain.

4.10.1 IMPACT POTENTIAL – BUILD ALTERNATIVES

Floodplain areas were identified using FIRMs of Anne Arundel County, Maryland as well as several other existing plans and documents as discussed in **Section 3.10.1**. The proposed limits of disturbance for each project were then compared with the floodplain limits to determine the extent of encroachment.

The only floodplain encroachment anticipated involves a portion of the Kitten Branch floodplain, where the proposed Runway 15R Glide Slope relocation alternatives (and associated roadway options) would encroach upon the existing 100-year floodplain. While attempts were made to minimize impacts to the floodplain for each Build Alternative, it is impractical to avoid encroaching on the floodplains due to the existing terrain and the close proximity of the runway to the floodplain associated with Kitten Branch. It is also not practical or environmentally prudent to move the runway in order to avoid the floodplain impacts.

The new Glide Slope fill varies between the Glide Slope alternatives (and associated roadway options) as to the extent to which it extends into the floodplain. Approximately 227,100 square feet of the proposed limit of disturbance for Build Alternative 1, 232,000 square feet of the limit of disturbance for Build Alternative 2, and 238,000 square feet of proposed limit of disturbance for Build Alternative 3 would be located within the existing 100-year floodplain. Final grades for the Glide Slope grading and associated roadway options within the floodplain will be maintained at existing elevations to the maximum extent practicable in order to minimize any potential for increasing the 100-year flood elevations. Preliminary estimates of cubic yards of fill and fill within the existing floodplains are shown below.

TABLE 4.10-1
FLOODPLAIN IMPACTS
RUNWAY 15R GLIDE SLOPE RELOCATION BUILD ALTERNATIVES

	Total Cubic Yards of Fill	Cubic Yards of Fill within the 100-Year Floodplain
Build Alternative 1	330,000	162,000
Build Alternative 2	335,000	165,000
Build Alternative 3	345,000	168,000

Source: ADCI, 2011

Based on initial modeling, the proposed Runway 15R Glide Slope Critical Area grading and construction of the perimeter roadway would likely raise flood elevations more than one foot in only that portion of Kitten Branch immediately above the perimeter roadway bridge crossing, all of which is on MAA property. In considering the proposed improvements (Runway 15R glide slope relocation and perimeter roadway) and associated floodplain modifications, the magnitude of impacts to Kitten Branch would be similar regardless of the alternative selected. Alternative 2 is preferred over Alternative 1 because Alternative 2 would: 1) not include not include Alternative 1's 30-foot retaining wall which would require fall protection devices that may affect the functionality of the glide slope antenna; 2) reduce the wildlife hazard potential of Kitten Branch as compared to Alternative 1; 3) have a shorter construction duration than Build Alternative 1; and 4) be less likely to interfere with future BWI Marshall development plans. While Alternative 2 has greater approximated impacts to Kitten Branch and the 100-year floodplain than Alternative 1, the differences are negligible. Specifically, Alternative 2 impacts 0.12 acres more of floodplains than Alternative 1 and has 60 more linear feet of temporary impacts to Kitten Branch. Additionally, Alternative 2 is preferable to Alternative 3 because it creates fewer impacts to floodplains and Kitten Branch. In addition, the COE and MDE also preferred the method of stream diversion and construction of the culvert “in-line” within the stream bed that is included as part of Build Alternative 2. Further investigation will be performed to identify any potential mitigation opportunities to the floodplain impacts created by these improvements based on constructability.

URS modeled a similar scenario in 2009 using the HEC-RAS model developed by the Corps of Engineers indicating that the increase in flood elevation could be restricted to MAA property. Additional refinements

would be included as part of the final design effort to better define the project approach and avoid and minimize the proposed impact.

While attempts were made to minimize impacts to the floodplain for each Build Alternative, it is impractical to avoid encroaching on the floodplains due to the existing terrain and the close proximity of the runway to the floodplain associated with Kitten Branch. It is also not practical or environmentally prudent to move the runway in order to avoid the floodplain impacts.

4.10.2 IMPACT POTENTIAL – NO BUILD ALTERNATIVE

With implementation of the No Build Alternative, no development would occur; therefore, there would be no impact to floodplains.

4.10.3 MITIGATION MEASURES

As discussed in **Section 1.0**, MAA has been coordinating with the COE and MDE regarding the complexity of the proposed projects and seeking continued guidance and support through the Section 404 permitting process of the CWA (as amended) for unavoidable impacts to potentially jurisdictional wetlands and Waters of the U.S. Floodplain impacts are regulated by MDE and will be authorized in conjunction with stream impacts as previously described (see **Section 4.5**). Avoidance and minimization for floodplain impacts must be fully demonstrated prior to authorization being granted. Authorization for activities associated with floodplain impacts by COE is not required under Section 404 of the CWA, as amended.

The anticipated impacts to floodplains are not considered a significant encroachment as there is no likelihood of loss of human life, no adverse effect on the safe operation of the airport, and no notable adverse effect on the natural and beneficial value of the floodplain. In addition, any impacts to the floodplain would be confined to MAA-owned property.

The proposed projects (Runway 15R Glide Slope and associated perimeter roadway) would occur within the floodplain of Kitten Branch. The level of impact would be finalized during the design phase of the project and coordination with appropriate Federal and state agencies would be required. Should a Letter of Map Revision (LOMR) be required for alteration of the floodplain, necessary coordination with FEMA would occur as part of the final design. All encroachment within the floodplain and any associated variations will be evaluated to minimize potential impacts to the airport and airport facilities. If mitigation is required, priority will be given to feasible options that maintain impacts on MAA-owned airport property.

4.11 COASTAL RESOURCES

MAA is required to comply with the regulations set forth and administered by the MDE and MDNR. These governing agencies are charged with identifying land uses which, individually or cumulatively, may cause

or contribute significantly to the degradation of coastal waters where there is a failure to attain or maintain applicable water quality standards or protect designated uses, as determined by the state pursuant to the water quality planning process or coastal waters that are threatened by reasonably foreseeable increases in pollution loading from new or expanding sources.

4.11.1 IMPACT POTENTIAL – BUILD ALTERNATIVES

As indicated in **Section 3.11**, the proposed improvement projects are located within the Maryland Coastal Zone. A determination of consistency for the proposed improvement projects with the goals and objectives of the Maryland Coastal Zone Management Program (CZMP) would be conducted by MDE as part of its review of the EA and subsequent project design plans for permit applications and in accordance with the Maryland regulatory review process. The MDE is the Maryland State agency that manages the State's CZMP. MDE has indicated that based on their review of the draft EA for this project the proposed airport improvements are consistent with the State's CZMP.

4.11.2 IMPACT POTENTIAL – NO BUILD ALTERNATIVE

The No Build Alternative would cause no impact to the coastal waters and water quality within the Maryland Coastal Zone because the No Build Alternative does not involve the construction, modification, or relocation of any new or existing facilities at BWI Marshall nor affect the operational characteristics of the Airport.

4.11.3 MITIGATION MEASURES

Proposed mitigation measures for impacts to water quality and wetlands have been discussed previously. As a part of the agency coordination process, personnel from MDE have participated in the wetland mitigation strategy sessions. MDE will review the draft EA document and provide any additional recommendations for mitigation measures that would be required above and beyond the proposed wetland mitigation.

4.12 LIGHT EMISSIONS AND VISUAL IMPACTS

The existing lighting associated with current landside and airside operations, and lighting from vicinity infrastructure was identified and assessed. The potential impact of light emissions and visual impacts from the No Build and Build Alternatives to light sensitive areas within the vicinity of BWI Marshall was qualitatively assessed as there are no proposed new lights or light structures proposed under any of the proposed projects. Any changes to lighting and/or their associated structures are for relocations of existing equipment, not new installations.

4.12.1 IMPACT POTENTIAL – BUILD ALTERNATIVES

The proposed development associated with the proposed Build Alternatives would not detract from the area's visual quality, and the proposed new projects would be in keeping with the appearance of a modern international airport.

The area surrounding BWI Marshall is an urban landscape. The Airport is encircled by highways and other local roads presently illuminated by streetlights. Nearby residential areas are currently subject to light emissions from arriving/departing aircraft, ground operations, work area lighting and security lighting. Although some of the improvements included will require minor relocation/replacement of existing sources, these changes would not increase the overall light emissions produced at the airport and the surrounding roadways as they are relocations and not new sources. Therefore, no additional light emissions or visual impacts would result from implementing any of the proposed Build Alternatives.

4.12.2 IMPACT POTENTIAL – NO BUILD ALTERNATIVE

Because the No Build Alternative does not involve the construction, modification, or relocation of any new or existing facilities at BWI Marshall nor affect the operational characteristics of the Airport, there are no light emissions or visual impacts directly attributable to this alternative.

4.13 HAZARDOUS MATERIALS, POLLUTION PREVENTION, AND SOLID WASTE

FAA Order 1050.1E, Change 1 requires consideration of a pollution prevention plan for actions that involve hazardous materials and solid wastes. Federal, state, and local laws strictly regulate the handling and disposal of hazardous substances and hazardous materials. In addition, BWI Marshall has developed an Environmental Compliance Book (November 2006, currently being updated) to address compliance requirements and how the requirements are being met at the airport.

The operation of the Airport involves the storage, use, and transport of hazardous materials and the generation of hazardous wastes. Hazardous materials are transported to and from the Airport by ground vehicles as well as by passenger and all-cargo aircraft. The largest quantity of hazardous material used at the Airport is aviation fuel, which is consumed in operations and therefore generates little hazardous waste. Smaller quantities of other hazardous materials are stored and used on the Airport. The most common hazardous waste generated at the Airport is used motor oil associated with the maintenance facilities at the Airport. **Section 3.14.2** describes information on known hazardous materials within the airport as reported in the aforementioned compliance book.

4.13.1 IMPACT POTENTIAL – BUILD ALTERNATIVES

Potential impacts could result from construction activities that disturb existing hazardous materials or contaminated soil, causing them to be released into the surrounding environment. Impacts could also occur by the introduction and use of hazardous materials, such as fuels, lubricants, solvents, degreasers, cleansers, hydraulic fluids, and deicing agents into the newly developed areas. The increased use and volume of these hazardous materials could increase the risk of accidental spills or leaks and result in the release of these products into the environment. Procedures such as ensuring proper equipment maintenance and functionality, best management practices, developing standardized operating procedures for material handling and storage, and providing spill prevention and control measures would greatly reduce the likelihood of any potential releases of these materials.

The Airport currently produces and collects solid waste. Additional waste produced by each proposed project (i.e. asphalt, concrete) could be re-used within the proposed projects, stockpiled for future use, or disposed of in accordance with existing disposal methods developed by Maryland Environmental Service (MES).

Pollution prevention, in accordance with the Federal Pollution Prevention Act, for the proposed projects, involves source reduction, recycling in an environmentally safe manner, treatment in an environmentally safe manner, and disposal in an environmentally safe manner. Maryland regulations support reduction, recovery, and re-use practices to reduce the generation of hazardous materials [(COMAR 14.14.05B(1)]. Each proposed project within this EA will have its own requirements for the handling of hazardous wastes. Prevention methods may include, but not be limited to, oil spill prevention (40 CFR 112) and stormwater discharge (COMAR 26.08.04)

Construction activities will require documentation that all hazardous materials will be disposed of in accordance with Local, State and Federal requirements. In addition, construction contracts and plans will require appropriate measures that comply with the health and safety of all employees involved with the proposed improvements. Environmental hazards may require contractors to have additional training, certification, and/or equipment such as OSHA Hazardous Material Worker Training, Asbestos Abatement Worker Certification, and specialized personal protective equipment.

4.13.2 IMPACT POTENTIAL – NO BUILD ALTERNATIVE

The No Build Alternative does not involve the construction, modification, or relocation of any new or existing facilities at BWI Marshall nor affect the operational characteristics of the Airport. Therefore, the No Build Alternative would have no impact on the existing hazardous waste, solid waste, and pollution prevention conditions at the Airport.

4.13.3 MITIGATION MEASURES

There are several proposed projects located within potential contamination areas. Prior to construction of the proposed improvements further coordination would be needed with the MAA Division of Environmental Compliance to determine if any mitigation measures would be needed to construct the proposed improvements.

4.14 CONSTRUCTION IMPACTS

The construction associated with the Build Alternatives would cause temporary impacts associated with the pavement improvements, roadway construction, utility construction, and building construction. Anticipated temporary impacts would include construction noise, dust and noise from heavy equipment traffic, disposal of construction debris, and air and water pollution. Mitigation would be addressed by incorporating the provisions of *FAA Advisory Circular 150/5370 – 10E, Standards for Specifying Construction of Airports, Item P-156, Temporary Air and Water Pollution Soil Erosion and Siltation Control* into the project plans, guidelines established for Erosion and Sediment Control as defined by the *2010 Maryland Standards and Specifications for Soil Erosion and Sediment Control* (Draft October 2009), MDE - Water Management Administration - *Maryland Stormwater Design Manual, Volumes I & II*, and *General Permit for Stormwater Associated with Construction Activity* (effective January 1, 2009).

4.14.1 NOISE

Runways 15R-33L and 10-28 would be closed during separate 60-day construction periods as well as extended weekend closures and nightly closures. Each of these runways serves approximately twenty-five percent of total operations and approximately fifty percent of all arrival operations. The majority of these operations would be temporarily relocated to Runway 4-22 as well as either Runway 15R-33L or 10-28 (depending on which runway is being closed for construction). Operations on Runway 4-22 currently account for less than one percent of total operations. Because of the low current utilization, operations and associated noise in the arrival corridor to Runway 4-22 would increase, but the burden would also be shared between the other air carrier runway that is not closed (either Runway 15R-33L or 10-28). The increase in daily DNL in these areas would be temporary and the change in annual DNL would be less than one dBA.

Construction activities would temporarily increase ambient noise levels in the immediate vicinity of the construction and land clearing activities. Grading and scraping operations are the noisiest, with such equipment generating noise levels as high as 70 dBA to 95 dBA within 50 feet of their operation. Existing noise levels from aircraft operations exceed these construction equipment noise levels. The nearest noise sensitive receiver is approximately 1,000 feet from the construction activity. Distance rapidly attenuates noise levels, so area residents may experience a modest increase in ambient noise levels during construction hours. The potential noise impacts associated with the operation of machinery onsite would be temporary and could be reduced by construction timing and staging. To minimize noise impacts,

construction equipment should be maintained to meet manufacturers' operating specifications. Impacts related to the delivery of materials may be minimized by requiring that the contractor use designated haul routes to avoid residential and other noise-sensitive receptors. Overall, construction noise is expected to have a minor temporary impact.

4.14.2 WATER QUALITY

All construction-related water quality impacts from the implementation of Build Alternatives would be temporary, indirect, and direct. Impacts would result from the removal of vegetation, grading, and other construction activities where the quality of surface water could be affected. Impacts would result from soil erosion, sedimentation, and operation of construction equipment. Best Management Practices would be employed through the implementation of an Erosion and Sediment Control Plan and a Pollution Prevention Plan. The provisions of the *2010 Maryland Standards and Specifications for Soil Erosion and Sediment Control* (Draft October 2009) must be considered as well as adherence to the MDE *General Permit for Stormwater Associated with Construction Activity* (effective January 1, 2009).

4.14.3 AIR QUALITY

Emissions associated with construction activities are temporary and variable depending on project location, duration and level of activity. These emissions occur predominantly in the engine exhaust from the operation of construction equipment and vehicles (e.g., scrapers, dozers, trucks, etc.), but is also attributed to fugitive dust produced from construction materials staging, demolition and earthworks activities, as well as evaporative emissions from asphalt paving operations.

Construction equipment typically utilized in airport development projects involve both on-road and non-road equipment. The former category of vehicles are used for the transport and delivery of supplies, material and equipment to and from the site, and also include construction worker vehicles. The latter category of vehicles is operated on-site only for activities such as paving, utility installation, site clearing and fill operations, demolition, etc.

For this analysis, activity levels and vehicle assignments for the non-road and on-road construction vehicles were developed based on the requirements and schedules outlined in the BWI-Marshall ALP. Non-road exhaust emissions factors were calculated using the current version of the U.S. EPA-sanctioned NONROAD2008a model while on-road emissions factors were computed using county-specific data processed by the U.S. EPA's MOBILE6.2 model.

Emissions factors used to estimate fugitive dust PM emissions from disturbance and demolition were obtained from the U.S. EPA's *Compilation of Air Pollution Emissions Factors* (i.e., AP-42), assuming a 75 percent control efficiency through implementation of mitigation techniques discussed in **Section 5.1.6**. Evaporative emissions from the application of hot-mix asphalt during paving operations were estimated using emissions factors sanctioned by the National Association of Clean Air Agencies (NACAA, formerly

STAPPA/ALAPCO).

A detailed list of the individual projects, construction equipment assignments, schedules, equipment usage schedules, and emissions factors are compiled in the air quality appendix of this document.

Because there are no anticipated changes to aircraft operations (e.g., number of operations, fleet mix, delay periods, etc.), motor vehicle traffic, or stationary sources attributable to the implementation of the ALP, air emissions associated with the operation of the airport are expected to remain unchanged, and are not included in this analysis.

The General Conformity Rule of the federal CAA ensures that federal agencies (including the FAA) do not approve, permit or fund development projects or actions that do not conform to a federally- approved State Implementation Plan (SIP). Because BWI Marshall is located in both an O_3 and $PM_{2.5}$ non-attainment area[1], an applicability analysis is conducted under the General Conformity Rule for construction-related emissions associated with the ALP.

Construction-related emissions associated with the proposed near-term improvement projects contained in the ALP are presented on **Table 4.14-1** and are segregated by year, emission source and pollutant type. For the purposes of this assessment, it is assumed that the construction period will extend over a four-year time frame from 2012 to 2015. The results for the pollutants VOC, NO_x, SO_2 and $PM_{2.5}$ are used in support of the General Conformity applicability analysis.[2] The pollutants CO and PM_{10} are also reported upon for disclosure purposes under NEPA. **Appendix AQ** contains additional details on these data and analyses.

As shown on **Table 4.14-1,** the peak emissions burden to the airshed from the BWI improvements occurs in construction year 2014, totaling 87.5 tons of CO, 6.7 tons of VOC, 36.8 tons of NO_x, 4.3 tons of SO_2, 100.6 tons of PM_{10} and 13.6 tons of $PM_{2.5}$. Additionally, annual emissions presented on **Table 4.14-1** do not exceed any applicable de minimis thresholds for VOC, NO_x, SO_2 or $PM_{2.5}$ for any construction year, and hence, construction related emissions resulting from the BWI improvements conform to the O_3 and $PM_{2.5}$ SIPs designed to attain the NAAQS in the Baltimore area.

[1] BWI-Marshall is located in an area designated as "moderate" non-attainment of the O_3 8-hour NAAQS, non-attainment of the $PM_{2.5}$ NAAQS, and within the ozone transport region of the U.S.

2 For Conformity purposes, NO_x and VOC are evaluated for compliance with O_3 SIPs. In consultation with EPA, MDE has determined that direct $PM_{2.5}$, NO_x and SO_2 should be evaluated for compliance with the Baltimore area $PM_{2.5}$ SIP.

TABLE 4.14-1
CONSTRUCTION EMISSIONS INVENTORY (TONS) AND GENERAL CONFORMITY APPLICABILITY

	CO				VOC			
	2012	**2013**	**2014**	**2015**	**2012**	**2013**	**2014**	**2015**
On-road Vehicles	1.7	0.6	6.5	1.4	0.3	0.1	2.1	0.4
Off-Road Equipment	0.7	0.2	6.3	0.7	0.1	0.0	1.3	0.2
Asphalt Placement	--	--	--	--	0.6	0.2	1.0	0.7
Employee Commutes	22.3	5.6	74.7	14.0	0.7	0.2	2.2	0.4
Fugitive Dust	--	--	--	--	--	--	--	--
Grand Total	**24.7**	**6.4**	**87.5**	**16.1**	**1.8**	**0.5**	**6.7**	**1.6**
De minimis - Ozone	**--**	**--**	**--**	**--**	**100**	**100**	**100**	**100**
Exceeds?	**--**	**--**	**--**	**--**	**No**	**No**	**No**	**No**
De minimis - PM2.5	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**
Exceeds?	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**
	NO_x				**SO_2**			
	2012	**2013**	**2014**	**2015**	**2012**	**2013**	**2014**	**2015**
On-road Vehicles	3.9	1.3	20.5	3.0	<0.1	<0.1	0.1	<0.1
Off-Road Equipment	1.6	0.4	14.5	1.6	0.3	0.1	4.1	0.5
Asphalt Placement	--	--	--	--	<0.1	<0.1	<0.1	<0.1
Employee Commutes	0.6	0.2	1.8	0.3	<0.1	<0.1	<0.1	<0.1
Fugitive Dust	--	--	--	--	<0.1	<0.1	<0.1	<0.1
Grand Total	**6.1**	**1.8**	**36.8**	**4.9**	**0.4**	**0.1**	**4.3**	**0.6**
De minimis - Ozone	**100**	**100**	**100**	**100**	**--**	**--**	**--**	**--**
Exceeds?	**No**	**No**	**No**	**No**	**--**	**--**	**--**	**--**
De minimis - PM2.5	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Exceeds?	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**
	PM_{10}				**$PM_{2.5}$**			
	2012	**2013**	**2014**	**2015**	**2012**	**2013**	**2014**	**2015**
On-road Vehicles	0.1	0.1	0.8	0.1	0.1	<0.1	0.5	0.1
Off-Road Equipment	0.2	0.1	3.5	0.5	0.2	0.1	3.4	0.5
Asphalt Placement	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Employee Commutes	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	0.1	<0.1
Fugitive Dust	26.6	23.9	96.2	52.6	2.7	2.4	9.6	5.3
Grand Total	**27.0**	**24.0**	**100.6**	**53.2**	**3.0**	**2.5**	**13.6**	**5.8**
De minimis - Ozone	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**
Exceeds?	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**
De minimis - PM2.5	**--**	**--**	**--**	**--**	**100**	**100**	**100**	**100**
Exceeds?	**--**	**--**	**--**	**--**	**No**	**No**	**No**	**No**

-- Does not apply.

Source: KB Environmental Sciences, Inc., 2012.

Similar to the General Conformity Rule, the Transportation Conformity Rule of the federal CAA ensures that federal agencies do not approve, permit or fund development projects or actions that do not conform to a SIP-conforming Transportation Improvement Plan (TIP). However, because none of the prescribed

ALP projects at BWI-Marshall involve alteration of the existing surface transportation roadway network nor expected to increase surface traffic significantly, this rule does not apply.

Construction-related emissions associated with the proposed near-term improvements included in this EA are considered to be "de-minimis" under the CAA General Conformity Rule, are temporary in duration (i.e., one to three years), and can be further reduced by employing the following mitigation measures:

- Reduction of exposed erodible surface area through appropriate materials and equipment staging procedures;
- Cover of exposed surface areas with pavement or vegetation in an expeditious manner;
- Reduction of equipment idling times;
- Ensure contractor knowledge of appropriate fugitive dust and equipment exhaust controls;
- Soil and stock-pile stabilization via cover or periodic watering;
- Use of low- or zero-emissions equipment;
- Use of covered haul trucks and conveyors during materials transportation;
- Reduction of electrical generator usage wherever possible;
- Suspension of construction activities during high-wind conditions;
- Creation of dust, odor and nuisance reporting system; and
- Prohibition of open burning for waste disposal.

4.14.4 SOLID WASTE

Construction activities generally require measures to prevent solid waste from being blown or washed off of a construction site and onto adjacent properties or into public streets, drainage ditches, stormwater sewers, and natural bodies of water.

Solid wastes generated from the Build Alternatives would be stockpiled at the Airport or removed to an approved off-site facility.

4.15 SUMMARY OF POTENTIAL NATURAL RESOURCES IMPACTS

The proposed potential environmental impacts for each proposed project element and the Sponsor's Preferred Alternative(s) have been discussed in detail in this Section. **Table 4.15-1** provides an overall view of the proposed impacts to streams, forests, floodplains, wetlands, and wetland buffers by proposed project and Build Alternative, as applicable. The proposed impacts to these resources will be mitigated in coordination with the appropriate Federal and State agencies, during the permit process.

TABLE 4.15-1
NATURAL RESOURCES IMPACTS OF THE SPONSOR'S PREFERRED ALTERNATIVES

Proposed Improvements	Streams (linear feet)		Wetlands (square feet)		Wetland Buffer (square feet)		Floodplains (square feet)		Forest Stands (acres)	Affores-tation (acres)
	Temp.	Perm.	Temp.	Perm.	Temp.	Perm.	Temp.	Perm.		
Runway to Taxiway Separation Deficiency Build Alternative 1	300 (Int.) 350 (Per.)	900 (Int.) 700 (Per.)	2,400	2,600	8,100	6,100	0	0	3.50	0.28
Runway 15R Glide Slope Relocation Build Alternative 2	460 (Per.)	1,200 (Per.)	275	11,228	3,400	32,200	53,500	232,000	2.16	0
Runway 33L Glide Slope Relocation Build Alternative 1	0	650 (Int.)	0	0	0	0	0	0	0.23	0
Runway 15R-33L Safety Area Improvements Build Alternative	0	50 (Per.)	0	0	4,000	900	0	0	0	0
Runway 10-28 Safety Area Improvements Build Alternative 1	0	60 (Per.)	0	0	0	850	0	0	0	0
Obstruction Removal and Line-of-Sight Clearance Build Alternative	0	0	315	0	945	0	0	0	507 Trees (Obstructions)* 2.35 Acres (Line-of-Sight)	0
TOTAL	1,110	3,560	2,990	13,828	16,445	40,050	53,500	232,000	8.01	0.28

Temp. – Temporary; Perm. – Permanent; Int. – Intermittent; Per. – Perennial

* 507 individual trees would need to be removed as they are obstructions to navigable airspace. Obstruction removal is exempt from the provisions of the Maryland's FCA.

Source: ADCI, 2011

4.16 CUMULATIVE IMPACTS

In accordance with Council of Environmental Quality (CEQ) regulations (Title 40 CFR Part 1508.7), this EA was prepared to consider both the direct and cumulative impacts of the proposed improvements and

reasonable alternatives to the proposed project as well as other reasonably foreseeable projects in the area of the BWI Marshall. Cumulative impacts represent the "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

4.16.1 CUMULATIVE PROJECTS

This section describes those environmental resources that could potentially be impacted by cumulative projects (past, present, and reasonably foreseeable actions).

A review of several information sources (noted in the individual discussions below) was conducted to determine past, present, and reasonably foreseeable development actions at BWI Marshall and surrounding areas. This review identified potential major capital improvement projects, some of which may be funded and other long-range projects that are not funded. The information sources included the BWI Marshall ALP (including Narrative Report for Phase I projects) which depicts existing features and proposed development at the airport, BWI Marshall 2011 Construction Update, and Maryland's FY 2011-2016 Consolidated Transportation Program. The planning horizon for the ALP is usually 20 years, but the ALP may also depict conceptual development plans beyond the formal planning period. In addition to the proposed AIP projects, the ALP depicts additional airfield and terminal facilities development. The cumulative projects identified on the ALP within the temporal parameters are described in the following section.

The analysis of cumulative impacts in this EA considered the potential impacts of the Build Alternatives and other development actions, both on and off the airport, that are related in terms of time or proximity.

4.16.2 ON-AIRPORT PROJECTS

MAA continuously manages the planning, design and construction of various airport projects on BWI Marshall property to improve the functionality of the airport as well as maintaining its economic vitality. The BWI Marshall Airport Master Plan (June 2010) addresses the long-term facility needs of the airport through 2030 and beyond. Airfield projects identified in the Master Plan are designed to improve the functional use and geometry of runways, taxiways, and holding aprons; lighting, marking, and signage of runways and taxiways; NAVAIDs; visual approach aids, and instrument approach procedures. Terminal projects are identified to improve areas of the airport where passengers transfer between ground transportation and concourses that allow them access to and egress from an aircraft. Support facilities at an airport encompass a broad set of functions that ensure smooth and efficient airport operation, including ARFF stations, airport administrative areas, airport maintenance facilities, airline maintenance hangars, flight kitchens, aircraft fuel storage, heating and cooling systems, and FAA facilities. Private investments are other revenue generating facilities on airport property. This includes private companies

(e.g., Northrop Grumman) and fixed based operators (FBOs). **Table 4.16-1** contains a list of recently completed, current and future projects that occur between 2005 and 2020, in order to qualitatively assess potential cumulative impacts.

4.16.3 OFF-AIRPORT PROJECTS

The following section discusses projects that are proposed for implementation within proximity of BWI Marshall spatial boundary. The spatial boundary encompasses portions of Anne Arundel County, Hanover, Linthicum, and Ferndale. Projects discussed in this section are limited to those within the spatial boundary that are included within the approved local growth management plans for the BWI Marshall area. The projects listed are reasonably foreseeable based on state and local planning documentation. The discussion is presented in terms of significant surface transportation improvements and proposed land development projects.

To identify major transportation and development projects for the assessment of cumulative impacts, a variety of information sources were reviewed. The Anne Arundel County General Development Plan, BWI/Linthicum Small Area Plan, Baltimore Metropolitan Council Transportation Outlook, Maryland's FY 2011-2016 Consolidated Transportation Program and the Baltimore Region Transportation Improvement Program 2011-2014 were reviewed to identify projects that were included for capital improvement funding.

4.16.3.1 Surface Transportation

There are a few major surface transportation projects within the spatial and temporal parameters for the cumulative impacts. MD 295 (i.e., Baltimore/Washington Parkway) is currently being widened from four to six lanes from I-195 northward to I-695.

The Maryland Transit Administration (MTA) has proposed BWI Station Improvements and a Fourth Track Project associated with the BWI Marshall Airport Rail Station. The project includes construction of a new platform, improvements to the current station with possible multi-level transit oriented development, addition of nine miles of fourth track along the Northeast Corridor Line and modifications to an interlocking just north of the West Baltimore MARC station. The general project area is defined as a 500-foot linear corridor centered on the existing rail line between the Odenton Station and Halethorpe Station, for a distance of approximately 10 miles. It is anticipated that all of the improvements would be made within the existing railroad and station rights-of-way.

TABLE 4.16-1

BWI MARSHALL ON-AIRPORT CUMULATIVE PROJECTS

	Project Name (type of project*)	Year
Recently Completed	Ramp Paving Project (A)	2011
	ASDE-X Installations	2010-2011
	Reconstruct the C and D aprons (A)	2009 - 2011
	Consolidated Rental Car Facility Improvements (S)	2010 - 2011
	Gate G Improvements (S)	2010 - 2011
	Runway 33L MALSR Installation	2009
Current	Comprehensive Paving Improvements (A)	2011 - 2014
	Enclosures for US Airways and American Airlines (T)	2011
	Apron Reconstruction (A)	2011
	Comprehensive Interior/Exterior Modifications (T)	2011
Future	Noise Zone Land Acquisition Program (M)	2012 - 2013
	Runway 15L-33R FAA Standards Compliance (A)	2012 - 2015
	Homeowner Assistance Program (M)	2012 - 2016
	Relocation of Electrical vault (S)	2016
	AMTRAK / MARC Facility (P)	2016
	Development of a new Northrop Grumman Hangar (P)	2016
	Snow Removal Equipment Storage Facility (S)	2016
	Connecting Terminal Taxiways and Apron Fill-in (A)	2017
	Construction of a second Fixed Based Operator (S)	2017
	Co-Generation Facility (S)	2017
	ARFF Expansion (S)	2017
	Demolition of Commuter Concourse for “Remain Overnight” (RON) Aircraft Parking (A)	2018
	Construction of Concourse E RON Pad (A)	2019
	New Fire Training Facility (S)	2019
	Construction of GA facilities (NW quadrant) (S)	2020
	BWI Trail Relocation (M)	2020
	Runway 10-28 RPZ Land Acquisition (M)	2020
	Construct Airport Perimeter Road (NW quadrant) (S)	2020
	Relocation of Taxiway R (A)	2020
	Concourse A Extension (T)	2020

***Type of Project:** (A) – Airfield project; (T) – Terminal area project; (S) – Support facility project; (P) – Private investment project; (M) – MAA project

Sources: MAA Capital Program FY 2011-2016; BWI Marshall ALP Narrative, 2010; BWI Marshall Construction Update, April 12, 2011;

4.16.3.2 Land Development

The BWI/Linthicum Small Plan Area includes proposed land use changes and land development projects in various phases. Airport Square Business Park, in Linthicum, is a business park along West Nursery Road that is planned for Employment Mixed land use to create more live/work opportunities along this employment corridor. The Ridge Road Area of Hanover, located near the BWI Amtrak Station, is designated for Transit Mixed Use to allow office, retail, and high density residential uses near major employers around the airport and near AMTRAK and MARC transit opportunities. Because of its proximity to BWI Marshall, the area is positioned to promote multi-modal transit opportunities. Developers have been interested in pursuing an "aerotropolis" concept that would incorporate airport- oriented uses, employment, hospitality, entertainment and residential uses in a transit-oriented development. The development would be planned within the area bordered by MD-295, Hanover Road, and Aviation Boulevard (Anne Arundel General Development Plan - GDP, 2009).

4.16.4 POTENTIAL CUMULATIVE IMPACTS

The following is a qualitative assessment of impact categories in which the potential for cumulative impact associated with the projects described previously, when considered along with the proposed airport improvement projects. **Table 4.16-2** provides a summary of the impact analysis for the cumulative projects for those resource categories that may have impacts as a result of the proposed airport improvements included in this EA.

4.16.4.1 Air Quality

The total amounts of air emissions at BWI Marshall are expected to increase in the future, with or without the Build Alternatives. This outcome is largely attributable to the forecasted increased aircraft operations at BWI Marshall over the same timeframe. Cumulative projects such as the MTA fourth track project could result in fewer vehicles on airport area roads or improved traffic flow in the vicinity of BWI Marshall thereby reducing air quality impacts.

4.16.4.2 Compatible Land Use

The Build Alternatives would not significantly impact compatible land use. Land use impacts would occur as a result of the off-airport cumulative projects. The land development projects would contribute to increased development of vacant or natural land uses near the airport. For instance, the Ridge Road area, Airport Square Business Park and other cumulative land development projects would impact land uses in the vicinity of BWI Marshall. It is expected that the cumulative projects would comply with the land use and transportation goals of the Anne Arundel County Development Plan which would reduce the potential for significant land use impacts.

4.16.4.3 Department of Transportation Act: Section 4(f)

The Build Alternatives would result in the removal of trees and man-made objects along the BWI Trail and in the vicinity of the Thomas A. Dixon Observation Area; however, these actions would not result in a significant direct or indirect impact to Section 4(f) resources. While the BWI Trail is slated for relocation in 2020, the relocated trail would be built prior to the closure of the existing trail segment and no loss of use or function would occur. A formal Section 4(f) determination would be prepared at the time of the proposed trail relocation.

4.16.4.4 Construction

Overall, construction of the cumulative projects would have a "moderate" potential to result in significant construction impacts. Construction activities associated with the cumulative projects would consist of land clearing, roadway and building construction, mostly occurring during daylight hours. Impacts from construction would include increased noise from construction operations, temporary increase in water turbidity, temporary increase in air emissions and disposal and management of construction and/or demolition wastes.

Grading and scraping operations are the noisiest activities, with equipment generating noise levels as high as 70 to 95 dBA within 50 feet of their operations. However, distance would rapidly attenuate noise levels so area residences would only experience a slight increase in ambient background conditions.

Temporary increases in water turbidity in drainage areas could occur during the period when excavated areas are exposed prior to paving or cover stabilization. It is expected that runoff from construction projects would be minimized by BMPs that would limit sediment transport. In addition, it is expected that efforts would be made to schedule construction operations to minimize the exposure of excavated areas and re-vegetate them as soon as possible after grading.

Construction equipment emissions and fugitive dust pollution from excavated areas can result in temporary impacts to ambient air quality. However, it is expected that these impacts would be minimized by the use of BMPs to minimize air quality impacts by treating excavated areas with water, covering graded areas with stabilizing materials, and not allowing open burning during unfavorable weather conditions.

Land clearing and grading operations associated with the construction of the cumulative projects could generate air emissions, with particulate matter (dust) having the greatest potential for impact. Most of this dust would redeposit close to the source, since it is generated low to the ground. Heavy construction equipment utilized would emit exhaust that contains CO, NOx, VOCs, and PM. Temporary air quality impacts associated with these sources would vary depending on the local weather conditions, level of construction activity, and the nature of the construction operation.

The types of waste generated by construction activities could include materials such as excess concrete and/or asphalt washed out of mixer trucks, excess wiring, conduits, and other electrical materials, and empty construction supply containers. These materials are not anticipated to significantly impact existing landfill operations. During construction of the proposed airport improvement projects at BWI Marshall, additional pollution prevention measures will be implemented, as needed, to avoid or minimize any potential impacts.

The impacts discussed above would be temporary in nature. Temporary pollution controls employed by MAA would include limiting work activities to normal business hours; restricting open burning; wetting of active equipment work areas; covering of all trucks hauling loose materials; stabilizing materials, mulch, sandbags, slope drains, sediment checks, artificial covering, and berms. All applicable local, state, and Federal environmental construction controls should be incorporated into the specifications and construction plans necessary for the individual cumulative projects. These controls would help minimize temporary construction impacts.

4.16.4.5 Fish, Wildlife, and Plants

No rare, threatened or endangered plant or animal species within the proposed project areas. Trees (i.e., 12 airspace obstructions) within the wetland buffer of known swamp pink habitat would be manually cut and left in place, and would not constitute a significant impact. According to MDNR correspondence, no impacts to swamp pink would result with the implementation of the Build Alternatives.

Fish, wildlife and plants within the vicinity of BWI Marshall have been and continue to be impacted by urban development. Urban development has resulted in the loss of natural communities throughout much of the area. Implementation of the cumulative projects could result in further changes in land cover. Off-airport cumulative projects could result in a permanent alteration of existing habitat. A review of the projects and area maps indicates the potential for impact is low and project sponsors would seek to avoid fish, wildlife and plant impacts where possible.

Therefore, implementation of the Build Alternatives and cumulative projects would not result in a significant cumulative impact to the environment surrounding BWI Marshall.

4.16.4.6 Floodplains

The cumulative projects have a low potential to result in impacts to 100-year floodplains. Potential impacts would occur from the creation of additional impervious surface, and the subsequent increase in stormwater runoff within the floodplains of the region. The increased stormwater runoff has the potential to flow into a floodplain. This could result in increased flooding and flood-related hazards during moderate to high-intensity storm events. However, potential floodplain encroachment associated with the cumulative projects could be avoided, and if unavoidable, mitigated, during the planning and design

phases of the cumulative projects such that changes to the 100-year flood elevations would be minimized.

4.16.4.7 Water Resources

Implementation of the cumulative projects would result in localized, temporary impacts to water resources. These impacts would result from land clearing and temporary construction activities and primarily consist of potential increases in sediment runoff and transport, siltation, and changes in storage volumes, flow velocities and pollutant levels in receiving water bodies. All off-airport construction activities should adhere to the design standards and guidelines contained in state and local specifications. These standards would help minimize any cumulative water quality impacts.

According to the GDP, there are potential infrastructure constraints as a result of the Ridge Road Area that need to be addressed. Water resource impacts of any cumulative project located in the Baltimore City Sewer Service Area is subject to an inter-jurisdictional agreement between the County and the City of Baltimore. This agreement allows the County a specified amount of treatment capacity at the Patapsco sewage treatment facility in Baltimore. The County will require that a concept plan be prepared with sufficient detail to allow adequate assessment of infrastructure impacts, including wastewater treatment, roads, and public safety services, prior to rezoning any properties within the area. Additionally, the County will require preservation of the Stony Run and Piny Run tributaries, stream buffers, and any associated sensitive areas.

The potential for water supply and permanent water quality and ground water quality impacts varies by the individual project. Impacts could primarily result from the runoff of stormwater from newly constructed roadways and associated impervious surfaces. Commercial construction in the vicinity of BWI Marshall could be required to utilize onsite water retention and water quality control measures to prevent degradation of water quality in groundwater and receiving bodies.

As described previously, implementation of the Build Alternatives would impact five stream segments totaling 3,535 linear feet. A Joint Federal/State Permit for the Alteration of any Floodplain, Waterway, Tidal or Nontidal Wetland in Maryland would be obtained from the COE and MDE prior to the disturbance of any jurisdictional surface water resource. Along with best management practices, adherence to the Maryland Stormwater Management Guidelines for State and Federal Projects, and an NPDES permit, potential water resources impacts of the Build Alternatives and cumulative projects would be minimized.

4.16.4.8 Wetlands

Implementation of the Build Alternatives would result in impacts to 10 wetlands (approximately 0.32 acres); MAA would coordinate with the COE and state agencies to obtain the necessary permits and certifications. Data for other off-airport development projects was not available to fully quantify wetland impacts in proximity to BWI Marshall. However, each project would be subject to Clean Water Act

requirements. It would be the responsibility of the project's sponsoring agency, corporation, or individual to avoid wetlands and other waters of the U.S. where possible, and where impacts are unavoidable, to minimize the impacts, and then provide mitigation for unavoidable impacts. Required mitigation would presumably result in no net loss of wetlands within the region, consistent with Federal policies. The sponsoring agency, corporation, or individual would be required to obtain the necessary Federal and/or state permits and certifications prior to the initiation of construction activities. Therefore, the potential cumulative impact to wetland resources as a result of implementing the Build Alternatives and cumulative projects would be considered low.

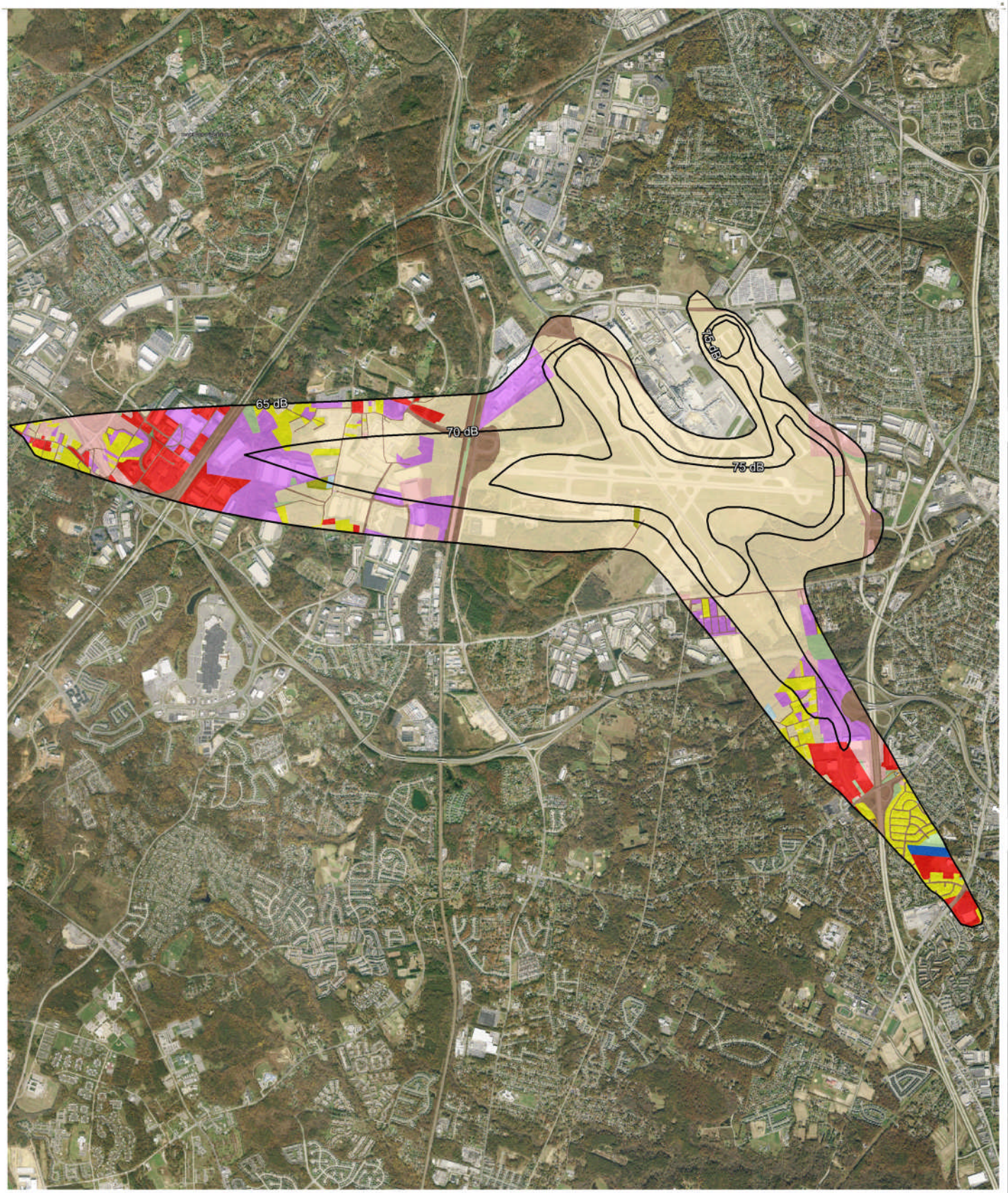
4.16.5 SUMMARY OF POTENTIAL CUMULATIVE IMPACTS

Through the use of BMPs and mitigation measures, the potential impacts of the Build Alternatives would be in accordance with all Federal, state, and local laws and regulations and therefore not result in a significant impact. As described previously, the cumulative projects would result in environmental impacts. Resources affected by the cumulative projects, most of which are land development projects, are different than the resources affected by the Build Alternatives. The government agency responsible for the development of each cumulative project will be responsible for obtaining all necessary approvals and permits to minimize impacts. Based on the types of cumulative projects planned for the area surrounding BWI Marshall, MAA has concluded that the implementation of the Build Alternatives along with the cumulative projects would not result in a significant cumulative impact.

4.17 OTHER CONSIDERATIONS

4.17.1 CONSISTENCY WITH PLANS, GOALS, AND POLICIES

The Build Alternatives are depicted on the FAA-approved ALP for BWI Marshall and are the projects that were developed by MAA and submitted to the FAA for environmental review and determination. MAA, in accordance with Section 511(a)(5) of the *Airport and Airway Improvement Act of 1982*, coordinates with other local governments and Federal, state, and local resource agencies to promote existing and future compatible land use in the vicinity of the relocated airport. This assurance relates to existing and planned land use and involves the adoption of zoning laws and other measures, to the extent reasonable, to restrict the use of land adjacent to or in the immediate vicinity of BWI Marshall to activities and purposes compatible with normal airport operations. The Build Alternatives are not expected to conflict with the objectives of Federal, regional, state, local, or Tribal land use plans, policies, or controls.



Legend

- BWI Owned Property
- Residential
- Multi-Family Residential
- Transient Lodging
- School
- Place of Worsihp
- Library
- Recreation
- Agriculture
- Forested Land
- Cemetery
- Commercial
- Exempt Commercial
- Industrial

BWI Baltimore/Washington International Thurgood Marshall Airport

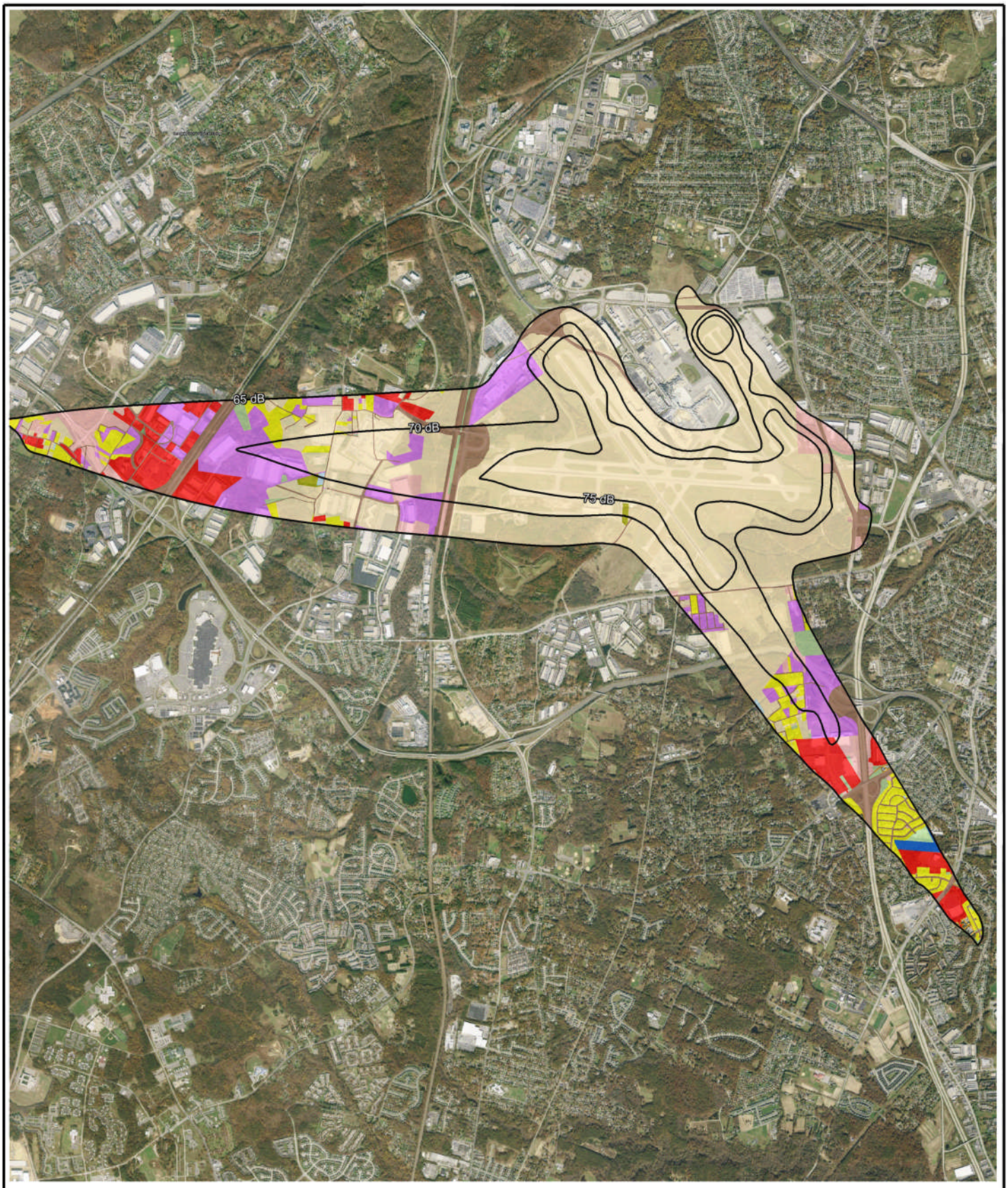
Environmental Assessment
for Proposed Airport Improvements

YEAR 2015 BUILD ALTERNATIVES NOISE CONTOURS

URS Aviation

Scale: **Not To Scale**

Exhibit: **4.1-1**



Legend

- BWI Owned Property
- Residential
- Multi-Family Residential
- Transient Lodging
- School
- Place of Worsihp
- Library
- Recreation
- Agriculture
- Forested Land
- Cemetery
- Commercial
- Exempt Commercial
- Industrial

BWI Baltimore/Washington International Thurgood Marshall Airport

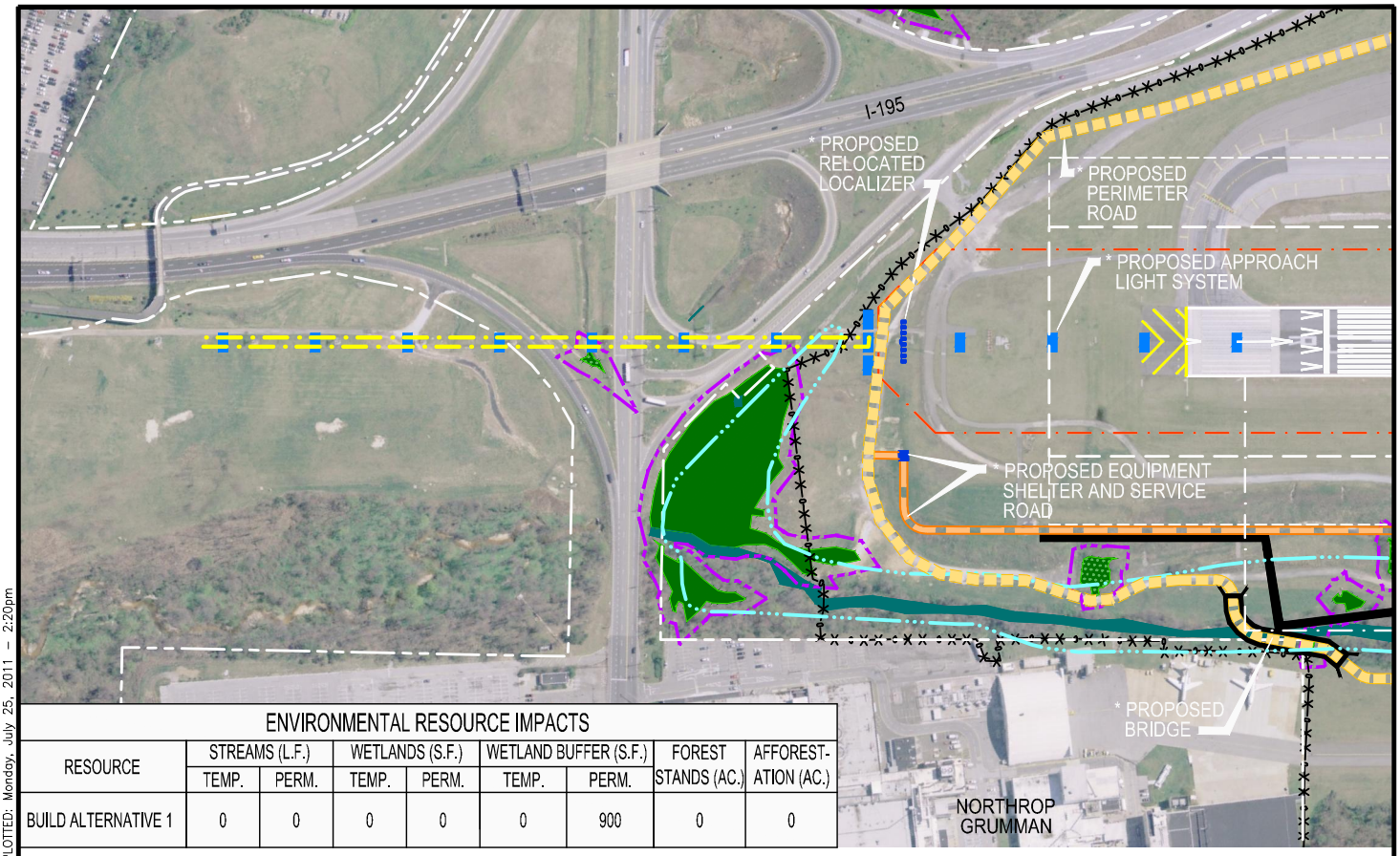
Environmental Assessment
for Proposed Airport Improvements

YEAR 2015 NO BUILD ALTERNATIVE NOISE CONTOURS

URS Aviation

Scale: **Not To Scale**

Exhibit: **4.1-2**



ENVIRONMENTAL RESOURCE IMPACTS								
RESOURCE	STREAMS (L.F.)		WETLANDS (S.F.)		WETLAND BUFFER (S.F.)		FOREST STANDS (AC.)	AFFOREST-ATION (AC.)
	TEMP.	PERM.	TEMP.	PERM.	TEMP.	PERM.		
BUILD ALTERNATIVE 1	0	0	0	0	0	900	0	0

RUNWAY 15R END MALSR BUILD ALTERNATIVE

LEGEND:

- AIRPORT PROPERTY LINE
- SECURITY FENCE
- RUNWAY SAFETY AREA (RSA)
- RUNWAY OBJECT FREE AREA (ROFA)
- GLIDE SLOPE ANTENNA
- GLIDE SLOPE CRITICAL AREA
- LOCALIZER ANTENNA
- LOCALIZER CRITICAL AREA
- PAPI (4 BOX)
- PERIMETER ROAD IMPROVEMENTS
- SERVICE ROAD IMPROVEMENTS
- JURISDICTIONAL STORM WATER MANAGEMENT POND WITH 25' BUFFER
- WATERS OF THE U.S.
- WETLANDS WITH 25' BUFFER
- ISOLATED WETLANDS WITH 25' BUFFER
- FLOODPLAIN BOUNDARY
- LIMIT OF DISTURBANCE

* DENOTES PROJECTS UNRELATED TO THE PROPOSED ALTERNATIVE

200 0 200 400
SCALE IN FEET

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment for Proposed Airport Improvements

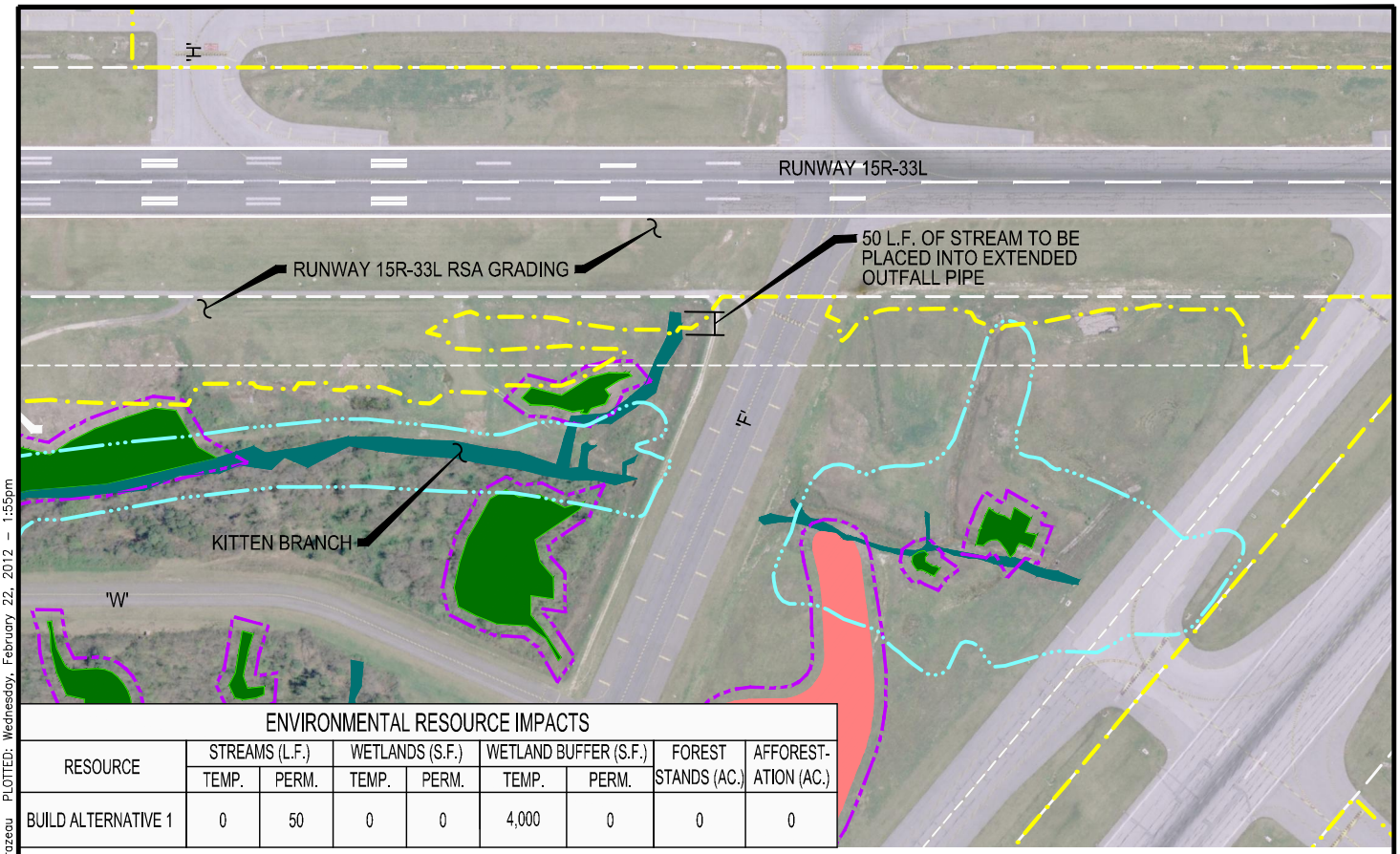
RUNWAY 15R END MALSR BUILD ALTERNATIVE

URS AVIATION

Scale: AS SHOWN

Exhibit: 4.5-1

FILE NAME: P:\20834876-\20834879\CAD\ENVIRON\ALP EXHIBITS (FEB 2011)\BWI EA 15R MALSR.dwg LAYOUT NAME: BWI EA 4.5-1 USER: kenneth_brozeau PLOTTED: Monday, July 25, 2011 - 2:20pm



ENVIRONMENTAL RESOURCE IMPACTS								
RESOURCE	STREAMS (L.F.)		WETLANDS (S.F.)		WETLAND BUFFER (S.F.)		FOREST STANDS (AC.)	AFFOREST-ATION (AC.)
	TEMP.	PERM.	TEMP.	PERM.	TEMP.	PERM.		
BUILD ALTERNATIVE 1	0	50	0	0	4,000	0	0	0

RUNWAY 15R-33L SAFETY AREA
BUILD ALTERNATIVE

LEGEND:

- AIRPORT PROPERTY LINE
- SECURITY FENCE
- RUNWAY SAFETY AREA (RSA)
- RUNWAY OBJECT FREE AREA (ROFA)
- JURISDICTIONAL STORM WATER MANAGEMENT POND WITH 25' BUFFER
- WATERS OF THE U.S.
- WETLANDS WITH 25' BUFFER
- ISOLATED WETLANDS WITH 25' BUFFER
- FLOODPLAIN BOUNDARY
- LIMIT OF DISTURBANCE

200 0 200 400
SCALE IN FEET

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment
for Proposed Airport Improvements

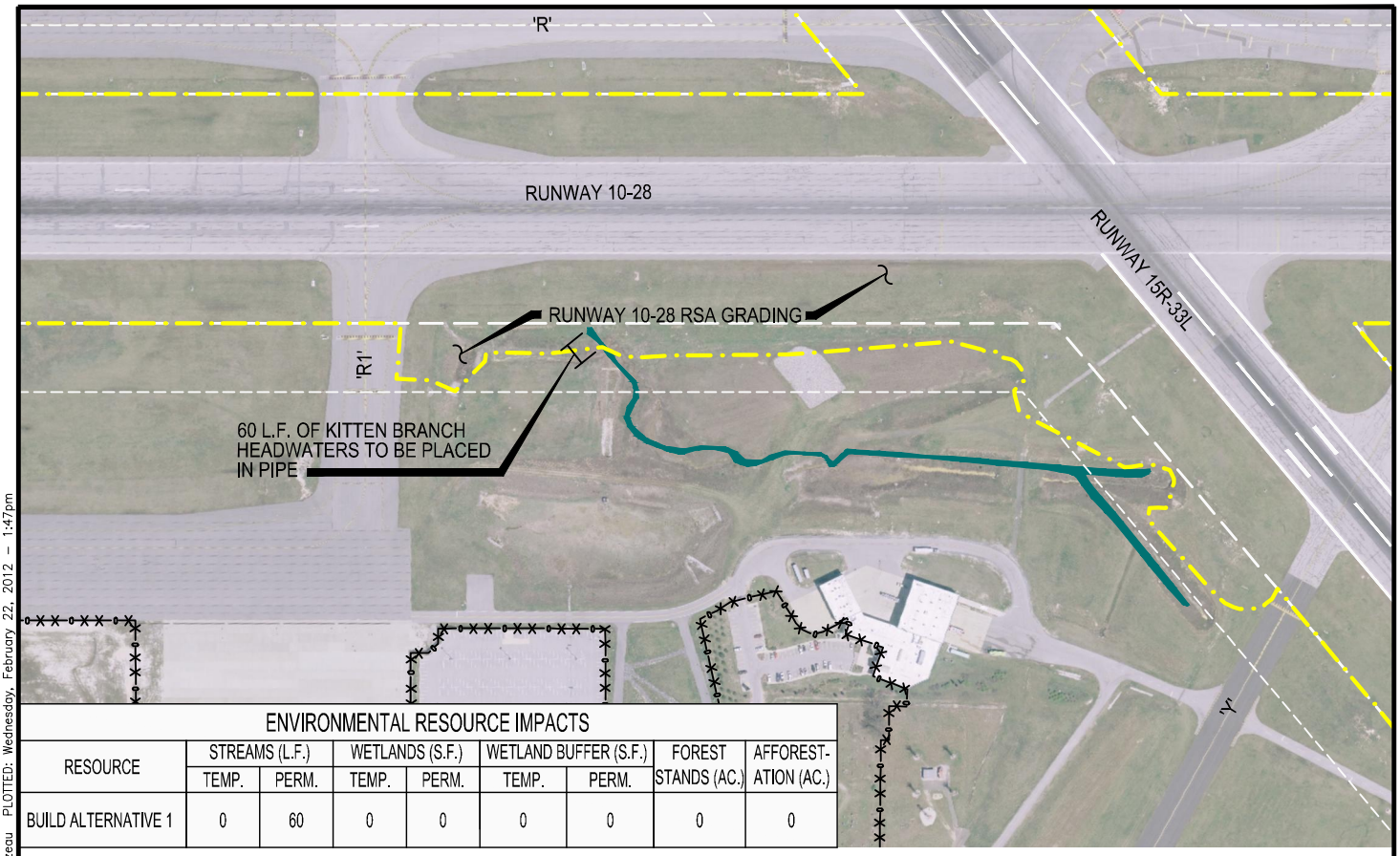
RUNWAY 15R-33L SAFETY AREA
BUILD ALTERNATIVE

URS AVIATION

Scale: AS SHOWN

Exhibit: 4.5-2

FILE NAME: P:\20834876-\20834879\CAD\ENVIRON\ALP EXHIBITS (FEB 2011)\BWI EA 15R-33L-INNER RSA.dwg LAYOUT NAME: BWI EA 4.5-2 USER: kenneth_brazeau PLOTTED: Wednesday, February 22, 2012 - 1:55pm



ENVIRONMENTAL RESOURCE IMPACTS

RESOURCE	STREAMS (L.F.)		WETLANDS (S.F.)		WETLAND BUFFER (S.F.)		FOREST STANDS (AC.)	AFFOREST-ATION (AC.)
	TEMP.	PERM.	TEMP.	PERM.	TEMP.	PERM.		
BUILD ALTERNATIVE 1	0	60	0	0	0	0	0	0

LEGEND:

- AIRPORT PROPERTY LINE
- SECURITY FENCE
- RUNWAY SAFETY AREA (RSA)
- RUNWAY OBJECT FREE AREA (ROFA)
- JURISDICTIONAL STORM WATER MANAGEMENT POND WITH 25' BUFFER
- WATERS OF THE U.S.
- WETLANDS WITH 25' BUFFER
- ISOLATED WETLANDS WITH 25' BUFFER
- FLOODPLAIN BOUNDARY
- LIMIT OF DISTURBANCE

200 0 200 400
SCALE IN FEET

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment
for Proposed Airport Improvements

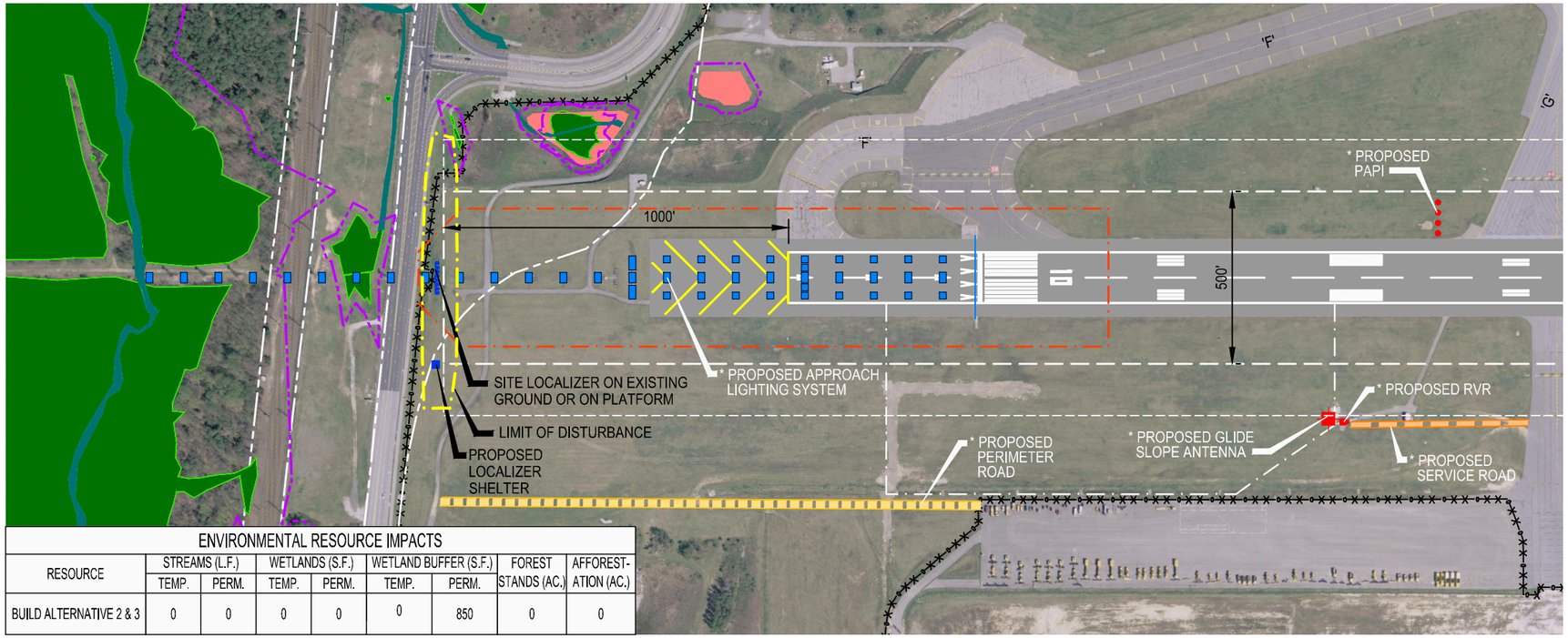
RUNWAY 10-28 SAFETY AREA
BUILD ALTERNATIVE

URS AVIATION

Scale: AS SHOWN

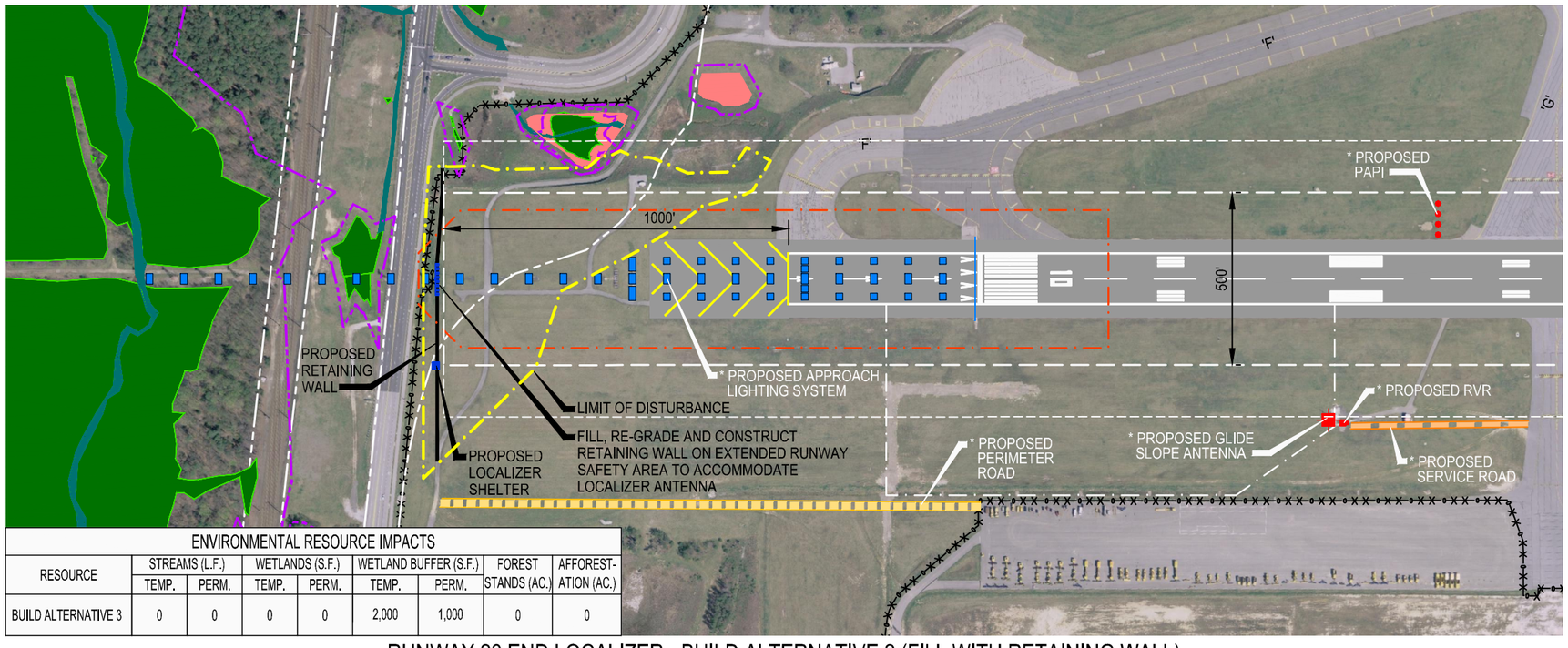
Exhibit: 4.5-3

FILE NAME: P:\20834876-\20834879\CAD\ENVIRON\ALP EXHIBITS (FEB 2011)\BWI EA 10-28-INNER RSA.dwg LAYOUT NAME: BWI EA 4.5-3 USER: kenneth_brazeau PLOTTED: Wednesday, February 22, 2012 - 1:47pm



ENVIRONMENTAL RESOURCE IMPACTS								
RESOURCE	STREAMS (L.F.)		WETLANDS (S.F.)		WETLAND BUFFER (S.F.)		FOREST STANDS (AC.)	AFFOREST-ATION (AC.)
	TEMP.	PERM.	TEMP.	PERM.	TEMP.	PERM.		
BUILD ALTERNATIVE 2 & 3	0	0	0	0	0	850	0	0

RUNWAY 28 END LOCALIZER - BUILD ALTERNATIVE 1 (PLATFORM OR ON GROUND)



ENVIRONMENTAL RESOURCE IMPACTS								
RESOURCE	STREAMS (L.F.)		WETLANDS (S.F.)		WETLAND BUFFER (S.F.)		FOREST STANDS (AC.)	AFFOREST-ATION (AC.)
	TEMP.	PERM.	TEMP.	PERM.	TEMP.	PERM.		
BUILD ALTERNATIVE 3	0	0	0	0	2,000	1,000	0	0

RUNWAY 28 END LOCALIZER - BUILD ALTERNATIVE 2 (FILL WITH RETAINING WALL)

LEGEND:

- AIRPORT PROPERTY LINE
- SECURITY FENCE
- RUNWAY SAFETY AREA (RSA)
- RUNWAY OBJECT FREE AREA (ROFA)
- GLIDE SLOPE ANTENNA
- GLIDE SLOPE CRITICAL AREA
- LOCALIZER ANTENNA
- LOCALIZER CRITICAL AREA
- PAPI (4 BOX)
- PERIMETER ROAD IMPROVEMENTS
- SERVICE ROAD IMPROVEMENTS
- JURISDICTIONAL STORM WATER MANAGEMENT POND WITH 25' BUFFER
- WATERS OF THE U.S.
- WETLANDS WITH 25' BUFFER
- ISOLATED WETLANDS WITH 25' BUFFER
- FLOODPLAIN BOUNDARY
- LIMIT OF DISTURBANCE

* DENOTES PROJECTS UNRELATED TO THE PROPOSED ALTERNATIVE

NOTE: SEE EXHIBIT 2.1-3 FOR LOCALIZER ALTERNATIVE PROFILES

200 0 200 400
SCALE IN FEET

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment for Proposed Airport Improvements

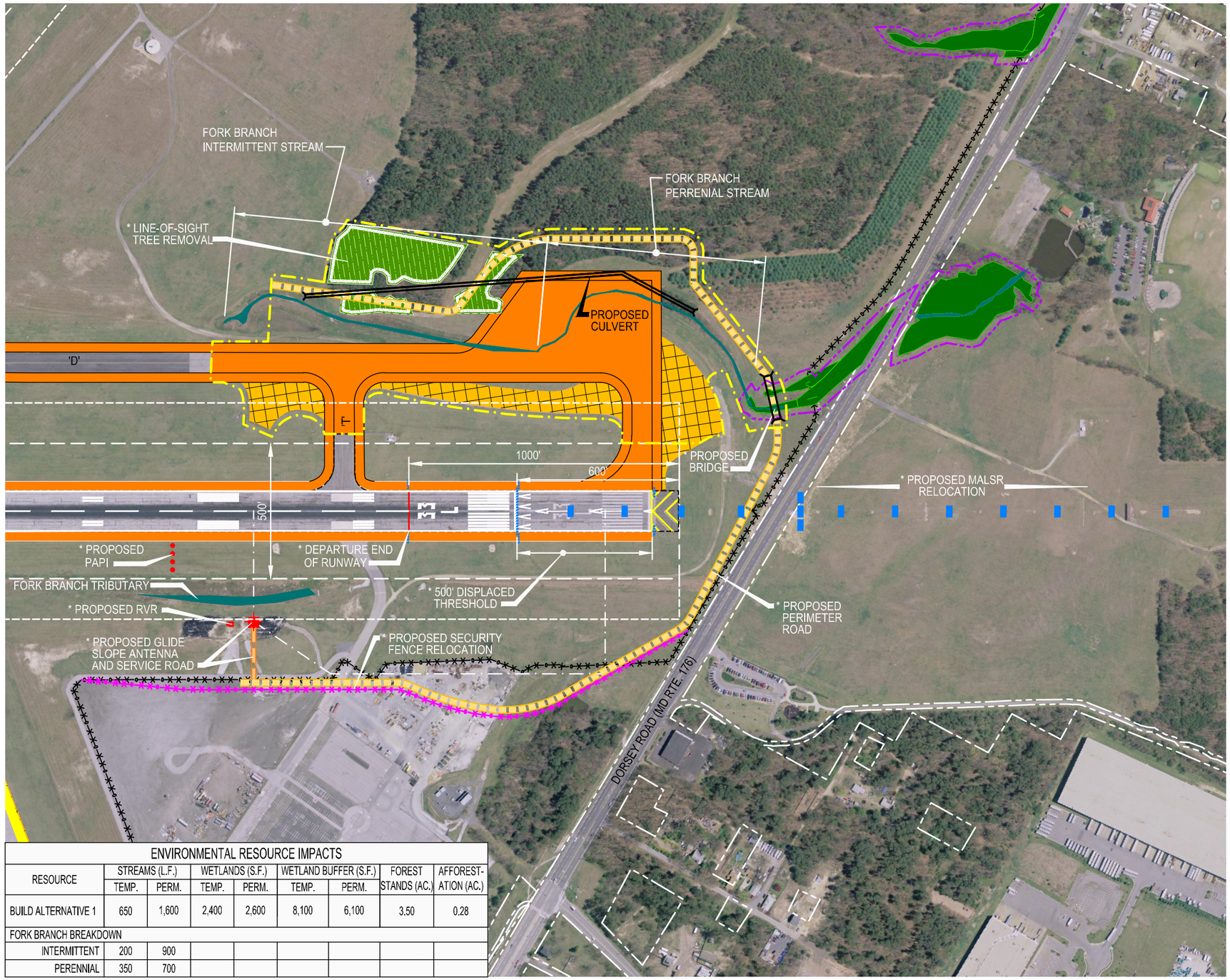
RUNWAY 28 LOCALIZER BUILD ALTERNATIVES

URS AVIATION

Scale: AS SHOWN

Exhibit: 4.5-4

FILE NAME: P:\20834876-\20834878\CAD\ENVIRON\ALP EXHIBITS (FEB 2011)\BWI EA 28 END LOCALIZER.dwg LAYOUT NAME: BWI EA 4.5-4 USER: kenneth.brazeau PLOTTED: Monday, August 01, 2011 - 9:17am



ENVIRONMENTAL RESOURCE IMPACTS								
RESOURCE	STREAMS (L.F.)		WETLANDS (S.F.)		WETLAND BUFFER (S.F.)		FOREST STANDS (AC.)	AFFOREST-ATION (AC.)
	TEMP.	PERM.	TEMP.	PERM.	TEMP.	PERM.		
BUILD ALTERNATIVE 1	650	1,600	2,400	2,600	8,100	6,100	3.50	0.28
FORK BRANCH BREAKDOWN								
INTERMITTENT	200	900						
PERENNIAL	350	700						

LEGEND:

- AIRPORT PROPERTY LINE
- SECURITY FENCE
- RUNWAY SAFETY AREA (RSA)
- RUNWAY OBJECT FREE AREA (ROFA)
- GLIDE SLOPE ANTENNA
- GLIDE SLOPE CRITICAL AREA
- LOCALIZER ANTENNA
- LOCALIZER CRITICAL AREA
- PAPI (4 BOX)
- JURISDICTIONAL STORM WATER MANAGEMENT POND WITH 25' BUFFER
- WATERS OF THE U.S.
- WETLANDS WITH 25' BUFFER
- ISOLATED WETLANDS WITH 25' BUFFER
- FLOODPLAIN BOUNDARY
- LIMIT OF DISTURBANCE

AIRFIELD PAVMENT LEGEND:

- NEW AIRSIDE PAVEMENT
- PAVEMENT REMOVAL
- PAVEMENT CONVERSION TO SHOULDER

PERIMETER ROAD ALTERNATIVES LEGEND:

- PERIMETER ROAD IMPROVEMENTS
- SERVICE ROAD IMPROVEMENTS

* DENOTES PROJECTS UNRELATED TO THE PROPOSED ALTERNATIVE

200 0 200 400
SCALE IN FEET

BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment
for Proposed Airport Improvements

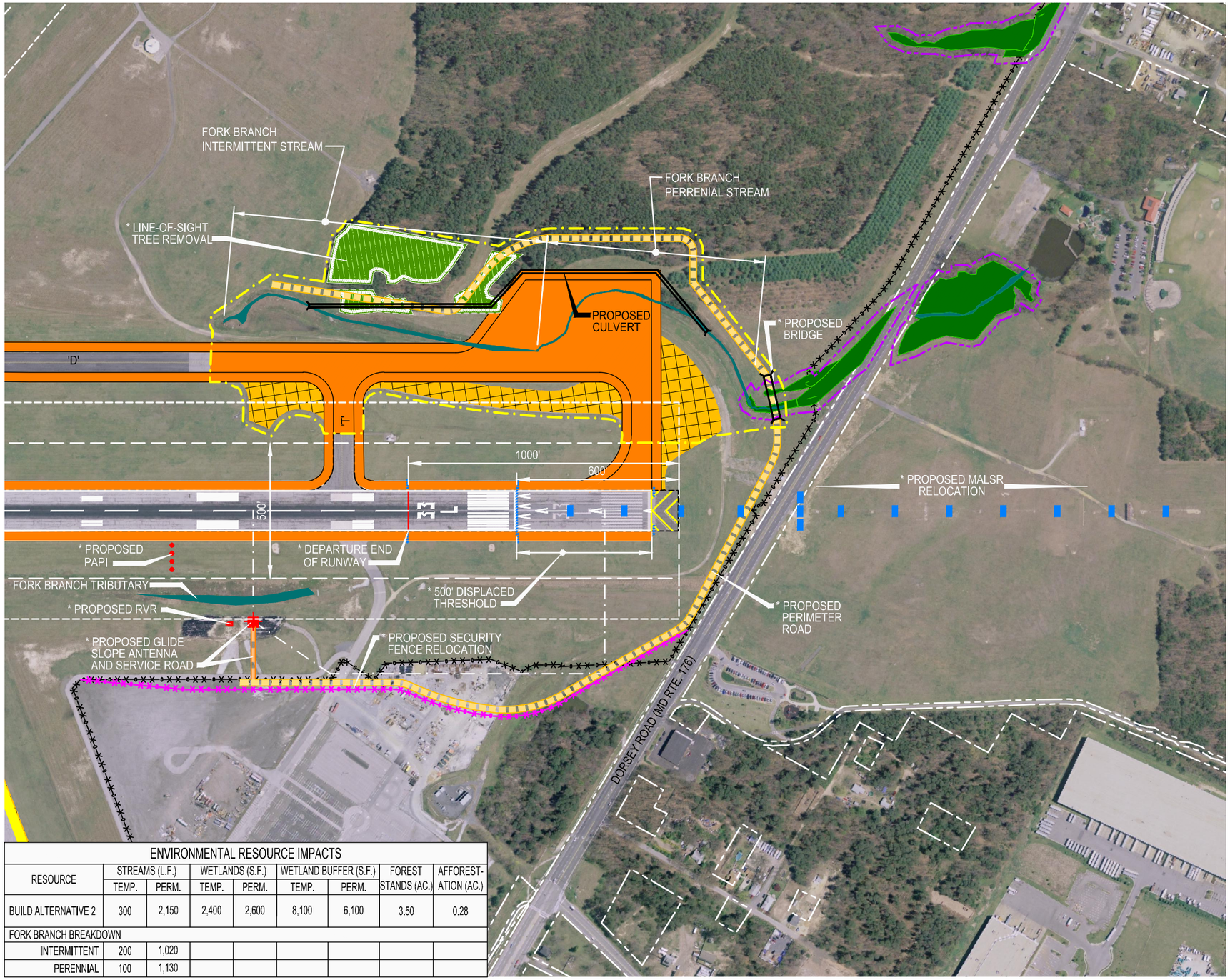
RUNWAY TO TAXIWAY SEPARATION
DEFICIENCY BUILD ALTERNATIVE 1

URS AVIATION

Scale: AS SHOWN

Exhibit: 4.5-5

FILE NAME: P:\20834876_\20834879\CAD\ENVIRON\ALP EXHIBITS (FEB 2011)\BWI EA 33L-END PERIMETER ROAD.dwg LAYOUT NAME: BWI EA 4.5-5 USER: kenneth.brazeau PLOTTED: Monday, February 27, 2012 - 8:11am



ENVIRONMENTAL RESOURCE IMPACTS

RESOURCE	STREAMS (L.F.)		WETLANDS (S.F.)		WETLAND BUFFER (S.F.)		FOREST STANDS (AC.)	AFFOREST-ATION (AC.)
	TEMP.	PERM.	TEMP.	PERM.	TEMP.	PERM.		
BUILD ALTERNATIVE 2	300	2,150	2,400	2,600	8,100	6,100	3.50	0.28
FORK BRANCH BREAKDOWN								
INTERMITTENT	200	1,020						
PERENNIAL	100	1,130						

LEGEND:

- AIRPORT PROPERTY LINE
- SECURITY FENCE
- RUNWAY SAFETY AREA (RSA)
- RUNWAY OBJECT FREE AREA (ROFA)
- GLIDE SLOPE ANTENNA
- GLIDE SLOPE CRITICAL AREA
- LOCALIZER ANTENNA
- LOCALIZER CRITICAL AREA
- PAPI (4 BOX)
- JURISDICTIONAL STORM WATER MANAGEMENT POND WITH 25' BUFFER
- WATERS OF THE U.S.
- WETLANDS WITH 25' BUFFER
- ISOLATED WETLANDS WITH 25' BUFFER
- FLOODPLAIN BOUNDARY
- LIMIT OF DISTURBANCE

AIRFIELD PAVMENT LEGEND:

- NEW AIRSIDE PAVEMENT
- PAVEMENT REMOVAL
- PAVEMENT CONVERSION TO SHOULDER

PERIMETER ROAD ALTERNATIVES LEGEND:

- PERIMETER ROAD IMPROVEMENTS
- SERVICE ROAD IMPROVEMENTS

* DENOTES PROJECTS UNRELATED TO THE PROPOSED ALTERNATIVE

200 0 200 400
SCALE IN FEET

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment
for Proposed Airport Improvements

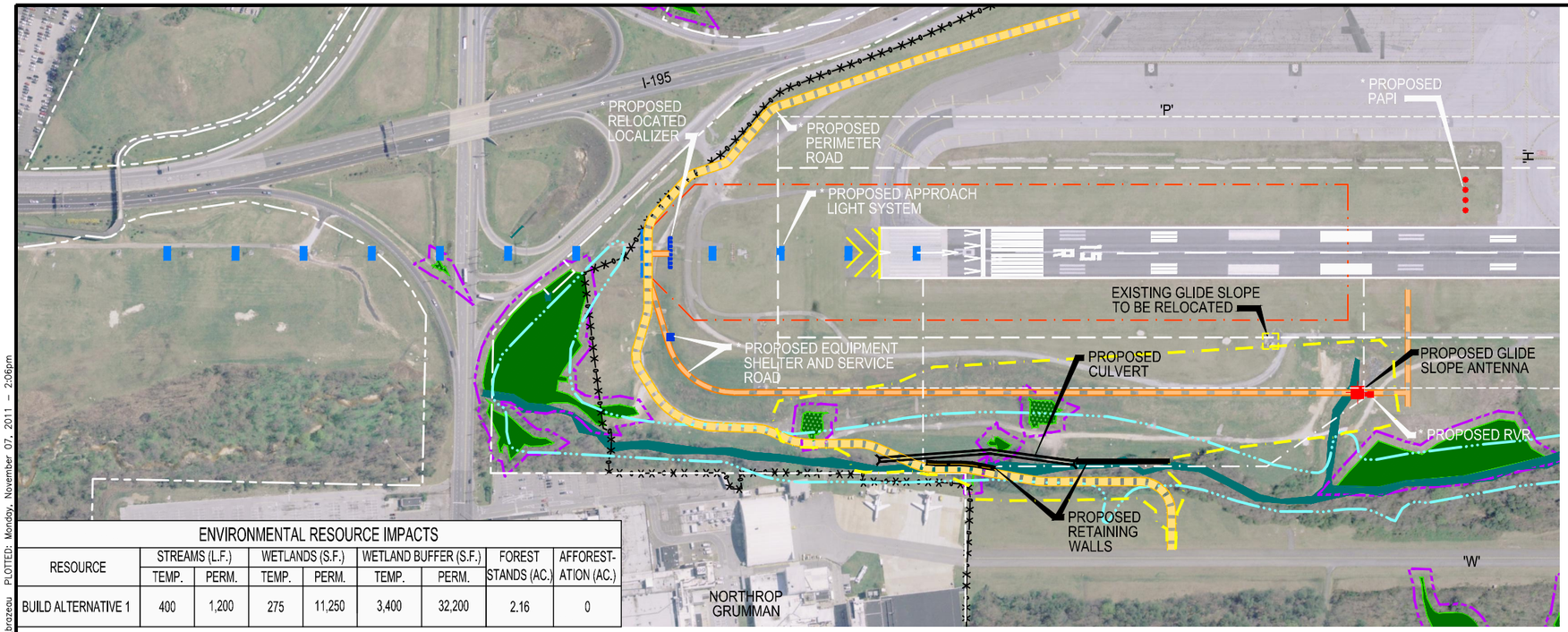
RUNWAY TO TAXIWAY SEPARATION
DEFICIENCY BUILD ALTERNATIVE 2

URS AVIATION

Scale: AS SHOWN

Exhibit: 4.5-6

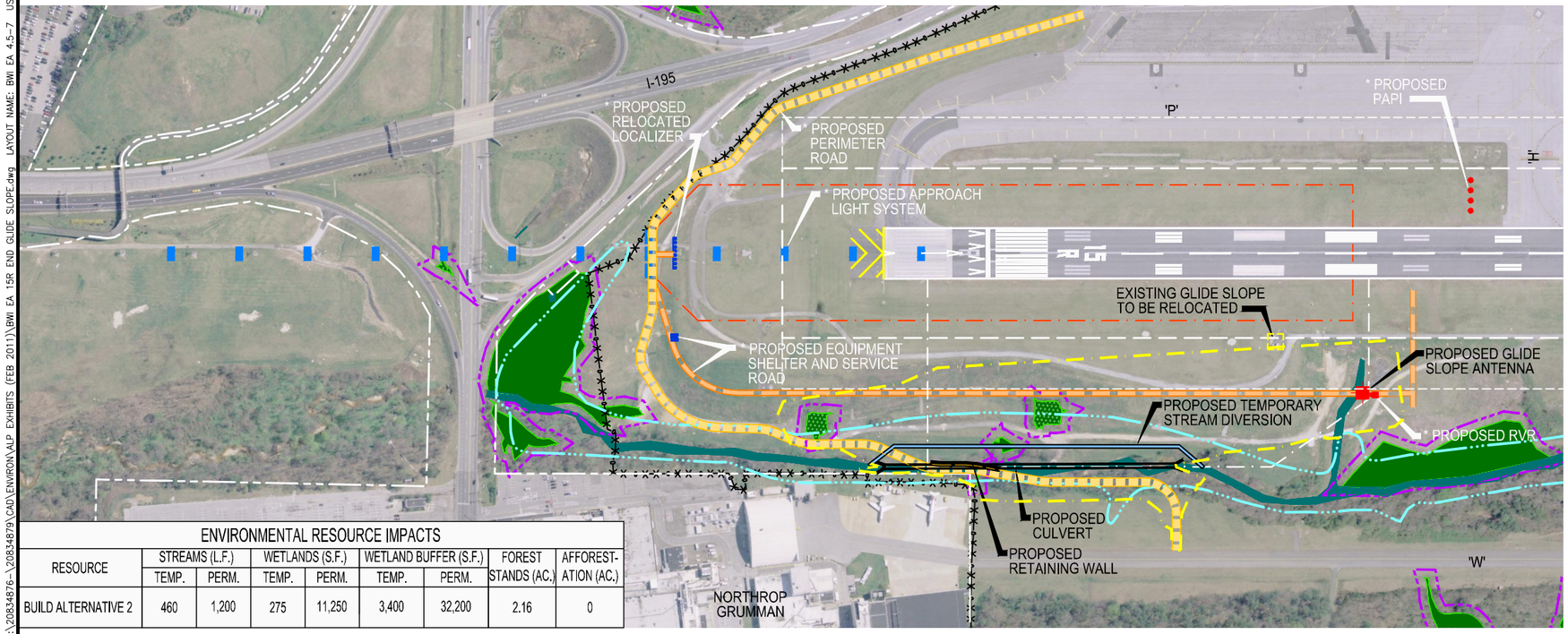
FILE NAME: P:\20834876-\20834879\CAD\ENVIRON\ALP EXHIBITS (FEB 2011)\BWI EA 33L-END PERIMETER ROAD.dwg LAYOUT NAME: BWI EA 4.5-6 USER: kenneth_brazeau PLOTTED: Monday, February 27, 2012 - 8:12am



ENVIRONMENTAL RESOURCE IMPACTS

RESOURCE	STREAMS (L.F.)		WETLANDS (S.F.)		WETLAND BUFFER (S.F.)		FOREST STANDS (AC.)	AFFOREST-ATION (AC.)
	TEMP.	PERM.	TEMP.	PERM.	TEMP.	PERM.		
BUILD ALTERNATIVE 1	400	1,200	275	11,250	3,400	32,200	2.16	0

RUNWAY 15R END GLIDE SLOPE
BUILD ALTERNATIVE 1 - RETAINING WALL INSTALLATION



ENVIRONMENTAL RESOURCE IMPACTS

RESOURCE	STREAMS (L.F.)		WETLANDS (S.F.)		WETLAND BUFFER (S.F.)		FOREST STANDS (AC.)	AFFOREST-ATION (AC.)
	TEMP.	PERM.	TEMP.	PERM.	TEMP.	PERM.		
BUILD ALTERNATIVE 2	460	1,200	275	11,250	3,400	32,200	2.16	0

RUNWAY 15R END GLIDE SLOPE
BUILD ALTERNATIVE 2 - CULVERT INSTALLATION

LEGEND:

- AIRPORT PROPERTY LINE
- SECURITY FENCE
- RUNWAY SAFETY AREA (RSA)
- RUNWAY OBJECT FREE AREA (ROFA)
- GLIDE SLOPE ANTENNA
- GLIDE SLOPE CRITICAL AREA
- LOCALIZER ANTENNA
- LOCALIZER CRITICAL AREA
- PAPI (4 BOX)
- PERIMETER ROAD IMPROVEMENTS
- SERVICE ROAD IMPROVEMENTS
- JURISDICTIONAL STORM WATER MANAGEMENT POND WITH 25' BUFFER
- WATERS OF THE U.S.
- WETLANDS WITH 25' BUFFER
- ISOLATED WETLANDS WITH 25' BUFFER
- FLOODPLAIN BOUNDARY
- LIMIT OF DISTURBANCE

* DENOTES PROJECTS UNRELATED TO THE PROPOSED ALTERNATIVE

200 0 200 400
SCALE IN FEET

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment for Proposed Airport Improvements

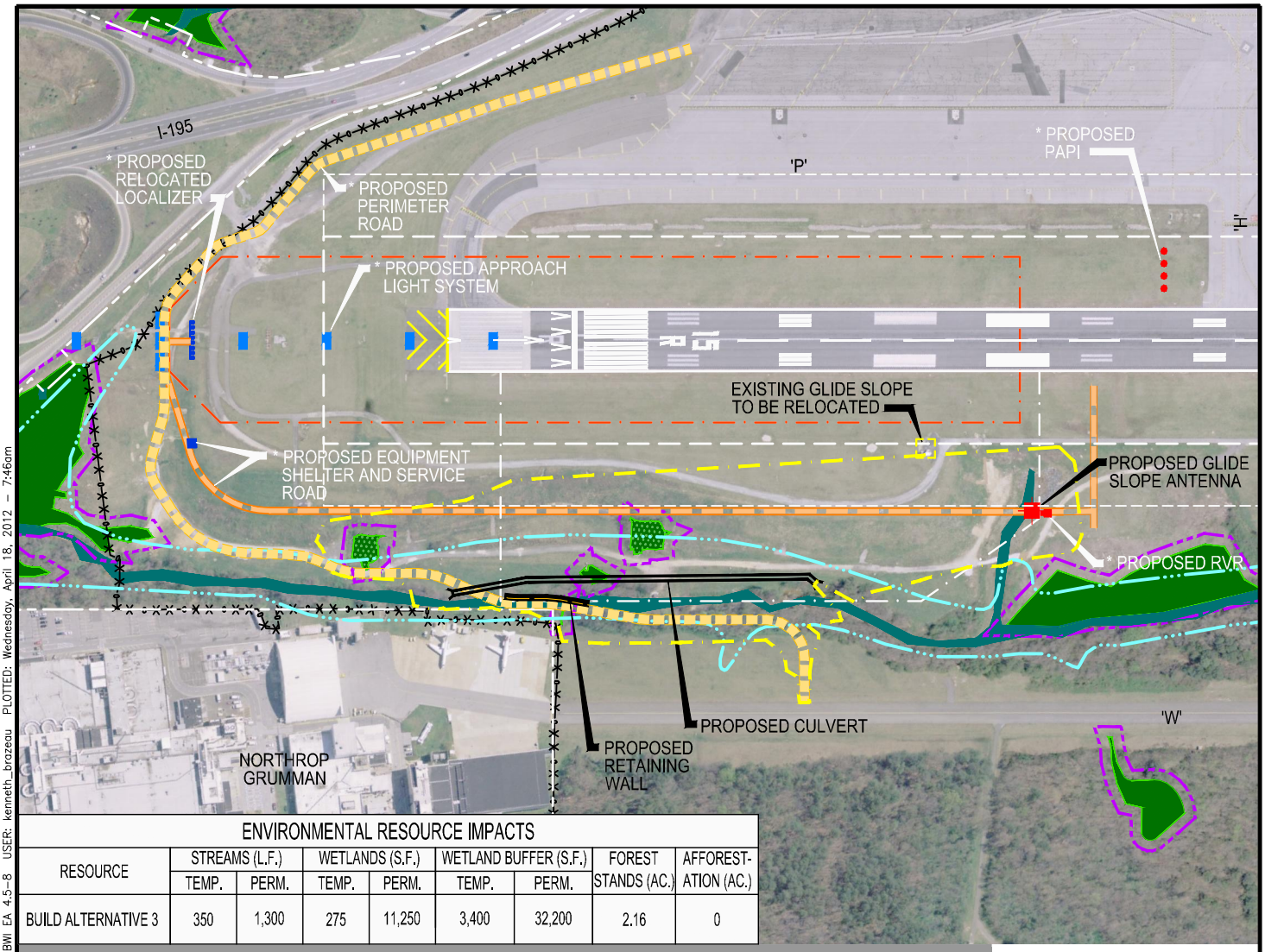
RUNWAY 15R END GLIDE SLOPE
BUILD ALTERNATIVES 1 AND 2

URS AVIATION

Scale: AS SHOWN

Exhibit: 4.5-7

FILE NAME: P:\20834876-\20834879\CAD\ENVIRON\ALP EXHIBITS (FEB 2011)\BWI EA 15R END GLIDE SLOPE.dwg LAYOUT NAME: BWI EA 4.5--7 USER: kenneth_brazeau PLOTTED: Monday, November 07, 2011 - 2:06pm



ENVIRONMENTAL RESOURCE IMPACTS

RESOURCE	STREAMS (L.F.)		WETLANDS (S.F.)		WETLAND BUFFER (S.F.)		FOREST STANDS (AC.)	AFFOREST-ATION (AC.)
	TEMP.	PERM.	TEMP.	PERM.	TEMP.	PERM.		
BUILD ALTERNATIVE 3	350	1,300	275	11,250	3,400	32,200	2.16	0

LEGEND:

- AIRPORT PROPERTY LINE
- SECURITY FENCE
- RUNWAY SAFETY AREA (RSA)
- RUNWAY OBJECT FREE AREA (ROFA)
- GLIDE SLOPE ANTENNA
- GLIDE SLOPE CRITICAL AREA
- LOCALIZER ANTENNA
- LOCALIZER CRITICAL AREA
- PAPI (4 BOX)
- PERIMETER ROAD IMPROVEMENTS
- SERVICE ROAD IMPROVEMENTS
- JURISDICTIONAL STORM WATER MANAGEMENT POND WITH 25' BUFFER
- WATERS OF THE U.S.
- WETLANDS WITH 25' BUFFER
- ISOLATED WETLANDS WITH 25' BUFFER
- FLOODPLAIN BOUNDARY
- LIMIT OF DISTURBANCE

* DENOTES PROJECTS UNRELATED TO THE PROPOSED ALTERNATIVE

200 0 200 400
SCALE IN FEET

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment for Proposed Airport Improvements

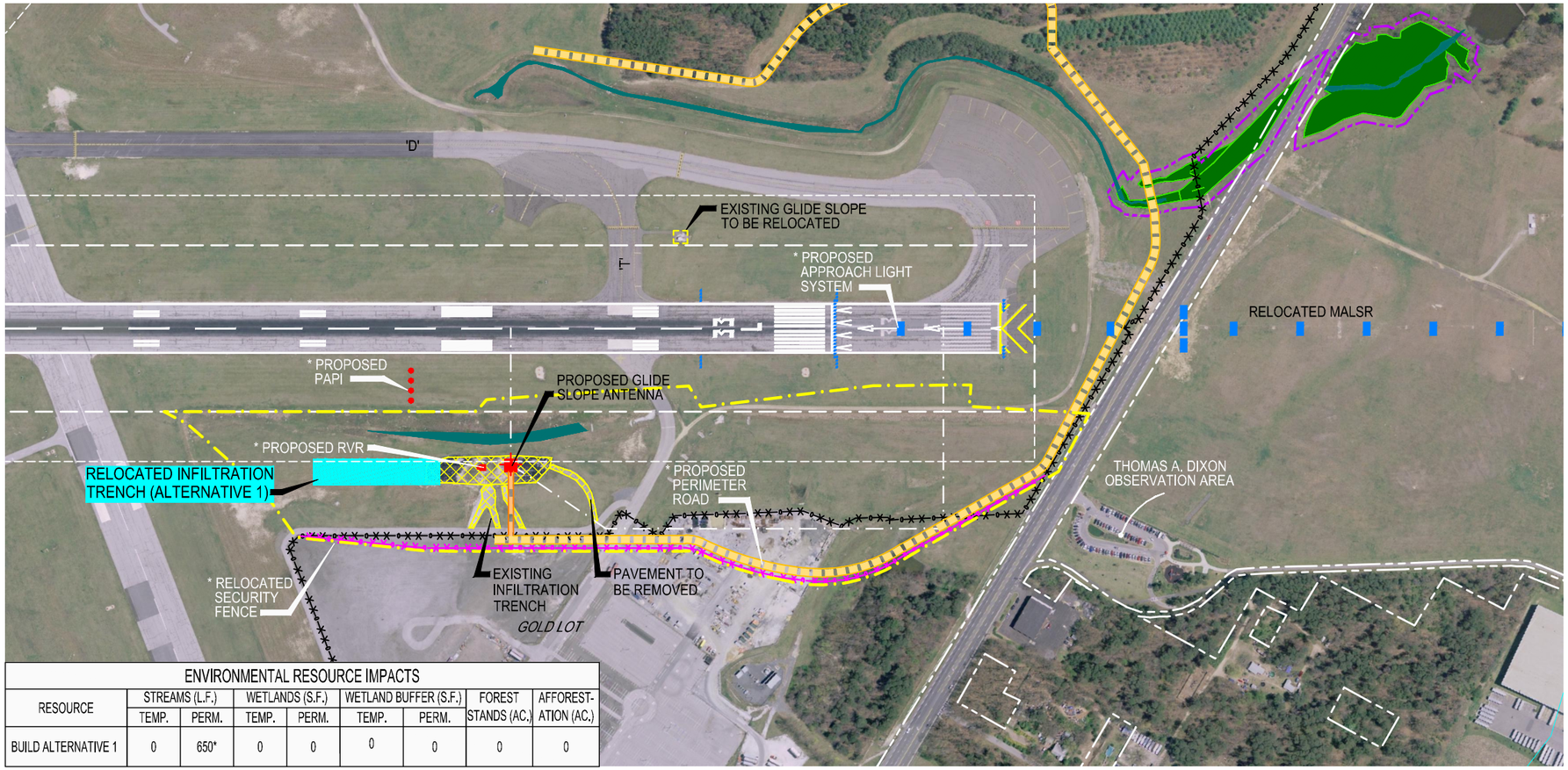
RUNWAY 15R END GLIDE SLOPE
BUILD ALTERNATIVE 3

URS AVIATION

Scale: AS SHOWN

Exhibit: 4.5-8

FILE NAME: P:\20834876-\20834879\CAD\ENVIRON\ALP EXHIBITS (FEB 2011)\BWI EA 15R END GLIDE SLOPE.dwg LAYOUT NAME: BWI EA 4.5-8 USER: kenneth_brazeau PLOTTED: Wednesday, April 18, 2012 - 7:46am



ENVIRONMENTAL RESOURCE IMPACTS								
RESOURCE	STREAMS (L.F.)		WETLANDS (S.F.)		WETLAND BUFFER (S.F.)		FOREST STANDS (AC.)	AFFOREST-ATION (AC.)
	TEMP.	PERM.	TEMP.	PERM.	TEMP.	PERM.		
BUILD ALTERNATIVE 1	0	650*	0	0	0	0	0	0

* INTERMITTENT

LEGEND:

- AIRPORT PROPERTY LINE
- SECURITY FENCE
- RUNWAY SAFETY AREA (RSA)
- RUNWAY OBJECT FREE AREA (ROFA)
- GLIDE SLOPE ANTENNA
- GLIDE SLOPE CRITICAL AREA
- LOCALIZER ANTENNA
- LOCALIZER CRITICAL AREA
- PAPI (4 BOX)
- PERIMETER ROAD IMPROVEMENTS
- SERVICE ROAD IMPROVEMENTS
- JURISDICTIONAL STORM WATER MANAGEMENT POND WITH 25' BUFFER
- WATERS OF THE U.S.
- WETLANDS WITH 25' BUFFER
- ISOLATED WETLANDS WITH 25' BUFFER
- FLOODPLAIN BOUNDARY
- LIMIT OF DISTURBANCE

* DENOTES PROJECTS UNRELATED TO THE PROPOSED ALTERNATIVE

200 0 200 400
SCALE IN FEET

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment for Proposed Airport Improvements

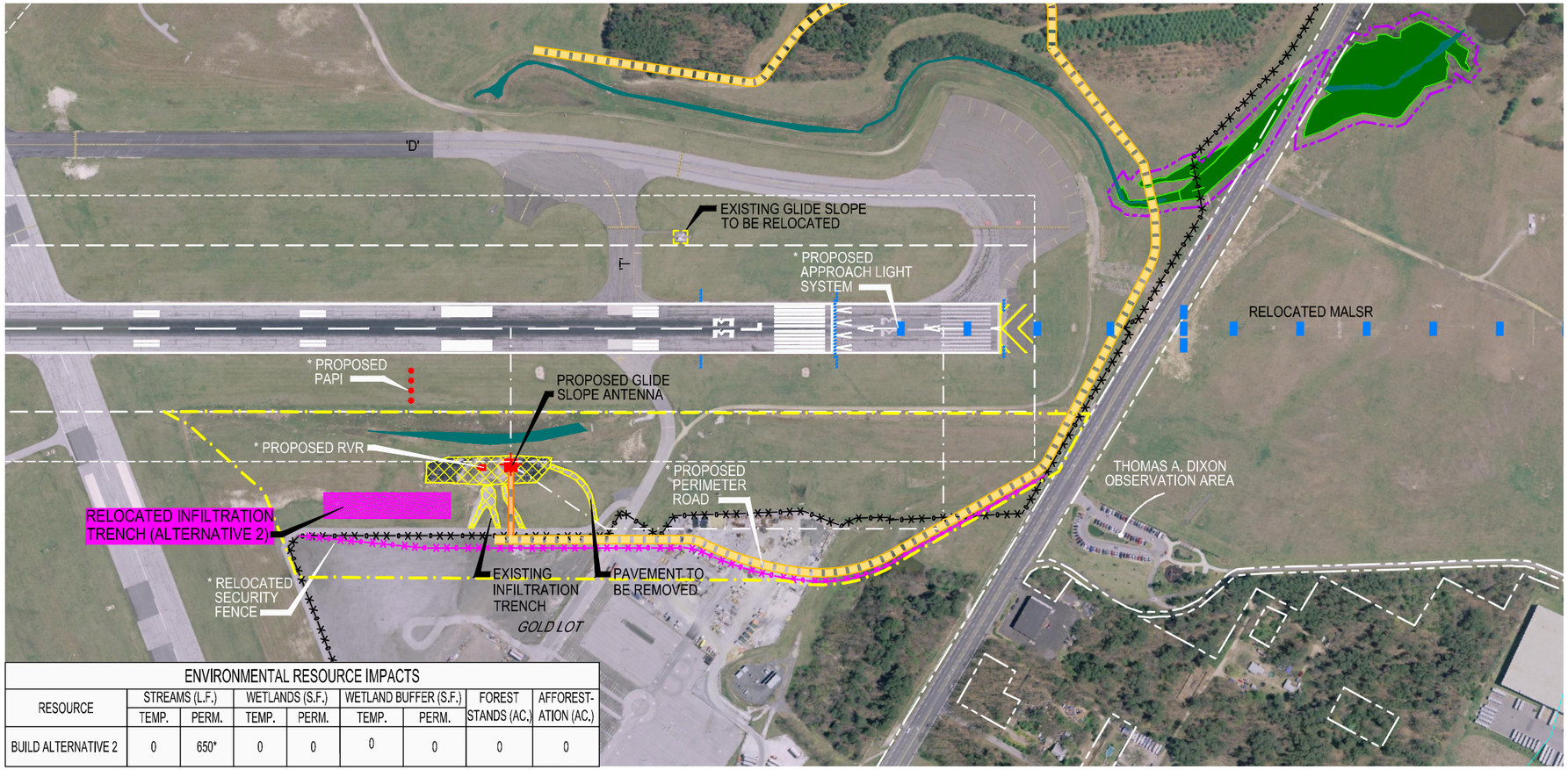
RUNWAY 33L END GLIDE SLOPE BUILD ALTERNATIVE 1

URS AVIATION

Scale: AS SHOWN

Exhibit: 4.5-9

FILE NAME: P:\20834876-\20834879\CAD\ENVIRON\ALP EXHIBITS (FEB 2011)\BWI EA 33L END GLIDE SLOPE.dwg LAYOUT NAME: BWI EA 4.5-9 USER: kenneth_brazeau PLOTTED: Wednesday, November 09, 2011 - 7:30am



ENVIRONMENTAL RESOURCE IMPACTS								
RESOURCE	STREAMS (L.F.)		WETLANDS (S.F.)		WETLAND BUFFER (S.F.)		FOREST STANDS (AC.)	AFFOREST-ATION (AC.)
	TEMP.	PERM.	TEMP.	PERM.	TEMP.	PERM.		
BUILD ALTERNATIVE 2	0	650*	0	0	0	0	0	0

* INTERMITTENT

LEGEND:

- AIRPORT PROPERTY LINE
- SECURITY FENCE
- RUNWAY SAFETY AREA (RSA)
- RUNWAY OBJECT FREE AREA (ROFA)
- GLIDE SLOPE ANTENNA
- GLIDE SLOPE CRITICAL AREA
- LOCALIZER ANTENNA
- LOCALIZER CRITICAL AREA
- PAPI (4 BOX)
- PERIMETER ROAD IMPROVEMENTS
- SERVICE ROAD IMPROVEMENTS
- JURISDICTIONAL STORM WATER MANAGEMENT POND WITH 25' BUFFER
- WATERS OF THE U.S.
- WETLANDS WITH 25' BUFFER
- ISOLATED WETLANDS WITH 25' BUFFER
- FLOODPLAIN BOUNDARY
- LIMIT OF DISTURBANCE

* DENOTES PROJECTS UNRELATED TO THE PROPOSED ALTERNATIVE

200 0 200 400
SCALE IN FEET

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment for Proposed Airport Improvements

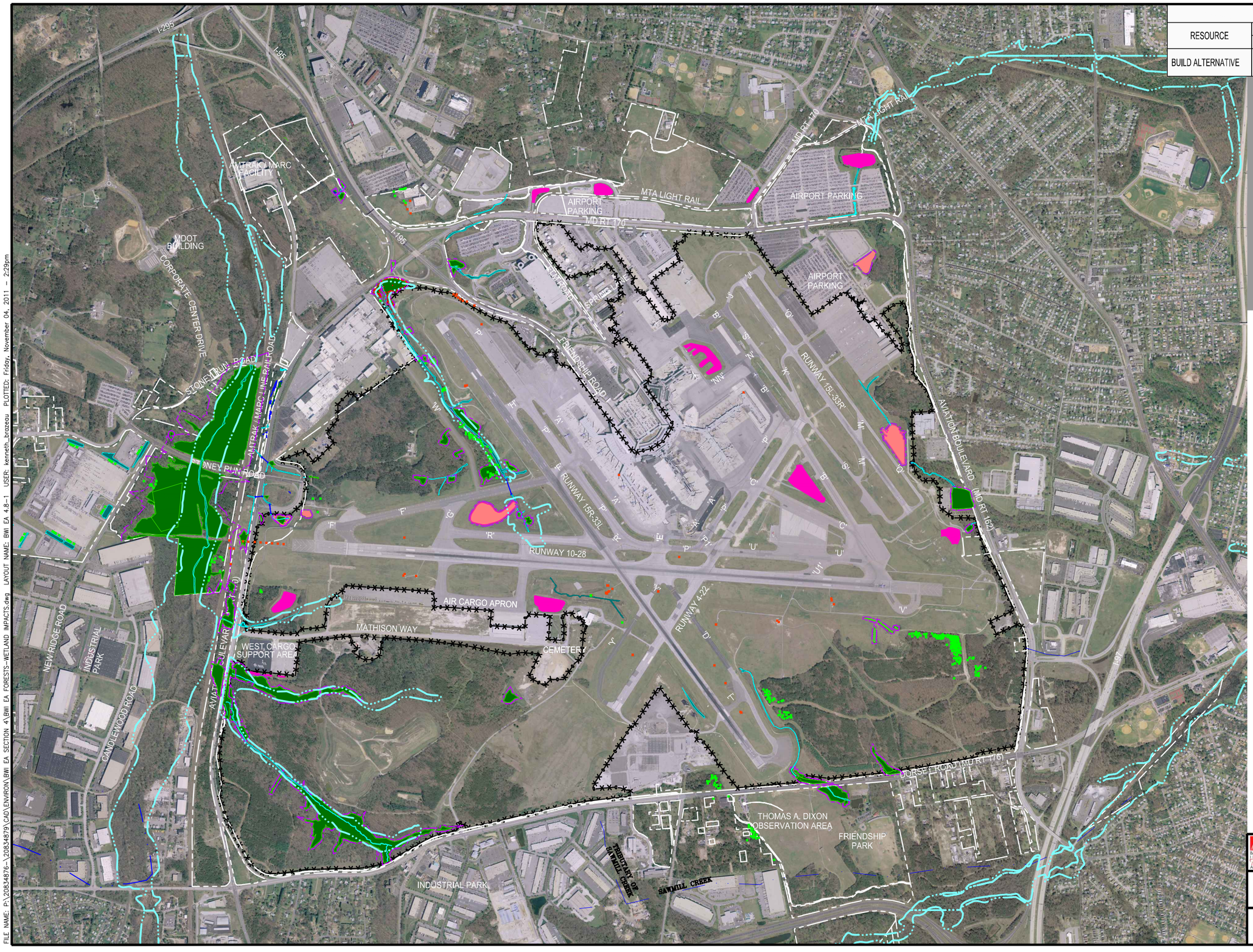
RUNWAY 33L END GLIDE SLOPE BUILD ALTERNATIVE 2

URS AVIATION

Scale: AS SHOWN

Exhibit: 4.5-10

FILE NAME: P:\20834876-\20834879\CAD\ENVIRON\ALP EXHIBITS (FEB 2011)\BWI EA 33L END GLIDE SLOPE.dwg LAYOUT NAME: BWI EA 4.5-10 USER: kenneth_brozeau PLOTTED: Wednesday, November 09, 2011 - 7:32am



ENVIRONMENTAL RESOURCE IMPACTS

RESOURCE	STREAMS (L.F.)		WETLANDS (S.F.)*		WETLAND BUFFER (S.F.)	
	TEMP.	PERM.	TEMP.	PERM.	TEMP.	PERM.
BUILD ALTERNATIVE	0	0	0	630	0	945

LEGEND

- AIRPORT PROPERTY LINE
- VEGETATIVE OBSTRUCTIONS
- MAN MADE OBSTRUCTIONS
- JURISDICTIONAL STORM WATER MANAGEMENT POND WITH 25' BUFFER
- WATERS OF THE U.S.
- WETLANDS WITH 25' BUFFER
- ISOLATED WETLANDS WITH 25' BUFFER
- FLOODPLAIN BOUNDARY

800 0 800 1600
SCALE IN FEET

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment
for Proposed Airport Improvements

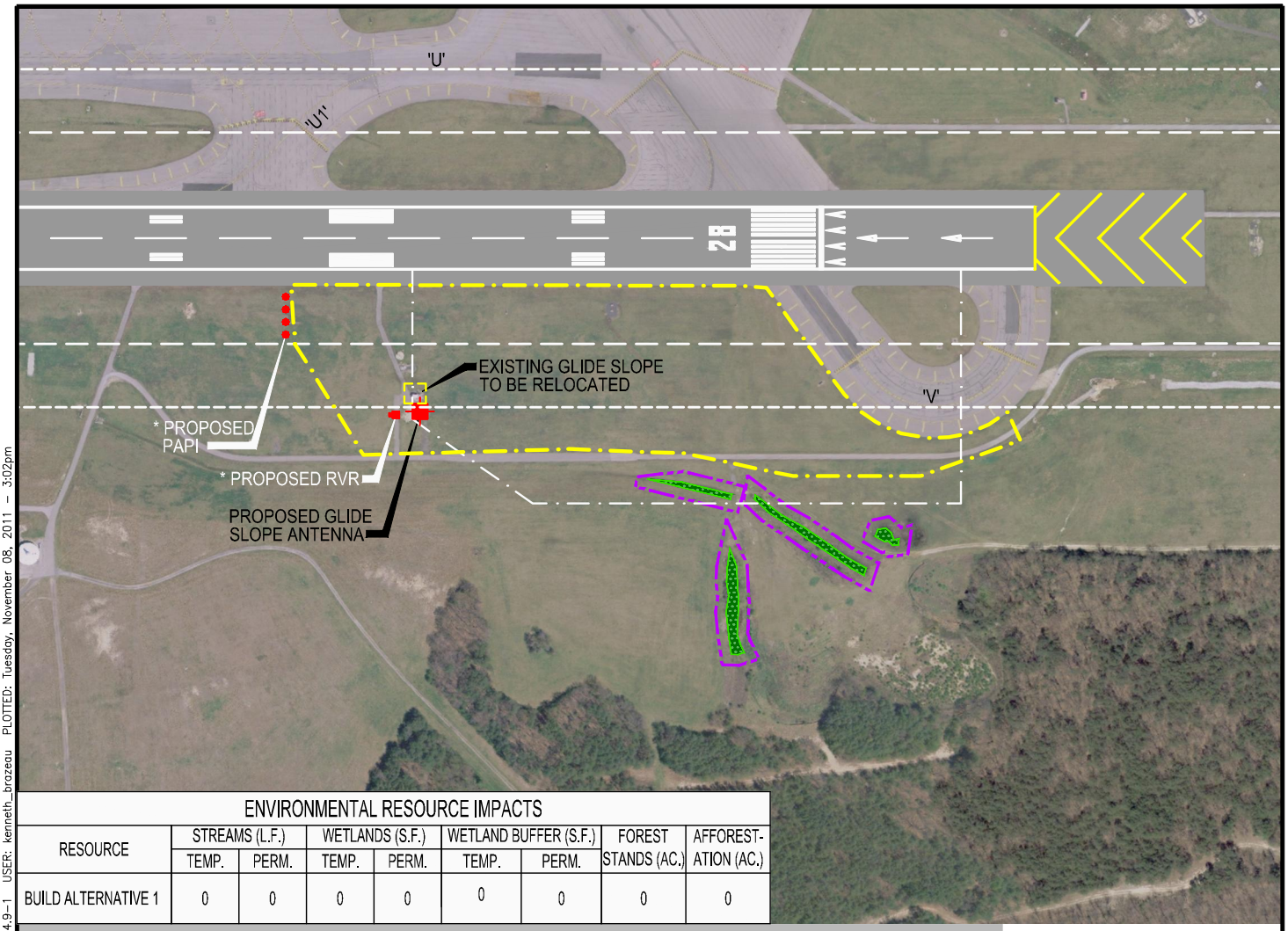
OBSTRUCTION REMOVAL IMPACTS

URS AVIATION

Scale: AS SHOWN

Exhibit: 4.8-1

FILE NAME: P:\20834876\20834879\CAD\ENVIRON\BWI EA SECTION 4\BWI EA FORESTS--WETLAND IMPACTS.dwg LAYOUT NAME: BWI EA 4.8-1 USER: kenneth_brazeau PLOTTED: Friday, November 04, 2011 - 2:29pm



ENVIRONMENTAL RESOURCE IMPACTS								
RESOURCE	STREAMS (L.F.)		WETLANDS (S.F.)		WETLAND BUFFER (S.F.)		FOREST STANDS (AC.)	AFFOREST-ATION (AC.)
	TEMP.	PERM.	TEMP.	PERM.	TEMP.	PERM.		
BUILD ALTERNATIVE 1	0	0	0	0	0	0	0	0

LEGEND:

- AIRPORT PROPERTY LINE
- SECURITY FENCE
- RUNWAY SAFETY AREA (RSA)
- RUNWAY OBJECT FREE AREA (ROFA)
- GLIDE SLOPE ANTENNA
- GLIDE SLOPE CRITICAL AREA
- LOCALIZER ANTENNA
- LOCALIZER CRITICAL AREA
- PAPI (4 BOX)
- PERIMETER ROAD IMPROVEMENTS
- SERVICE ROAD IMPROVEMENTS
- JURISDICTIONAL STORM WATER MANAGEMENT POND WITH 25' BUFFER
- WATERS OF THE U.S.
- WETLANDS WITH 25' BUFFER
- ISOLATED WETLANDS WITH 25' BUFFER
- FLOODPLAIN BOUNDARY
- LIMIT OF DISTURBANCE

* DENOTES PROJECTS UNRELATED TO THE PROPOSED ALTERNATIVE

200 0 200 400
SCALE IN FEET

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Environmental Assessment
for Proposed Airport Improvements

RUNWAY 28 END GLIDE SLOPE BUILD ALTERNATIVE

URS AVIATION

Scale: AS SHOWN

Exhibit: 4.9-1

FILE NAME: P:\20834876-\20834879\CAD\ENVIRON\ALP EXHIBITS (FEB 2011)\BWI EA 28 END GLIDE SLOPE.dwg LAYOUT NAME: BWI EA 4.9-1 USER: kenneth_brazeau PLOTTED: Tuesday, November 08, 2011 - 3:02pm

SECTION 5
LIST OF PREPARERS

The following personnel have had primary responsibilities in the preparation of this document:

MARYLAND AVIATION ADMINISTRATION

Personnel	Title	Experience	Project Responsibilities
Robin Bowie	Manager, Division of Environmental Planning	23	Project Manager
John Hurt	Environmental Analyst	26	Impact analysis; Wetland delineations; QA/QC

URS CORPORATION

Personnel	Title	Experience	Project Responsibilities
Stacy Quesinberry	Project Manager	13	Project Manager
Ken Brazeau	Senior Airport Planner	24	Alternatives Development and Exhibits
Mike Steer	Principal	40	QA/QC
Mike Metcalf	Graphics Designer	43	Exhibits
Jack Deter	Airport Engineer	28	Alternatives Development
Jennifer Lutz	Environmental Planner	11	Environmental Consequences and QA/QC
Sean Chisam	Engineer	5	Alternatives analysis and development
Mike Pizza	Project Engineer	13	Alternatives analysis and development
Paul Behrens	Senior Environmental Planner	34	Cumulative impacts; QA/QC
David Alberts	Environmental Planner	14	Cumulative impacts; QA/QC
Ron Reeves	Noise Technical Lead	20	Noise Analysis
David Weij	Airport Operations Analyst	20	Radar and Noise Modeling Analysis

AIRPORT DESIGN CONSULTANTS, INC.

Personnel	Title	Experience	Project Responsibilities
Cedrick Johnson	Project Manager	17	Engineering Support
Keith Fritz	Project Engineer	16	Engineering Support
Steve Lucchesi	QA/QC	30	Engineering Support
Bob Suarez	Design Engineer	3	Engineering Support
Mike Zeller	Design Engineer	1	Engineering Support

KB ENVIRONMENTAL SCIENCES, INC.

Personnel	Title	Experience	Project Responsibilities
Michael Kenney	Air Quality Scientist	28	Air Quality Assessment Task Leader
Paul Sanford	Air Quality Specialist	3	Air Quality Assessment
Mike Ratte	Air Quality Scientist	15	Air Quality Assessment

A.D. MARBLE & COMPANY

Personnel	Title	Experience	Project Responsibilities
Erik Schwenke	Senior Environmental Scientist	14	Affected Environment/Environmental Consequences, QA/QC
Anna McAninch	Environmental Scientist	8	Affected Environment, Environmental Consequences
Emma Diehl	Architectural Historian	8	Section 106 Coordination for Historic Structures
Richard White	Archaeologist	15	Principal Investigator; Phase I Report Author
Judson Kratzer	Archaeologist	32	QA/QC
Bryan Butina	Archaeologist	20	Archaeology Field Director
John Gorczyk	Archaeologist	3	Archaeology Field Technician
Justin Bracken	Archaeologist	3	Archaeology Field Technician
Chris Connallon	Archaeologist	5	Archaeology Field Technician
Jennifer Babiarz	Archaeologist	7	Archaeology Field Technician

TRAVESKY & ASSOCIATES, LTG.

Personnel	Title	Experience	Project Responsibilities
Marie B. Travesky	Public Involvement Manager	25	Public Involvement
Denise H. Nugent	Public Involvement Manager	20	Public Involvement
Lydia Fair	Public Involvement Specialist	6	Public Involvement
Tania Cunha	Public Involvement Specialist	10	Public Involvement
Allison Henry	Public Involvement Specialist	2	Public Involvement

OHIO UNIVERSITY

Personnel	Title	Experience	Project Responsibilities
Simbo Odunaiya	Avionics Specialist		NAVAID Modeling

JMT

Personnel	Title	Experience	Project Responsibilities
Leyla Lange	Senior Environmental Scientist	17	Impact analysis; Permit coordination; and QA/QC

APPENDIX A

LIST OF REFERENCES

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ACRONYMS

AC	Advisory Circular
ACHP	Advisory Council on Historic Preservation
AIP	Airport Improvement Program
ALP	Airport Layout Plan
ALS	Approach Lighting System
ALSF-II	High Intensity Approach Lighting System with Sequenced Flashing Lights
ANZ	Airport Noise Zone
ARC	Airport Reference Code
ARFF	Airport Rescue and Fire Fighting
ASDA	Accelerated Stop Distance Available
AST	Above Ground Storage Tank
ATCT	Airport Traffic Control Tower
BMP	Best Management Practice
BWI Marshall	Baltimore/Washington International Thurgood Marshall Airport
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CIP	Capital Improvement Program
CO	Carbon Monoxide
COE	US Army Corp of Engineers
COMAR	Code of Maryland Regulations
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
CZMP	Coastal Zone Management Program
dB	Decibels
dBA	A-weighted decibels
DNL	Average Annual Day-Night Sound Level
DOT	US Department of Transportation
EA	Environmental Assessment
EPA	US Environmental Protection Agency
ESA	Endangered Species Act
ESD	Environmental Site Design
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulation
FBO	Fixed Based Operator
FCA	Forest Conservation Act
FCP	Forest Conservation Plan
FONSI	Finding of No Significant Impact
FPPA	Farmland Protection Policy Act
FSD	Forest Stand Delineation

FWS	US Fish and Wildlife Service
GIS	Geographic Information System
GSCA	Glide Slope Critical Area
HAPs	Hazardous Air Pollutants
HVAC	Heating, Ventilation, and Air Conditioning
ILS	Instrument Landing System
INM	Integrated Noise Model
JD	Jurisdictional Determination
JPA	Joint Permit Application
LDA	Landing Distance Available
MAA	Maryland Aviation Administration
MALSR	Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights
MDE	Maryland Department of the Environment
MDNR	Maryland Department of Natural Resources
MOS	Modification of Standards
NAAQS	National Ambient Air Quality Standards
NAVAIDs	Navigational Aids
NEPA	National Environmental Policy Act of 1969
NHPA	National Historic Preservation Act
NO_2	Nitrogen Dioxide
NPDES	National Pollutant Discharge Elimination System
NPIAS	National Plan of Integrated Systems
NRCS	National Resource Conservation Service
NRHP	National Register of Historic Places
O_3	Ozone
OFA	Object Free Area
PAPI	Precision Approach Path Indicator
Pb	Lead
PCS	Permit Compliance System
PEM	Emergent Wetlands
PFO	Forested Wetlands
PL	Public Law
PM	Particulate Matter
$PM_{2.5}$	Particulate Matter with a diameter of 2.5 micrometers or less
PM_{10}	Particulate Matter with a diameter of 10 micrometers or less
PMP	Pavement Management Program
PSS	Scrub-shrub Wetlands
RAIL	Runway Alignment Indicator Lights
ROFA	Runway Object Free Area
RPZ	Runway Protection Zone
RSA	Runway Safety Area
RVR	Runway Visibility Range

SO_2	Sulfur Dioxide
TAF	Terminal Area Forecast
TODA	Takeoff Distance Available
TORA	Takeoff Run Available
TSA	Transportation Security Administration
URS	URS Corporation
USC	United States Code
USDA	US Department of Agriculture
USGS	US Geological Survey
VASI	Visual Approach Slope Indicator
VOC	Volatile Organic Compound

Preserving America's Heritage

November 12, 2010

Ms. Robin M. Bowie
Manager, Division of Environmental Planning
Maryland Aviation Administration
P.O. Box 8766
BWI Airport, MD 21240-0766

RE: Invitation to attend agency scoping meeting for the Environmental Assessment (EA) for Runway Safety Area (RSA) and other improvements at BWI Marshall Airport Anne Arundel County, Maryland

Dear Ms. Bowie:

On October 21, 2010, the Advisory Council on Historic Preservation (ACHP) received your invitation to participate in an agency scoping meeting for the preparation of an Environmental Assessment (EA) for various improvements at BWI Marshall Airport under review by the Federal Aviation Administration (FAA). At this time, we do not expect to attend meetings or provide formal comments at environmental review milestones. However, we appreciate your keeping us informed, as we may decide to become more actively involved in the future, if warranted. We are also happy to provide FAA with technical assistance at any time on matters related to historic preservation and Section 106 of the National Historic Preservation Act.

The ACHP encourages FAA to coordinate the Section 106 process with National Environmental Policy Act (NEPA) compliance by notifying, at your earliest convenience, the appropriate State Historic Preservation Officer (SHPO) and/or Tribal Historic Preservation Officer (THPO), Indian tribes, and other consulting parties pursuant to our regulations, "Protection of Historic Properties" (36 CFR Part 800). Through early consultation, FAA will be able to determine the appropriate strategy to ensure Section 106 compliance is completed in a timely manner for this undertaking.

FAA should continue consultation with the appropriate SHPO/THPO, Indian tribes, and other consulting parties to identify and evaluate historic properties and to assess any potential adverse effects on those historic properties. If FAA determines that the undertaking will adversely affect historic properties, or that the development of a programmatic agreement is necessary, the federal agency must notify the ACHP and provide the documentation detailed at 36 CFR §800.11(e).

ADVISORY COUNCIL ON HISTORIC PRESERVATION

1100 Pennsylvania Avenue NW, Suite 803 • Washington, DC 20004
Phone: 202-606-8503 • Fax: 202-606-8647 • achp@achp.gov • www.achp.gov

Thank you for inviting our participation in the development of this project. Should you have any questions as to how your agency should comply with the requirements of Section 106, please contact Anthony Guy Lopez by telephone at (202) 606-8525 or by e-mail at alopez@achp.gov.

Sincerely,

Charlene Dwin Vaughn, AICP
Assistant Director
Office of Federal Agency Programs
Federal Permitting, Licensing, and Assistance Section

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, U.S. ARMY CORPS OF ENGINEERS
P.O. BOX 1715
BALTIMORE, MD 21203-1715

REPLY TO
ATTENTION OF

DEC 0 8 2010

Operations Division

Ms. Robin M. Bowie, Manager
Maryland Aviation Administration
Division of Environmental Planning
P.O. Box 8766
BWI Airport, Maryland 21240-0766

Dear Ms. Bowie:

This is in response to the Maryland Aviation Administration (MAA) letter dated October 20, 2010, regarding the Runway Safety Area (RSA) improvements at Baltimore/ Washington International Thurgood Marshall Airport (BWI Marshall) in Anne Arundel County, Maryland and the request for scoping comments in the preparation of a National Environmental Policy Act (NEPA) document for the proposed project.

The U.S. Army Corps of Engineers, Baltimore District (Corps) is a cooperating agency in the preparation of the Environmental Assessment (EA) for the proposed project. In this regard, we look forward to working with your agency as the document is developed to ensure that the information presented in the NEPA document is adequate to fulfill the requirements of Corps regulations, the Clean Water Act Section 404(b)(1) Guidelines, and the Corps public interest review process.

To meet the requirements of the Corps review process, the Corps requests that the following topics be comprehensively evaluated in the EA:

1. Purpose and need for the project. In order to satisfy the Department of the Army regulations, the Corps will need to concur on the purpose and need statement for the project. We would be pleased to work with you and the applicant to develop a purpose and need statement that will satisfy the Department of the Army regulations for review of project under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899.

2. Alternatives analysis/Clean Water Act Section 404(b)(1) Guidelines. As background, a fundamental precept of the Clean Water Act Section 404 regulatory program is that impacts to wetlands and other waters of the U.S. will be avoided and minimized, where it is practicable to do so. Under Section 404, only the least environmentally damaging practicable alternative can receive DA authorization. Note that an alternative is practicable if it is available and capable of being done after taking into consideration cost, logistics, and existing technology in light of overall project purposes.

The 404(b)(1) Guidelines require an Alternatives Analysis, which addresses how impacts to waters of the United States have been avoided and/or minimized. If impacts to waters of the United States, including jurisdictional wetlands, cannot be avoided, the Alternatives Analysis identifies the compensatory mitigation required to replace lost functions and services of the aquatic resources. Information on the Alternatives Analysis and the results of any studies, assessments, and evaluations of the proposed project are needed in the NEPA document. Based on the agreed upon project purpose, in accordance with established Corps policy, the Corps will need to concur on the range of alternatives retained for detailed study in the NEPA document. At a minimum, the NEPA document must comprehensively evaluate the practicability of the following alternatives to avoid and or minimize impacts to waters of the U.S., including jurisdictional wetlands:

- runway safety area improvements and alignment shifts to the north, south, east and west of the current runway alignment;
- constructing retaining walls where appropriate, and or spanning structures over waters of the U.S.;
- stream relocation as opposed to filling or piping;
- storm water management pond locations;
- navigation aid location;
- proposed method for tree obstruction removal in waters of the U.S., including jurisdictional wetlands affecting the approach and departure airspace, including constructing temporary access roads, equipment to be used, etc.

3. Corps public interest review factors. The decision to issue a permit will be based on an evaluation of the probable impacts, including cumulative impacts, of the proposed activity and its intended use on the public interest. Among the factors that must be evaluated as part of the Corps public interest review include: conservation, economics, aesthetics, general environmental concerns, wetlands and streams, historic and cultural resources, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shore erosion and accretion, recreation, water supply and conservation, energy needs, safety, food and fiber production, mineral needs, water quality, considerations of property ownership, air and noise impacts, and, in general, the needs and welfare of the people. Each of the Corps public interest factors must be evaluated comprehensively in the NEPA document.

4. Delineation of all waters of the U.S., including jurisdictional wetlands, in the project area.

5. Quantify impacts to waters of the U.S. (both temporary and permanent) to all waters of the U.S. (e.g., perennial, intermittent, ephemeral streams; rivers, lakes, ponds), including jurisdictional wetlands, for each project alternative. For streams and rivers, include both the linear feet of stream/river impacts (measured along the centerline of the stream/river) and square feet of impact. For temporary wetland impacts, quantify any change in wetland classification (e.g., palustrine forested to palustrine emergent, etc.)

6. Cumulative and indirect impacts resulting from the project.

7. Environmental justice including compliance with the Executive Order 12898 on environmental justice.

8. Describe the disposal options for any excess fill material resulting from utility line installation.

9. Wetland and stream mitigation plans.

10. Analysis of the project's compliance with Section 7 of the Endangered Species Act, Section 106 of the National Historic Preservation Act, Section 401 of the Clean Water Act, and the Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996 (Public Law 04-267) [essential fish habitat (EFH) assessment].

11. Air quality impacts (i.e., Section 176(c) of the Clean Air Act General Conformity Rule Review).

12. Compliance with the Executive order on floodplains.

13. Project review schedule and NEPA document preparation schedule. Other important milestones (e.g., public hearings, etc.) should also be listed in the NEPA document.

Should it be determined that an Environmental Impact Statement (EIS) will be developed for the review of this project, we request that this office be a cooperating agency in the development of the EIS. The above-listed items would also need to be evaluated as part of the EIS to fulfill the requirements of Corps regulations, the Clean Water Act Section 404(b)(1) Guidelines, and the Corps public interest review process.

We look forward to working with your agency as the EA is developed and the review of the project proceeds. Should you have any questions concerning this letter, please contact Mr. Richard Kibby of this office at 410-962-0694.

Sincerely,

Joseph P. DaVia
Chief, Maryland Section Northern

USDA

United States Department of Agriculture

Animal and Plant Health Inspection Service

Wildlife Services

c/o Airport Operations
3rd Floor Terminal
BWI Airport, MD 21240

November 3, 2011

Ms. Robin Bowie
Manager, Division of Environmental Planning
Maryland Aviation Administration
Baltimore/Washington International Thurgood Marshall Airport
P.O. Box 8766
BWI Airport, MD 21240

SUBJECT: Relocation of Kitten Branch on Runway 15R or Fork Branch on 33L as Proposed Alternatives.

Dear Ms. Bowie:

As requested by the U.S. Army Corps of Engineers (COE) during the meeting on Tuesday, November 1, 2011, with the Maryland Aviation Administration (MAA), COE, and the Maryland Department of the Environment (MDE), USDA Wildlife Services (WS) is providing this letter in reference to the Proposed Alternatives for stream relocation for the Runways 15R and 33L runway improvement projects.

WS does not support the relocation of Kitten Branch on Runway 15R or Fork Branch on 33L as proposed alternatives to accommodate proposed projects in those areas. Relocation of the two streams would increase the wildlife attractants at BWI Marshall and potentially increase wildlife hazards to aviation. Such proposed alternatives would not meet the FAA A/C 150/5200-33B, *Hazardous Wildlife Attractants On or Near Airports*.

We look forward to continue providing assistance in managing wildlife at BWI Marshall. We hope this information has addressed your request. If you need additional information, please do not hesitate to contact me at 410-859-7367.

Sincerely,

Jeremy Smith, Wildlife Biologist, USDA WS

cc: John Stewart, Director, Airport Operations, MAA
Kevin Sullivan, USDA WS MD/DE/D.C.
Scott Healey, USDA WS MD/DE/D.C.

Robin Bowie

From: Jeremy Smith (USDA)
Sent: Thursday, September 15, 2011 2:57 PM
To: Robin Bowie
Cc: 'Healey, Ronald S (APHIS)'; 'Sullivan, Kevin (APHIS)'
Subject: RE: Review of Kitten Branch Tributaries for Stream Stabilization

Robin,

USDA has reviewed the email below about our site visit on 9/12/11 and the discussion about the stream stabilization project. USDA agrees that the proposed project would be appropriate and does not foresee wildlife hazards increasing as a result of the project If anything, it will most likely *decrease* the attractiveness of these two locations to hazardous bird species, as was the case with the Sachs Branch area.

Jeremy Smith, Wildlife Biologist
c/o BWI Office of Airport Operations
410-859-7367

life Biologist
United States Department of Agriculture
Animal & Plant Health Inspection Service
Wildlife Services
c/o BWI Office of Airport Operations
410-859-7367
410-698-2830 cell
jsmith12@bwiairport.com
http://www.aphis.usda.gov/ws/

From: Robin Bowie
Sent: Monday, September 12, 2011 3:21 PM
To: Jeremy Smith (USDA)
Cc: John Hurt; 'Lange, Leyla'; 'Sullivan, Kevin (APHIS)'; 'Healey, Ronald S (APHIS)'
Subject: Review of Kitten Branch Tributaries for Stream Stabilization

Jeremy:

Thank you for taking the time to join John and myself today to look at Kitten Branch and two of its tributaries that may require stream stabilization. As a result of the rains from Hurricane Irene and subsequent Tropical Storm Lee in less than a week, several stream areas have incurred extensive washout/erosion issues. As these areas are within the arrival/departure airspace of Runway 15R, MAA wished to confer with USDA as to their potential for wildlife hazards should MAA decide to move forward with stream stabilization projects in these areas.

To recap our discussion in the field today, we met at the access road for the MALSR for Runway 15R and reviewed a tributary to Kitten Branch that runs under this access road that experienced a collapse last year. While MAA fixed the collapsed roadway under an emergency action, the recent storms have caused extensive erosion resulting in a large pond area. MAA would propose to do a stream stabilization in this area that would eliminate the pond area

and then plant the area with plants that would help stabilize the area, similar to the work done on the Sachs Branch stream area below the Daily Garage. As we discussed, USDA approved the Sachs Branch project.

MAA wished to consulted with USDA to determine if USDA thought this area would enhance wildlife and thus be considered a wildlife hazard or if making the corrections noted above, the area would then become less of a wildlife hazard. It was your determination that our proposal would not enhance the area into becoming a wildlife hazard. It was also noted that USDA has not had any trouble with this particular area as a wildlife hazard area of concern, that more open fields and open water areas have traditionally caused the most concern. Although this area is within the arrival/departure airspace for Runway 15R, USDA noted that this area is an already existing stream, and the proposed corrections would not be the construction of a new stream, which would pose a concern to USDA. The site is also somewhat camouflaged. Thus, the final determination was that this area would not increase or exasperate wildlife hazards and USDA would concur that this site would be appropriate for a stream stabilization project.

We then traveled along the sewer access roadway to look at a second tributary to Kitten Branch that crosses the sewer access road. The downstream area has severe scour at the culvert outfall, is incised and is actively eroding. We looked at the main stem of Kitten Branch upstream of the pedestrian boardwalk bridge and continuing downstream to the lower limit of the Anne Arundel County stream bank armoring which shows a very incised, unstable channel which threatens to impact the integrity of the boardwalk pilings and exposing water lines and manholes. All of these areas are already established streams within the forested area of Kitten Branch, all are well camouflaged, all have not traditionally been areas of wildlife hazard concern, and the stabilization efforts would not be the construction of new streams, which would pose a concern to USDA. Thus, the final determination was that these areas would not increase or exasperate wildlife hazards and USDA would concur that these sites would be appropriate for a stream stabilization project.

MAA is asking that you review these notes from our field meeting today and let us know if you concur with our understanding of the discussions we had about these areas

If you have any questions or wish to discuss further, please let me know. Thanks again for your time this afternoon!

Ms. Robin M. Bowie
Manager, Division of Environmental Planning
Maryland Aviation Administration
Baltimore/Washington International Thurgood Marshall Airport
410-859-7103 (office)
410-859-7082 (fax)
rbowie@bwiairport.com

Mailing Address
P.O. Box 8766
BWI Airport, MD 21240

Overnight Shipping Address
991 Corporate Boulevard
Linthicum, MD 21090

Quesinberry, Stacy

From: Quesinberry, Stacy
Sent: Monday, March 05, 2012 1:35 PM
To: Robin Bowie (rbowie@bwiairport.com)
Subject: FWS Respond to Draft EA

Robin,

I spoke with Devin Ray this afternoon (FWS) and he indicated that FWS would not be responding to the Draft EA since they have previously coordinated with us on these projects and there aren't any issues.

Thanks,
Stacy.

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Stacy L. Quesinberry | Senior Environmental Planner | stacy.quesinberry@urs.com

URS Corporation | 1800 Washington Boulevard, Suite 410 | Baltimore, MD 21230-1708
Office: 410.468.0875 | Direct: 410.649.4037 | Fax: 410.468.3259

MEMORANDUM

TO: Robin Bowie, MAA and Meeting Attendees (see below)
DATE: January 24, 2011
FROM: Leyla E. Lange, JMT
PROJECT: Proposed Airport Improvements at Baltimore/Washington International Thurgood Marshall Airport

RE: Meeting with Jim Tracy at MDE

On January 20, 2011, representatives from MAA and JMT met with Jim Tracy at MDE offices to discuss MAA's approach to meeting MDE erosion and sediment and stormwater management requirements focusing on the water quality design requirements for the forthcoming Proposed Airport Improvements at Baltimore/Washington International Thurgood Marshall Airport (BWI Marshall). Those in attendance included:

Robin Bowie	MAA	410-859-7103	rbowie@bwiairport.com
John Hurt	MAA	410-859-7384	jhurt@bwiairport.com
Jim Tracy	MDE	410-537-3566	jtracy@mde.state.md.us
Alan Peljovich	JMT	410-859-7142	apeljovich@bwiairport.com
Leyla Lange	JMT	301-938-2677	llange@jmt.com

Mr. Peljovich provided an overview of the Runway Safety Area (RSA) Improvement Program and Pavement Management Program (PMP) for BWI Marshall. Improvements to RSA's at BWI Marshall are necessary to comply with a Congressional Mandate requiring all RSA's to meet FAA safety criteria by December 31, 2015. Mr. Peljovich explained that a number of additional projects will be completed as FAA requires that all current Modifications of Standards be reconciled at the same time the RSA Improvements are being performed. Mr. Peljovich will be the Design Program Manager for the RSA/PMP Program.

The group discussed the need to integrate the MDE permit process into the RSA/PMP program as early as possible to ensure that BWI Marshall meets all of the requirements of the Congressional Mandate by December 31, 2015. Mr. Tracy explained that development of SHA's "Priority List" is a result of the numerous SHA projects that are processed on a daily basis. Based on the phasing of the projects, Mr. Tracy does not forsee the potential for MDE's approval process to impinge on the RSA/PMP schedule. All RSA/PMP submissions for review will be clearly indicated.

The group discussed the status of the letter of approval for the extension of the IMP. Ms. Bowie explained that a new Institutional Management Plan (IMP) will be prepared for BWI Marshall within the next two years taking into account the new requirements of the Stormwater Management Act 2007; however, MAA does not yet have a letter from MDE stating that the IMP will be extended to bridge the

gap including a disposition on the existing credits and the RSA/PMP projects they are intended to offset. Mr. Tracy will look into the status and provide a letter to MAA within two weeks.

Ms. Lange provided a summary of MAA's proposed approach to calculation and tracking of stormwater management requirements for the RSA/PMP program. Ms. Lange explained that all calculations and tracking would be performed on a sub-basin level to be consistent with past efforts. Ms. Bowie and Mr. Hurt are responsible for tracking MAA's stormwater management credits/needs.

The following items were discussed:

- Due to the nature of the airfield environment and the need for MAA to ensure the safety of the travelling public, MDE understands that strict compliance with implementing Environmental Site Design to the Maximum Extent Practicable at BWI Marshall is not feasible while meeting FAA standards. Because of this, MDE will work with MAA to determine the best way to achieve compliance on a case-by-case basis.
- RSA Grading – a large portion of the work associated with the proposed projects are simply grading RSAs to meet FAA standards with respect to slope criteria. These areas are currently grassed and will remain grassed in perpetuity; there will be no change in imperviousness or land-use within these areas. MDE agreed that it would be unreasonable to penalize MAA for grading work; therefore, these areas will be treated on a case-by-case basis and may either qualify for a variance or a waiver under Section 3.3A.
- Redevelopment – impervious areas that are currently treated by stormwater management facilities that still have capacity will not be considered redevelopment. The 15R de-icing hold pad reconstruction project is one example.
- Stormwater Management Credits – existing credits from oversized stormwater management facilities can be applied to the proposed projects; however, only water quality credits will be accepted. Ms. Bowie and Mr. Hurt are responsible for tracking MAA's stormwater management credits/needs. Mr. Tracy requested MAA provide the most current information for comparison with MDE records to ensure consistency. Existing credits will be carried forward at a 1:1 ratio.
- Innovative ESD Practices – RSAs provide approximately 250 feet of turf between the edge of runway pavement and any drainage structure. MDE will grant credit for these areas as 110 linear feet of pavement is being treated by over 250 feet of turf; credit ratio to be applied has yet to be determined and will likely be decided on a case-by-case basis.

The meeting adjourned at 11:45 am.

The above statements represent a true and accurate account of the discussion during this meeting to the best of my knowledge. If there are any conflicts, misrepresentations or omissions with the above statements please contact our office at (410) 329-3100 within fourteen (14) days of this date.

cc: All Attendees
Russ Ruffing, JMT

Quesinberry, Stacy

From: Robin Bowie <rbowie@bwiairport.com>
Sent: Wednesday, May 04, 2011 11:04 AM
To: 'Stacy_Quesinberry@URSCorp.com'
Subject: April 27, 2011, Meeting w/ MDNR Recap

Minutes from a meeting with MDNR.

Ms. Robin M. Bowie
Manager, Division of Environmental Planning
Maryland Aviation Administration
Baltimore/Washington International Thurgood Marshall Airport
410-859-7103 (office)
410-859-7082 (fax)
rbowie@bwiairport.com

Mailing Address
P.O. Box 8766
BWI Airport, MD 21240

Overnight Shipping Address
991 Corporate Boulevard
Linthicum, MD 21090

From: Robin Bowie
Sent: Wednesday, May 04, 2011 11:03 AM
To: 'Honeczy, Marian'
Subject: FW: April 27, 2011, Meeting w/ MDNR Recap

Marian:

Thanks!!

Ms. Robin M. Bowie
Manager, Division of Environmental Planning
Maryland Aviation Administration
Baltimore/Washington International Thurgood Marshall Airport
410-859-7103 (office)
410-859-7082 (fax)
rbowie@bwiairport.com

Mailing Address
P.O. Box 8766
BWI Airport, MD 21240

Overnight Shipping Address
991 Corporate Boulevard
Linthicum, MD 21090

From: Honeczy, Marian [mailto:MHONECZY@dnr.state.md.us]
Sent: Wednesday, May 04, 2011 9:17 AM
To: Robin Bowie
Subject: RE: April 27, 2011, Meeting w/ MDNR Recap

Looks good to me.

Marian Honeczy
Supervisor, Urban and Community Forestry
MD Forest Service
580 Taylor Ave E-1
Annapolis, MD 21401
(410) 260-8511

Register all newly planted trees today!
www.trees.maryland.gov

From: Robin Bowie [mailto:rbowie@bwiairport.com]
Sent: Wednesday, April 27, 2011 11:02 AM
To: Honeczy, Marian
Subject: April 27, 2011, Meeting w/ MDNR Recap

Marian:
It was nice to see you again! Glad we had the opportunity to catch up. Below please find below a really quick recap of our meeting with regards to the Environmental Assessment that MAA is currently preparing for FAA for Proposed Airport Improvement Projects and tree removal:
Using Exhibit 1.0-2, Proposed Airport Improvement Projects, we went through each of the forest areas designated on the map for tree removal. With the exception of the area designated as line-of-sight tree removal for the Air Traffic Control Tower to see the newly proposed Runway 33L hold pad, the trees to be removed fall are deemed as obstructions on the FAA approved Airport Layout Plan and thus full under the Part 77 exemption and will not need to be mitigated. The line-of-sight tree removal is not currently in a conservation easement per the existing Reforestation Master Plan (RMP 2003) and will be mitigated using the area designated in the RMP as the Stony Run preservation/conservation area west of the airport. MDNR is going to supply a copy of a basic easement to use that may also meet the requirements of MDE.
It was discussed that if MAA clearly defines the acreage of trees to be impacted in each area in the EA, then the public notice for the EA can serve as the public notice for MDNR. Each time a project is submitted for MDNR review, MAA is to refer to and include a copy of the public notice to MDNR.
It was discussed that MAA will be updating the RMP as a result of this EA.
It was discussed that harvesting the forest areas may be the best way to clear the areas leaving stumps. It was suggested that MAA obtain a forester to help with the appropriate way to remove the trees, how to sell the wood, replant any areas and in some cases remove the wood with the least amount of disturbance. Also, the forester may be able to assist with determinations of whether erosion and sediment control exemptions may apply depending on the type of removal process.
Let me know if I missed anything! Thanks again for meeting with me today!

Ms. Robin M. Bowie
Manager, Division of Environmental Planning
Maryland Aviation Administration
Baltimore/Washington International Thurgood Marshall Airport
410-859-7103 (office)
410-859-7082 (fax)
rbowie@bwiairport.com

Mailing Address
P.O. Box 8766
BWI Airport, MD 21240

Overnight Shipping Address
991 Corporate Boulevard
Linthicum, MD 21090

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Draft Compensatory Mitigation Plan

Baltimore/Washington International Thurgood Marshall Airport

Proposed Airport Improvement Projects

February 2012

Executive Summary

The Maryland Aviation Administration (MAA) has prepared this Draft Compensatory Mitigation Plan (DCMP) in accordance with the *Final Rule on Compensatory Mitigation for Losses of Aquatic Resources* (33 USC 332). Currently, MAA is preparing an Environmental Assessment (EA) for projects associated with proposed improvements at Baltimore/Washington International Thurgood Marshall (BWI Marshall) Airport in Anne Arundel County, Maryland, which include projects that will result in unavoidable impacts to jurisdictional wetlands and waterways (i.e., streams). Currently, under the selected Preferred Alternative projects, the worst case scenario unavoidable permanent impacts include 11,235 square feet of non-tidal wetlands (9,600 square feet of which are isolated wetland impacts), 30,030 square feet of non-tidal wetland buffers, and 3,566 linear feet (51,015 square feet) of stream impact, 1,229 linear feet (17,170 square feet) of which are intermittent. Compensatory mitigation for the impacts to wetlands and streams are proposed to be fulfilled through permittee-responsible mitigation. Many of the proposed projects are "fixed-by-function"; therefore, alternative sites were not considered. However, alternative engineering designs and construction methodologies are being developed as a means to further avoid and minimize potential impacts to jurisdictional resources.

Numerous factors were considered during the mitigation site selection including proximity to active runways and approach/departure airspace, potential for creating future obstructions to navigable airspace, and location with respect to proposed impacts. Providing compensatory mitigation on-site (on BWI Marshall campus), directly adjacent to the area of impact was precluded by the provisions of 33 CFR 332.3(b)(1) "Compensatory mitigation should not be located where it will increase risks to aviation by attracting wildlife to areas where aircraft-wildlife strikes may occur (e.g. near airports)." USDA Wildlife Services personnel at BWI Marshall have been consulted during the site selection process to ensure that there would be no increased risk to aviation based on the proposed mitigation to be performed.

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Introduction

Background

The Federal Aviation Administration (FAA) develops design criteria and standards for public and commercial aviation facilities to provide a safe environment for the travelling public. FAA design criteria and standards address requirements for airfield facilities such as lengths, widths, grades and separation distances for runways, taxiways, associated safety areas, object free areas, and location and placement of navigational aids based on maximum aircraft size intended for the facility. Part 77 of the Code of Federal Regulations (CFR) further defines imaginary airspaces surrounding aircraft facilities that must be kept free and clear of any natural or man-made obstructions that could potentially cause damage to an aircraft, and/or decrease the safety, efficiency and utilization of an airport. In certain minor instances, FAA may grant a Modification of Standards (MOS); ultimately, conditions permitted by a MOS must be reconciled when larger projects provide an opportunity.

Runway and Taxiway Safety Areas (RSAs and TSAs) are integral components of airfields that provide a measure of safety in the event of an aircraft's excursion from pavement. In October 1999, FAA established Order 5200.8, Runway Safety Area Program, with an objective that "…RSAs at federally obligated airports and all RSAs at airports certificated under 14 Code of Federal Regulations (CFR) Part 139 shall conform to the standards contained in A/C [Advisory Circular] 150/5300-13 Airport Design, to the extent practicable." The United States Congress has established a deadline of December 31, 2015 for all commercial airports to have compliant RSAs.

MAA owns and operates BWI Marshall, a Part 139-certificated facility located in Anne Arundel County, Maryland, approximately nine miles south of Baltimore City and approximately thirty miles northeast of Washington DC (see **Appendix A**, **Figure 1**). Currently, the RSAs at BWI Marshall do not meet prescribed FAA standards and improvements must be implemented.

Purpose and Need for Improvements at BWI Marshall Airport

The purposes of the proposed improvements are to accomplish those tasks that would allow BWI Marshall to continue to operate in a safe and efficient manner while meeting FAA design criteria, and accommodating the Airport's current and future needs. Based on the information presented in this section, the proposed actions are needed for the following reasons:

- The current RSAs for all runways at BWI Marshall are deficient;
- There is insufficient separation between the Glide Slope and runway centerline on Runways 10-28, 15R-33L, and 15L-33R;
- Portions of the existing perimeter roadway penetrate the RSAs and Object Free Areas (OFAs) on the Runway 15R, 33L and 15L ends;
- There are existing deficiencies to airside and landside pavements requiring improvements;

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- There are several existing penetrations to the 14 CFR Part 77 surfaces to Runway 10-28, 15R-33L, and 15L-33R;
- Terminal operation, security, and code deficiencies need to be addressed; and
- The MAA does not own portions of the existing Runway Protection Zones (RPZs) of Runway 10, 15L, 15R, and 33L.

Specific existing deficiencies in the operation and maintenance of BWI Marshall are addressed in the EA for each project proposed. All of the proposed projects are to be completed by 2015 as depicted on the current BWI Marshall Airport Layout Plan (ALP) approved by FAA in February 2011 (see **Appendix A**, **Figure 2**).

An EA has been prepared by MAA to provide FAA with sufficient information to support an environmental finding for Proposed Airport Improvements at BWI Marshall in compliance with the National Environmental Policy Act (NEPA) (42 United States Code [USC] 4321 et seq.) and the Council on Environmental Quality (CEQ) implementing regulations (40 CFR 1500-1508). The document follows guidelines for EA preparation contained in FAA Orders 1050.1E, Change 1, *Environmental Impacts: Policies and Procedures* (March 2006); and 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions* (April 2006) as supplemented by FAA's *Environmental Desk Reference for Airport Actions* (October 2007). The U.S. Army Corps of Engineers (USACE) has agreed to participate throughout the EA process to provide guidance and support through the Clean Water Act (as amended) Section 404 permitting process for unavoidable impacts to potentially jurisdictional wetlands and waters of the U.S. MAA has been closely coordinating with both USACE and the Maryland Department of the Environment (MDE) through monthly meetings to discuss permitting and mitigation requirements. Minutes of all agency coordination efforts are provided in **Appendix B**.

Natural Resources Impacted

The proposed projects would result in unavoidable impacts to state and federally regulated aquatic resources. MAA maintains and continually updates an inventory of these resources at BWI Marshall (see **Appendix A**, **Figure 3**) and closely coordinates with both USACE and MDE regarding the jurisdictional status of their aquatic resources. A preliminary Jurisdictional Determination was performed by USACE and MDE in January 2011. Impacted resources are located within two subwatersheds: Kitten Branch and Fork Branch.

<u>Kitten Branch:</u>

Kitten Branch is a wadeable gravel and sand-bed perennial stream with pool/riffle morphology and an alluvial floodplain. Kitten Branch is very likely to have been physically modified (relocated/straightened) and is generally incised with moderate to poor floodplain connectivity. Kitten Branch originates on the BWI Marshall airfield complex and is fed by overland flow and stormwater practices, which drain impervious surfaces and adjacent grass areas. Kitten Branch is bordered by a wooded riparian buffer of varied width for much of its length. The stream runs parallel to Runway 15R-33L, which is being redesigned to adhere to FAA RSA criteria.

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Kitten Branch is a moderately stable to stable E-type stream with effective vertical grade control features and a stable planform. In most places, it has undergone an entire cycle of channel evolution (incision, widening, and redevelopment of floodplain at lower elevation) to form this relatively stable geomorphology. Stream stability on the BWI Marshall campus ranges from moderately stable to stable.

Several wetlands associated with Kitten Branch will be impacted by the proposed projects (see **Table 1**).

Table 1 – Kitten Branch Wetlands

Resource ID	Type	Quality	Comments
Wetland KB-2	PEM	Low	Small, low species diversity and high human disturbance (routinely mowed)
Wetland KB-8	PFO (isolated)	Low	Small, isolated, low species diversity and high human disturbance (routinely mowed)
Wetland KB-9	PFO (isolated)	Low	Small, isolated, low species diversity and high human disturbance (routinely mowed)
Wetland 16	PEM	Low	Small, low species diversity and high human disturbance (routinely mowed)

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Fork Branch:

Fork Branch is an intermittent stream that transitions to a perennial wadeable stream with a bed comprised of sand and small gravel. Fork Branch originates on the BWI Marshall airfield (roughly paralleling the 33R end of Runway 15L/33R) and is fed by overland flow and springs. It is very likely to have been physically modified (relocated/straightened and possibly lowered). Fork Branch is located either artificially or naturally in a confined valley with little to no access to a true floodplain. It is generally incised with poor floodplain connectivity, and some benching within the incised channel. The perennial portion of the stream is bordered by a riparian buffer for much of its length with an abrupt transition to maintained turf prior to exiting the BWI Marshall campus.

Fork Branch is a moderately stable to stable E-type stream in a B-shaped valley without the slope of a B-type stream. The stream appears to be vertically stable. In the intermittent segment of the stream, concrete check dams serve as effective grade control. The channel appears to have undergone an entire cycle of channel evolution (incision, widening, and redevelopment of floodplain at lower elevation) to form a stable channel and bankfull bench within the incised channel. Stream stability of Fork Branch on the BWI Marshall campus ranges from moderately stable to stable.

One wetland associated with Fork Branch will be impacted as a result of the proposed improvements (see **Table 2**).

Table 2 – Fork Branch Wetland

Resource ID	Type	Quality	Comments
Wetland FB-2	PEM	Low	Small, low species diversity and high human disturbance (routinely mowed)

Objectives: MAA proposes to provide approximately 3,566 linear feet (92,280 square feet) of stream restoration and 1,635 square feet of palustrine emergent wetland creation to compensate for unavoidable permanent impacts to federally jurisdictional resources. Additionally, 19,200 square feet of palustrine forested wetland creation will be incorporated into the restoration reach as mitigation for unavoidable impacts to state jurisdictional resources (i.e., isolated wetlands). Stream restoration in the form of bed and bank stabilization, reconnection of the channel with its 100-year floodplain, riparian plantings and control of invasive exotics are proposed within an approximately 3,000 linear foot long reach of the mainstem of Kitten Branch and 1,500 linear foot long reaches of first order perennial tributaries to Kitten Branch. Additionally, the restoration activities will incorporate appropriate means for armoring of water and sewer lines currently exposed within the active channel and known to exist within the floodplain as necessary.

The proposed restoration activities will improve overall water quality within Kitten Branch and the Patapsco Lower North Branch watershed by decreasing the transport of sediment by attenuating high flow storm events through reconnecting the stream channel with its 100-year flood plain and bed and bank stabilization in areas exhibiting significant and continued degradation. The Patapsco Lower North Branch Watershed currently is reported to have impairments that include bacteria, biological, metals, nutrients, sediment and toxics. An approved Total Maximum Daily Load (TMDL) for nutrients (nitrogen and phosphorus) has been established for the watershed and Draft TMDLs are proposed for bacteria and sediment.

Site Selection: Numerous factors were considered during the site selection process including proximity to active runways and approach/departure airspace, potential for creating future obstructions to navigable airspace, and location with respect to proposed impacts. Providing compensatory mitigation on-site, directly adjacent to the area of impact was precluded by the provisions of 33 CFR 332.3(b)(1) "Compensatory mitigation should not be located where it will increase risks to aviation by attracting wildlife to areas where aircraft-wildlife strikes may occur (e.g. near airports)." USDA Wildlife Services personnel at BWI Marshall were consulted throughout the site selection process to ensure that the activities would not cause an increased risk to aviation or the safety of the travelling public.

The Patapsco River Lower North Branch Watershed was selected as the preferred watershed for location of all compensatory mitigation efforts. In an effort to streamline the permitting process, MAA originally intended to partner with Anne Arundel County to fund stream restoration projects that were shovel ready. Three potential sites were field reviewed including Furnace Branch, International Drive and Kingswood Development. Furnace Branch provided opportunities for stream restoration but was

eliminated from consideration due to several factors, including but not limited to: not located on MAA-owned property, no potential to reconnect with floodplain, constrained area, coordination with railroad required, no potential for wetland creation and no replacement of lost functions and values. The International Drive site provided opportunities for stream restoration and wetland creation but was eliminated from further consideration due to USDA's concerns about the potential for increased wildlife hazards due to the proximity to approach/departure airspace. The Kingswood Development site provides opportunities for both stream restoration and wetland creation; however, no plans have been developed for the proposed activities.

Kitten Branch, downstream of the BWI Marshall campus, provides on-site opportunities for both stream restoration and wetland creation. It affords over 4,500 linear feet of stream restoration and numerous locations in which riparian planting, wetland restoration, and control of invasive vegetation could be implemented. This portion of Kitten Branch is entirely on MAA-owned property. Areas proposed for compensatory mitigation would become part of the greater ecologically self-sustaining stream valley system. USDA Wildlife Services has provided concurrence that due to the proposed nature of the restoration activities, no increased risk to aviation will occur despite the proximity of the proposed mitigation areas to approach/departure airspace. Both USACE and MDE have provided concurrence that restoration of these areas would satisfy compensatory mitigation needs for the projects and replace lost functions and values associated with impacted areas.

Site Protection Instrument: The proposed mitigation would occur entirely on MAA-owned property within the FEMA designated 100-year floodplain for Kitten Branch. The entire area also has a high probability of containing archeological resources. These factors, combined with the location within approach/departure airspace, provide a reasonable enough degree of assurance that the area will not be subject to future disturbance from development. Real estate instruments such as restrictive covenants and deed restrictions would ensure protection of the site in perpetuity.

Baseline Information: Kitten Branch is a perennial stream that originates within the airfield of BWI Marshall Airport. From its headwaters, Kitten Branch flows parallel to Runway 15R-33L in a northwesterly direction and exits the airport campus through a box culvert that conveys it beneath MD 170 (Aviation Boulevard). Surface runoff and outfalls from water quality best management practices within the airfield contribute hydrology to Kitten Branch on the airport campus. Additionally, Sachs Branch, a perennial tributary, discharges to Kitten Branch just prior to the culvert that conveys flow beneath MD 170. Downstream of the MD 170 culvert, Kitten Branch continues to flow in a northwesterly direction on MAA-owned property to its ultimate confluence with Stony Run in the vicinity of the I-195/295 Interchange. Several intermittent and perennial tributaries contribute hydrology to Kitten Branch prior to its confluence with Stony Run.

Development downstream of the MD 170 culvert includes the Amtrak Station and the associated access road as well as a parking facility for Northrop Grumman, both west of the stream channel. The area between the stream channel and I-195 is relatively undeveloped and contains navigational aids associated with Runway 15R-33L and associated FAA access roadways as well as a sewer access roadway

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that roughly parallels the stream channel and existing sewer lines. A hiker-biker trail that encircles the BWI Marshall campus crosses Kitten Branch via a pedestrian bridge in the vicinity of the Amtrak Station.

Baseline data collection efforts including detailed topographic survey, stream geomorphology, habitat assessments and biological sampling are currently underway within the proposed restoration reaches. Additionally, delineation of all wetlands adjacent to the restoration reaches is currently being performed. This information will be compiled into an existing conditions report that will serve as the baseline conditions for comparison of monitoring efforts to determine overall success of the mitigation project.

Credit Determination Methodology: Because MAA is currently undergoing design of the projects, avoidance and minimization efforts are continuing and unavoidable impacts to jurisdictional resources continue to decrease. The Joint Federal/State Application for the Alteration of Any Floodplain, Waterway, Tidal or Nontidal Wetland in Maryland prepared for the proposed improvements has quantified impacts based upon the current design (see **Table 3**). During a meeting held at MAA offices USACE and MDE confirmed that the following mitigation credit ratios would apply: stream mitigation (1:1); emergent wetland (1:1); forested/scrub-shrub wetland (2:1).

MAA proposes to provide approximately 3,566 linear feet (92,280 square feet) of stream restoration and 1,635 square feet of palustrine emergent wetland creation to compensate for unavoidable permanent impacts to federally jurisdictional resources. Additionally, 19,200 square feet of palustrine forested wetland creation will be incorporated into the restoration reach as mitigation for unavoidable impacts to state jurisdictional resources (i.e., isolated wetlands).

Table 3. Impact by Resource Type

Resource Type	Temporary Impact		Permanent Impact		Total Impact	
	Linear feet	Square feet	Linear feet	Square feet	Linear feet	Square feet
Perennial WUS	974	15, 135	2,337	33,845	3,311	48,980
Intermittent WUS	155	2,035	1,229	17,170	1,384	19,205
PFO Wetland*	n/a	0	n/a	9,600	n/a	9,600
PSS Wetland	n/a	0	n/a	0	n/a	0
PEM Wetland	n/a	1,350	n/a	1,635	n/a	2,985
Wetland Buffers	n/a	13,340	n/a	30,030	n/a	43,370
Total	**1,129**	**31,860**	**3,566**	**92,280**	**4,695**	**124,140**

*denotes isolated wetlands (MDE jurisdictional only).

Mitigation Work Plan: In order to develop the mitigation work plan, MAA will perform a geomorphic assessment of the 5,000 linear feet of stream and determine overall stability on a reach by reach basis. A longitudinal profile and cross-sectional data will serve as baseline information for comparison. A biological assessment of in-stream conditions will also be performed following EPA's Rapid Bioassessment Protocol to serve as a benchmark for annual comparison. A field delineation of waters of the US (including jurisdictional wetlands) is currently underway. A geomorphic assessment of the restoration reaches is also being performed to identify specific locations in which in-stream structures are warranted.

Once data has been collected, specific areas for restoration/stabilization will be finalized and techniques to be utilized will be identified. Conceptual designs for these areas will be developed and reviewed with both USACE and MDE prior to further refinement. MAA will develop a detailed Mitigation Design Report that includes the rationale behind all components of the mitigation design package including but not limited to: construction methods, timing and sequence; sources of water, including connections to existing waters and uplands; methods for establishing desired plant communities; plans to control invasive/exotic plant species; proposed grading plans including elevations and slopes of the substrate; soil management; and erosion control measures. In addition, planform geometry, channel form (e.g., typical channel cross-sections), watershed size, design discharge, and riparian area plantings will be included in the Mitigation Design Report. Detailed written specifications will be developed to support the construction drawings. Once agreement has been reached by USACE, MDE, and MAA on the final design package, a contract to implement the restoration activities will be let.

Maintenance Plan: All compensatory mitigation sites will be designed to be self-sustaining after the 5-Year Monitoring Period is over and performance standards have been met to the agencies' satisfaction. Until that time, MAA anticipates deer browse to be the biggest problem in areas that are proposed for planting. Locations of specific stream restoration practices will be visited after major storm events to determine if the restoration practice is performing according to the design. Bed, bank and upland erosion are anticipated to be the biggest problems for stream restoration areas. Any anomalies in either vegetation or stream stability within restoration areas will be brought to the attention of both USACE and MDE to determine if adaptive management might be warranted.

Ecological Performance Standards: Ecological performance standards for compensatory wetland mitigation areas will follow guidance provided by USACE and MDE. Performance standards for stream restoration areas will include analysis of cross-sectional data to determine if the reaches are actively aggrading, degrading, or moving either vertically or laterally. Biological assessments will also be performed on an annual basis to determine if the in-stream habitat for benthic organisms is improving. Indices of biological integrity based on species diversity and pollution tolerance of species comprising the benthic community will be used for biological performance standards.

Monitoring Requirements: Annual monitoring of both wetland creation/enhancement areas and stream restoration reaches will be conducted over a 5-year period and annual monitoring reports will be submitted to both USACE and MDE no later than December 30 of each calendar year. Wetland mitigation areas will follow monitoring guidance set forth by USACE and MDE. Stream restoration areas will include annual collection of longitudinal and cross-sectional data as well as biological data for comparison to baseline information.

Long-term Management: MAA is committed to providing successful compensatory mitigation for impacts associated with the Proposed Airport Improvements at BWI Marshall and will continue to monitor the sites until they have not only met performance standards but have also been deemed to be self-sustaining. As the sites are on MAA-owned property, they will remain MAA's responsibility. If the property is ever disposed of, a deed restriction will be incorporated that precludes disturbance of any of the restoration areas and protects them in perpetuity.

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Adaptive Management Plan: Should unforeseen issues threaten the success of the mitigation sites, MAA will implement adaptive management strategies. Potential issues could include erosion damage from extreme storm events during the vegetative establishment period and colonization of sites by invasive species triggering the need for adaptive management either during or after the required 5-Year Monitoring Period. Annual reports comparing site specific data with Performance Standards in conjunction with observations made during data collection will indicate the need to consider implementation of adaptive management. MAA will follow the following steps if monitoring data or observations indicate adaptive management is necessary:

- Notify USACE and MDE of the issues, potential causes and proposed solutions;
- Work with USACE and MDE to agree upon corrective measures and establish a timeframe for implementation;
- Implement corrective measures according to the established schedule; and
- Continue to implement corrective measures and monitoring until Performance Standards have been met.

Financial Assurances: MAA has allocated $2,300,000 as a line item in its Capital Improvements Program specifically to perform compensatory mitigation for unavoidable impacts associated with the Proposed Airport Improvements at BWI Marshall. Additionally, individual design contracts for projects with unavoidable impacts have budget allocated for mitigation design services.

DRAFT

Appendix A

Figures

DRAFT

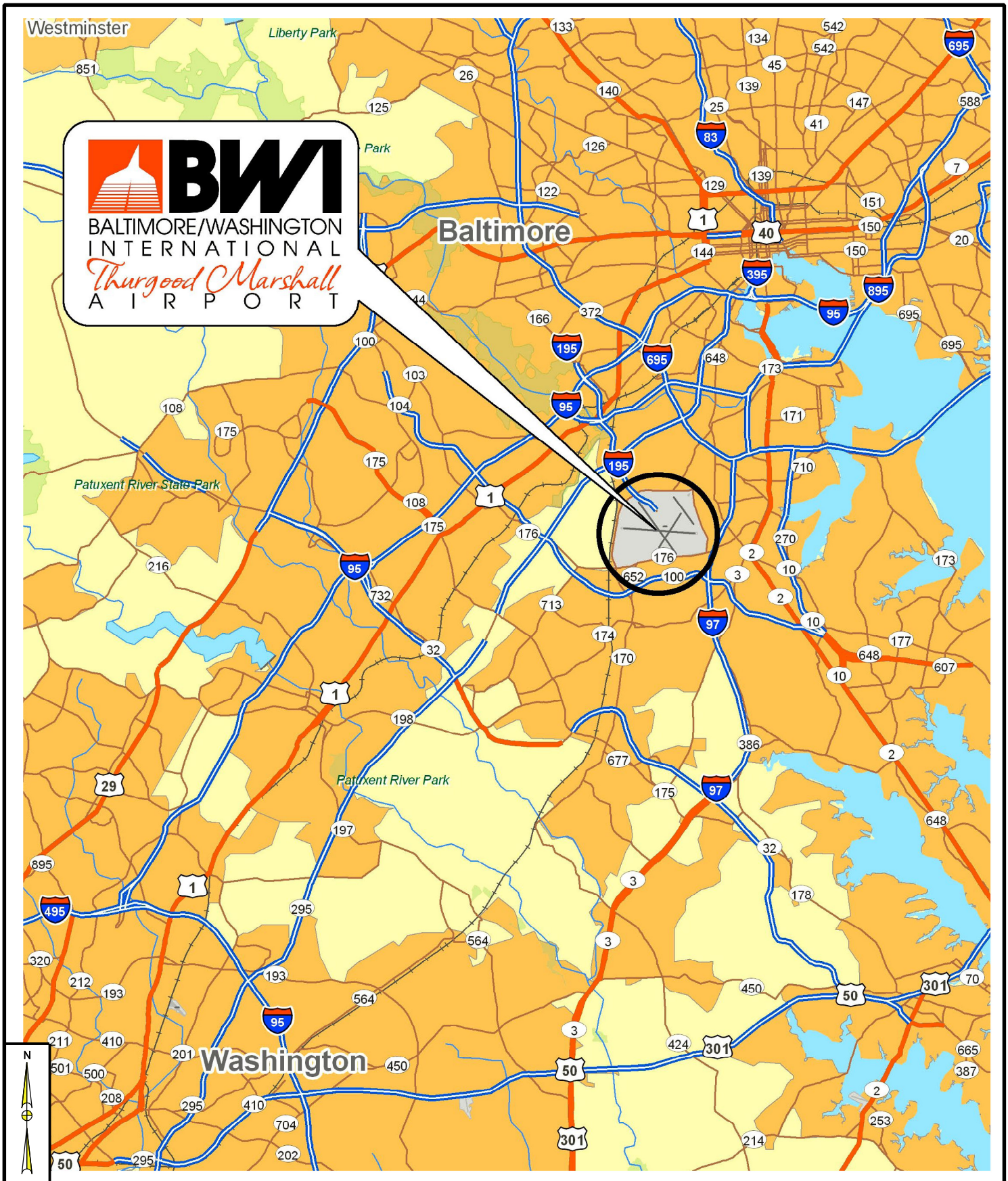


FIGURE 1: VICINTY MAP

BALTIMORE/WASHINGTON INTERNATIONAL THURGOOD MARSHALL AIRPORT PROPOSED AIRPORT IMPROVEMENTS

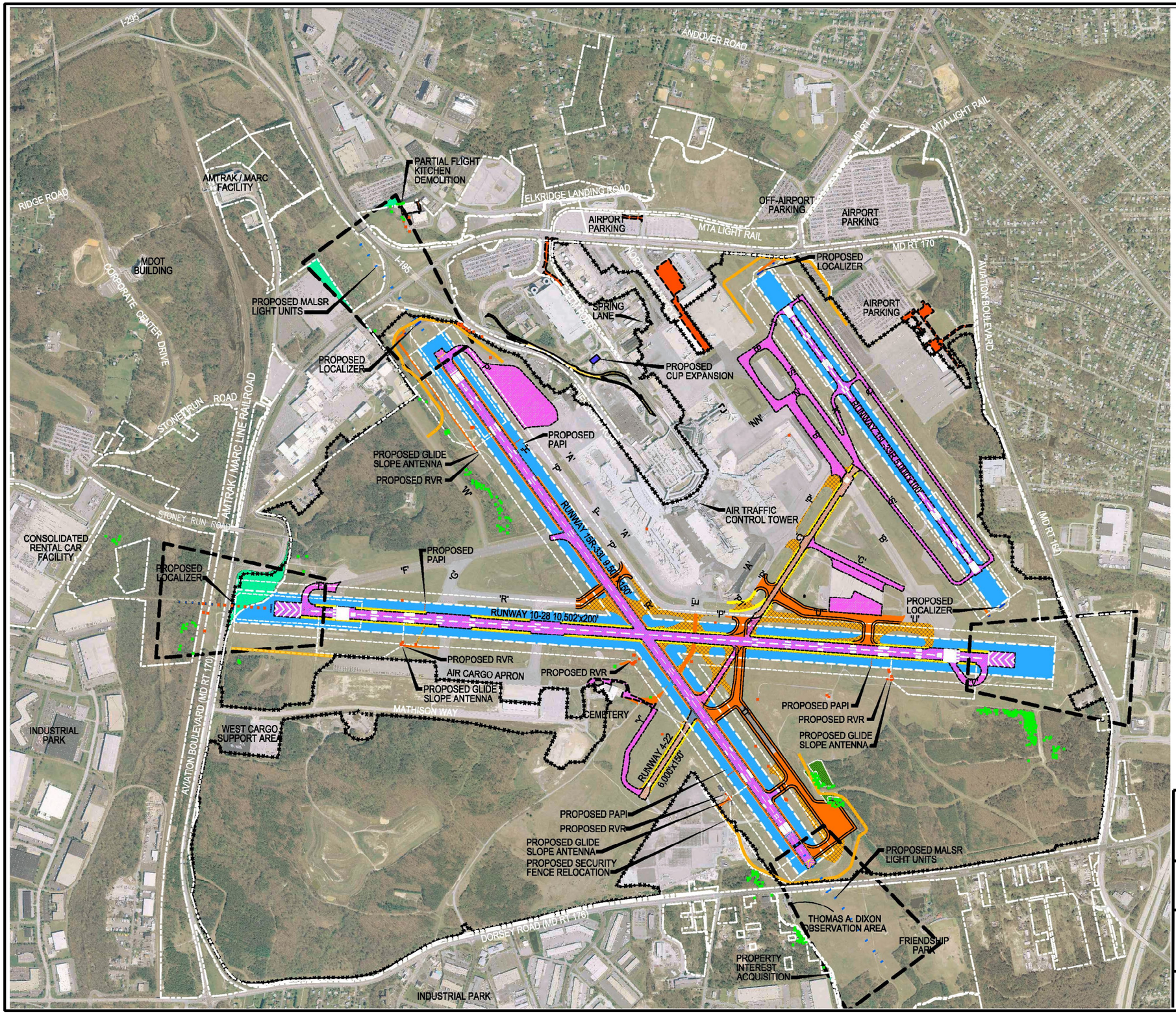
Miles
0 0.5 1 2 3 4

DATA SOURCE: MAA ENVIRONMENTAL ASSESSMENT; PROPOSED AIRPORT IMPROVEMENTS AT BALTIMORE/ WASHINGTON INTERNATIONAL THURGOOD MARSHALL AIRPORT

DATE: FEBRUARY 2012

Maryland Aviation Administration

JOHNSON, MIRMIRAN & THOMPSON
Engineering A Brighter Future



PROPOSED AIRPORT IMPROVEMENTS:

N

RUNWAY SAFETY AREA IMPROVEMENTS:

- (SEE NEW MARKINGS) RUNWAY 15R-33L THRESHOLD DISPLACEMENT
- RUNWAY SAFETY AREA GRADING
- RUNWAY 15R-33L MALSR RELOCATION
- RUNWAY 15R-33L RVR AND PAPI RELOCATION
- RUNWAY 28 AND 15L-33R LOCALIZER RELOCATION

FAA DESIGN STANDARDS:

- PERIMETER ROAD RELOCATION
- SERVICE ROAD IMPROVEMENTS
- (NOT SHOWN) RUNWAY 15R-33L 3 FOOT SHIFT
- HELIPAD RELOCATION
- GLIDE SLOPE RELOCATION
- NEW PAVEMENT - 35' SHOULDERS AND TAXIWAY IMPROVEMENTS

TERMINAL EXIT ROADWAY IMPROVEMENTS:

- NEW PAVEMENT

AIRFIELD PAVEMENT IMPROVEMENTS:

- AIRSIDE PAVEMENT MANAGEMENT PROGRAM IMPROVEMENTS
- LANDSIDE PAVEMENT MANAGEMENT PROGRAM IMPROVEMENTS
- PAVEMENT CONVERSION TO SHOULDER
- PAVEMENT REMOVAL FOR AIRFIELD PROJECTS INCLUDING CONVERSION OF RUNWAY 4-22 TO TAXIWAY

CENTRAL UTILITY PLANT (CUP) IMPROVEMENTS:

- PROPOSED CUP EXPANSION

OBSTRUCTION POINTS:

- MAN-MADE OBSTRUCTION POINTS
- VEGETATIVE OBSTRUCTION POINTS
- LINE-OF-SIGHT CLEARANCE

RUNWAY PROTECTION ZONE COMPLIANCE:

- PROPERTY INTEREST ACQUISITION

LEGEND:

- AIRPORT PROPERTY LINE
- SECURITY FENCE
- RUNWAY PROTECTION ZONE
- RUNWAY OBJECT FREE AREA (OFA)

750 0 750 1500
SCALE IN FEET

FIGURE 2: PROPOSED AIRPORT IMPROVEMENT PROJECTS

BALTIMORE/WASHINGTON INTERNATIONAL THURGOOD MARSHALL AIRPORT PROPOSED AIRPORT IMPROVEMENTS

Maryland Aviation Administration

JOHNSON, MIRMIRAN & THOMPSON
Engineering A Brighter Future

DATA SOURCE: MAA ENVIRONMENTAL ASSESSMENT: PROPOSED AIRPORT IMPROVEMENTS AT BALTIMORE/ WASHINGTON INTERNATIONAL THURGOOD MARSHALL AIRPORT

DATE: FEBRUARY 2012

Appendix B

Agency Coordination

DRAFT

In reply please refer to: 2083048X

December 17, 2010

MEMORANDUM

TO: Files

FROM: Stacy Quesinberry

REFERENCE: Maryland Aviation Administration
Comprehensive Environmental Planning Services Contract
Contract No. MAA-AE-05-003
Task 17 – Environmental Assessment for Proposed Airport Improvements
Baltimore/Washington International Thurgood Marshall Airport

A meeting was held on November 18, 2010 at 11 AM in the Maryland Aviation Administration (MAA) Assembly Rooms with personnel from MAA, Federal Aviation Administration (FAA) Washington Airports District Office, the Maryland Department of Natural Resources (MDNR), Maryland Department of the Environment (MDE), U.S. Army Corps of Engineers – Baltimore District (COE), JMT, URS Corporation (URS), and A.D. Marble & Company (see attendance list below) to discuss the restart of the Environmental Assessment (EA) for Proposed Airport Improvements at BWI Marshall and how each of their respective agencies would be involved.

Marian Honeczy	--	MDNR	mhoneczy@dnr.state.md.us
Judy Broersma	--	MDE	jbroersma@mde.state.md.us
Joseph DaVia	--	COE	Joseph.Davia@usace.army.mil
Rich Kibby	--	COE	Richard.Kibby@usace-army.mil
Chris Osburn	--	FAA WADO	Chris.Osburn@faa.gov
Robin Bowie	--	MAA	rbowie@bwiairport.com
Wayne Schuster	--	MAA	wschuster@bwiairport.com
Ken Brazeau	--	URS	Kenneth_Brazeau@urscorp.com
Stacy Quesinberry	--	URS	Stacy_Quesinberry@urscorp.com
Michael Steer	--	URS	Mike_Steer@urscorp.com
Erik Schwenke	--	A.D. Marble & Company	eschwenke@admarble.com
Leyla Lange	--	JMT	llange@jmt.com
David Lookenbill	--	JMT/WSA	dlookenbill@jmt.com

The following are highlights from the meeting.

WETLANDS

Ms. Robin Bowie began the meeting detailing that the MAA submitted a wetland identification and delineation report in October 2008, but a Jurisdictional Determination was never completed for the wetlands within the report. J. DaVia stressed that the COE will be re-engaging the EA process with Mr. Richard Kibby being dedicated to MAA on this effort. The COE database will be updated to reflect the restart of the EA.

R. Bowie indicated that Mr. Steve Elinsky (COE) had previously stated that the Joint Permit Application should be included as part of the Draft EA. J. DaVia indicated that that effort would be extensive and not necessary at this time. The EA will serve as the public document for the COE as well as the Avoidance, Minimization, and Mitigation Report for the Joint Permit Application. Mr. Chris Osburn indicated that there is no intent to do an Environmental Impact Statement (EIS) and that the FAA would issue an environmental finding as long as there is active and continuous agency coordination and if the Maryland and COE regulations are adhered to and appropriate mitigation rates presented. The finding for this EA will also include a Record of Decision due to the Navaids component of the EA. C. Osburn questioned what the COE would deem a significant impact that would trigger an EIS. J. DaVia indicated that the COE has done EAs for approximately 5-10 acres of impacts and that the COE typically only permits 30-40 acres of impacts per year. Ms. Leyla Lange indicated that the potential impacts from the proposed airport improvement projects is estimated at 6,000 linear feet of stream and 5 acres of wetlands.

R. Bowie stated that the proposed schedule includes a Preliminary Draft EA to FAA for review and comment in April 2011 with a Draft EA out for public review in May 2011. The environmental finding could take a few months to prepare given the need to distribute to multiple FAA lines of business.

Regarding permitting, J. DaVia indicated that the EA will discuss the necessary alternatives and a final COE-approved mitigation plan will be needed before the COE would issue a standard individual permit. C. Osburn added that FAA will not issue a construction grant to the MAA until the COE has issued their permit.

In a discussion of the purpose and need for the proposed improvements, C. Osburn indicated that the FAA will not issue any additional waivers for not meeting FAA design standards. J. DaVia added that the EA should not include any projects that do not meet the stated purpose and need. In response to a specific alternative to glide slope antenna grading options (sideband or capture-effect), C. Osburn indicated that looking at those grading options would be acceptable, but non-standard locations and/or grading should not be presented in the EA.

J. DaVia further added that the EA document needs to clearly identify the projects' purpose and need as well as any alternatives investigated to avoid or minimize potential impacts.

During the discussion on mitigation options, the COE indicated that they prefer COE-approved mitigation banks as the first option followed by Fee-in-Lieu and Permittee Responsible. The MDE's preference is the opposite of the COE. C. Osburn indicated that the FAA prefers banking and any wetland creation as mitigation not occurring on airport property. C. Osburn indicated that R. Bowie would work with the COE and MDE directly. Mr. Wayne Schuster would like an email group list set-up to keep everyone in the loop. For future meetings, Ms. Judy Broersma and Mr. David Walbeck should also be invited as well as Ms. Kelly Flint, waterway engineer for the Maryland Department of the Environment.

FORESTS

Ms. Marian Honeczy indicated that Forest Conservation Plans will be needed for individual projects; however, not for the EA document. Individual worksheets should be completed to estimate potential forest mitigation needs to support the EA. A statement will be needed from FAA indicating that the obstructions proposed for removal are hazards to navigation as those would be exempt from mitigation requirements. C. Osburn added that if an agency requests re-vegetation, the FAA would accommodate that request.

The meeting adjourned at 12:00 PM.

This represents URS' understanding of the main topics presented and discussed during the meeting concerning the EA restart and agency participation.

SLQ

cc: Meeting Attendees

In reply please refer to: 20834878

January 3, 2011

MEMORANDUM

TO: Files

FROM: Stacy Quesinberry / Leyla Lange / Robin Bowie

REFERENCE: Maryland Aviation Administration
Comprehensive Environmental Planning Services Contract
Contract No. MAA-AE-05-003
Task 17 – Environmental Assessment for Proposed Airport Improvements
Baltimore/Washington International Thurgood Marshall Airport

A meeting was held on December 16, 2010 at 10 AM in the Maryland Aviation Administration (MAA) Assembly Room B with personnel from MAA, Federal Aviation Administration (FAA) Washington Airports District Office, the Maryland Department of the Environment (MDE), U.S. Army Corps of Engineers – Baltimore District (COE), JMT, URS Corporation (URS), and Airport Design Consultants, Inc. (see attendance list below) to discuss the status of the Environmental Assessment (EA) for Proposed Airport Improvements at BWI Marshall and continued coordination with the COE and MDE for potential impacts to protected resources.

Judy Broersma	--	MDE	jbroersma@mde.state.md.us
Kelly Flint	--	MDE	kflint@mde.state.md.us
Joseph DaVia	--	COE	Joseph.Davia@usace.army.mil
Rich Kibby	--	COE	Richard.Kibby@usace.army.mil
Chris Osburn	--	FAA WADO	Chris.Osburn@faa.gov
Robin Bowie	--	MAA	rbowie@bwiairport.com
John Hurt	--	MAA	jhurt@bwiairport.com
Wayne Schuster	--	MAA	wschuster@bwiairport.com
Stacy Quesinberry	--	URS	Stacy_Quesinberry@urscorp.com
Cedrick Johnson	--	Airport Design Consultants, Inc.	cjohnson@adci-corp.com
Kristin Aiosa	--	JMT	kaiosa@jmt.com
Leyla Lange	--	JMT	llange@jmt.com

The following are highlights from the meeting.

Review of 11/18/10 Agency Scoping Minutes

Ms. Robin Bowie began the meeting by requesting comments on the minutes of the November 18, 2010 Agency Coordination and Agency Scoping meetings. C. Osburn indicated that FAA would request a change on Page 2 to indicate the FAA would issue a grant, not a construction permit. R. Bowie will accept comments on the meeting through the end of the day, December 20, 2010. J. DaVia indicated that the COE has not yet reviewed the minutes, but if they had any comments they would email them to R. Bowie on December 20, 2010. J. DaVia advised that if no comments are received within 48 hours from COE, the minutes are acceptable.

Review of COE 12/8/10 Letter

C. Osburn indicated that the Airport Layout Plan (ALP) is not yet approved, meaning that there may be some changes to the project list. The purpose and need for the projects has been defined (preliminarily) while there still may be changes to the alternatives. The man-made obstructions are still being discussed as well as the need to relocate existing weather facilities. Many aspects of the proposed work do not impact COE regulated resources. In order to keep the project moving at a good pace, C. Osburn requested that COE trust FAA/MAA to notify them only on proposed work that would impact COE regulated resources. C. Osburn advised that FAA might provide formal comments to the COE letter.

J. DaVia questioned if all the project elements will be considered in the EA. C. Osburn indicated that all the projects will be discussed, including purpose and need, alternatives, and impact evaluation for each proposed project. The FAA will not release the Draft EA for public review and comment until the project list is set and all project discussions are included in the EA.

J. DaVia indicated that the COE public review process (public interest review factors) should be concurrent with the EA and the two processes should be able to be combined. The COE applies a two-part test: does it pass the Clean Water Act (404.1.B); and does it pass the COE public interested review (do the benefits outweigh the impacts)? In order to obtain a permit the project must pass both. The COE process includes a public notice and comment period. The COE wants to be able to accept the EA at the end of the process and approve the proposed project while keeping the MDE involved along the entire process. J. Broersma indicated that the MDE's public notice will be part of the permitting process and cannot happen until the JPA is significantly complete, including adjacent property owner notifications. The MDE recommends using the pre-application process.

Powerpoint Presentation of the Proposed Projects

C. Johnson presented several of the proposed projects to be included in the EA as well as some preliminary alternatives (copies of the presentation to be provided to any interested party).

Several of the proposed projects are a result of a Congressional mandate for airports to provide Runway Safety Area (RSA) compliance to each of their runways by 2015. As a result of several RSA projects, there are navigational aids (NAVAIDs) that will also need to be relocated: glide slopes for runways 15R-33L, 15L-33R, and 10-28. C. Osburn added that the NAVAIDs are owned by the FAA.

Runway 15R-33L

For the Runway 15R glide slope alternatives, J. DaVia requested that an alternative that places the glide slope on a concrete pad supported by columns be investigated for avoidance and minimization of impacts. C. Johnson stated that this type of solution has been researched at other airports and has been found to substantially increase cost and cause maintenance issues. C. Johnson added that the concrete pad would need to be covered with soil due to RSA requirements and C. Osburn added that a certain percentage of the RSA can be paved. J. DaVia stated that COE would like this type of alternative included, even if it is to justify why it would not be used.

The Runway 33L glide slope alternatives involve the need to relocate an existing infiltration trench; there are several alternatives for the trench relocation with the glide slope remaining in one location. Another project on the 33L end is the relocation of an existing taxiway hold pad that would likely result in wetland and stream impacts.

Runway 15L-33R

Only one alternative was presented for the relocated glide slope. C. Johnson stated that there are two other alternatives that have been ruled out. He presented the alternatives and described their limitations. K. Flint and J. DaVia stated that these alternatives should be included in the analysis. R. Bowie confirmed that these alternatives will be included in the EA. J. DaVia asked about the potential for taking the COE jurisdictional stormwater management pond off-line and restoring the stream channel. R. Bowie described how FAA/MAA would like to eliminate the pond entirely due to wildlife hazard issues, but the current plan is to replace it in-kind due to stormwater requirements, capacity issues, and the fact that the pond is part of a very connected system. W. Schuster noted that during the Master Plan update MAA considered purchasing property to relocate stormwater management, but at that point there was nothing practical available. C. Johnson asked

whether building a platform over the pond would be considered an impact. J. DaVia stated that yes it would be an impact from discharge of fill and that he would not ask FAA/MAA to evaluate this. He stated that he would like FAA/MAA to think about taking the pond off-line. K. Flint inquired whether it was possible to include underground stormwater management to take the pond off-line and satisfy the capacity issue. C. Osburn stated that underground storage is a solution at many airports. R. Bowie noted that the pond is a nice wetland area with good filtration capability and little wildlife hazard issues. C. Osburn stated that FAA would prefer to see the pond gone if it is possible to maintain the quality elsewhere. J. DaVia asked if the pond takes in the majority of the impervious runoff from the airport. L. Lange stated it received about a third of the impervious run-off. C. Osburn added that EPA will be issuing more stringent de-icing effluent guidelines in the near future so this may be something that should be taken into account now. He also noted that the air traffic controllers have a great need to maintain geometry of the airfield and their input will be taken into account. J. DaVia said that these issues should be wrapped back into the project purpose and need.

Mitigation

R. Bowie stated that FAA/MAA prefers to keep mitigation off site to avoid wildlife hazard issues. R. Bowie described the Stony Run mitigation/conservation area as an example of the type of potential mitigation that MAA was looking into. J. DaVia stated that the COE is not generally supportive of preservation to satisfy mitigation requirements unless the project area is under intense development pressure. The COE wants to see replacement of lost function and values. Preservation could be a component, but won't be counted by the COE. R. Bowie stated that DNR was interested in preservation for mitigation. J. DaVia suggested reaching out to the local soil conservation district and county (Dennis McMonigle) for potential mitigation projects. J. DaVia stressed that FAA/MAA should get on the JE meeting agenda as soon as possible. He suggested coordinating with Bob Tabisz at MDE to request time (one-hour slot suggested) to present at the January JE meeting.

R. Bowie stated that FAA/MAA would like to go through the EA process starting with the worst case scenarios and tightening up as the process proceeds to permitting. Is this approach acceptable? C. Osburn stated that in order for FAA to issue a determination they do not need a permit in place, but rather a determination of permittability. FAA will look at mitigation strategies and whether it is permittable. J. DaVia asked what the Draft EA target is. R. Bowie stated that a preliminary Draft EA is scheduled to go to FAA on April 1st and a draft will go to the public on May 1st.

K. Flint indicated that she would like to have a field visit to see the proposed project areas. L. Lange described the existing resource data. J. DaVia stated that he did not want to make FAA/MAA go through the JD process again. The COE will be flexible on the JD process. R. Bowie indicated that FAA/MAA would accept a Preliminary JD. MAA will coordinate a field visit for January 11, 2011 at 9 AM. J. Broersma suggested initiating a mitigation meeting with MDE (Dave Walbeck, K. Flint, R. Kibby, and Anne Arundel County).

ACTION ITEMS

All – Comments on meeting handout due by December 30, 2010.
All – field visit scheduled for 9 AM on January 11, 2011.
COE – Comments on the Agency Scoping Post-Meeting due December 20, 2010.
R. Bowie – to provide copies of slide presentation to meeting attendees (without impact calculations).
R. Bowie – to provide agencies with the draft Purpose and Need for review in paragraph form.
R. Bowie – to coordinated MDE mitigation meeting.
J. Hurt – to coordinate getting MAA on the JE agenda (trying for 1/26/11).
L. Lange – to coordinate with D. McMonigle regarding potential mitigation opportunities in Anne Arundel County.

The meeting adjourned at 12:15 PM.

This represents URS' understanding of the main topics presented and discussed during the meeting concerning the COE and MDE coordination and the BWI Marshall EA.

SLQ:LL:RMB

cc: Meeting Attendees

NAME	AGENCY/COMPANY	PH / EMAIL
John Hurt	MAA	410 859 7384 jhurt@bwiairport.com
Leyla Lange	JMT	410-316-2427 llange@jmt.com
Kristin Aiosa	JMT	410-316-2489 kaiosa@jmt.com
Wayne Schuster	MAA - OPES	410-859-7787 wschuster@bwiairport.com
Chris Osburn	FAA	(703) 661-1365 Chris.osburn@faa.gov
Kelly Flint	MDE	kflint@mde.state.md.us ~~410-300-422~~
Erica Johnson	ADCI	CJohnson@ADCI-CORP.com
Stacy Quesinberry	URS	stacy_quesinberry@urscorp.com	410-891-9333
Robin McBride	MAA	(410) 859-7103 RBOWIE@BWIAIRPORT.com
Joseph DaVia	US Army COE	410.962.5691 joseph.davia@usace.army.mil
Richard Kibby	CORPS	410.962.0694 richard.kibby@usace.army.mil
Judy Broersma	MDE	410.537.3769 jbroersma@mde.state.md.us

MEMORANDUM

TO: Robin Bowie, MAA and Meeting Attendees (see below)
DATE: January 18, 2011
FROM: Leyla E. Lange, JMT
PROJECT: Proposed Airport Improvements at Baltimore/Washington International Thurgood Marshall Airport

RE: Field Review/Preliminary Jurisdictional Determination

On January 11, 2011, a field review of areas of proposed unavoidable impact to jurisdictional resources due to Proposed Airport Improvements at Baltimore/Washington International Thurgood Marshall Airport (BWI Marshall) was conducted by the US Army Corps of Engineers and the Maryland Department of the Environment. The group met at MAA offices at 9:00 am. A brief overview of the proposed route around the airfield and the areas for closer inspection was provided. Preliminary engineering drawings of the areas of unavoidable impact were provided for the field. Those in attendance included:

John Hurt	MAA	410-859-7384	jhurt@bwiairport.com
Kelly Flint	MDE	410-537-3536	kflint@mde.state.md.us
Rich Kibby	USACE	410-962-0694	richard.kibby@usace.army.mil
Leyla Lange	JMT	301-938-2677	llange@jmt.com

The group first stopped at Muddy Bridge Branch, a perennial stream with an in-line stormwater management facility adjacent to Runway 15L/33R. Potential impacts to this system include filling the downstream portion of the facility to allow for relocation of the glide slope (standard location and standard grading). Expansion of the upstream portion of this facility will be necessary to compensate for the volume displaced by fill. Linear feet of stream channel impact will include area of channel piped beneath fill as well as concrete swale/inflow channel. Currently, there is no flow over this structure as water appears to be piping beneath it; impacts to this area must be included in calculations. Design of the facility expansion will include a remedy for the failed concrete swale/inflow channel.

The group visited Fork Branch adjacent to Runway 15R/33L. On the east side of the runway, the channel was deemed to be intermittent from the uppermost extent to the culvert outfall of flow from the system previously identified as FB-1; FB-1 is actually the headwaters of Fork Branch (adjacent to a recently reconstructed infiltration trench for the Gold Lot) and is intermittent. The perennial portion of Fork Branch (on the east side of the runway) a very narrow valley with steep slopes on both sides. Alternatives for this area were discussed and it was determined that relocation of the stream channel outside the limits of construction necessary for the proposed improvements would not be a practicable alternative.

The group stopped at the area of rutting adjacent to Runway 10/28 near the Midfield Cargo Complex. The conveyance channel adjacent to the paved area currently utilized for storage of snow equipment was discussed; this channel was created during construction of the Midfield Cargo Complex to convey runoff from impervious surfaces to an off-line stormwater management pond and is non-jurisdictional. Mitigation requirements for unavoidable impacts to Signal Branch resulting from the Midfield Cargo Complex project were fulfilled through the restoration of Sachs Branch.

The group reviewed the wetlands associated with the Kitten Branch floodplain as well as the Kitten Branch stream channel. Two abandoned sediment basins were determined to be isolated and therefore only MDE jurisdictional. An area adjacent to a manhole was discussed; this area could be receiving hydrology from the sanitary sewer and samples have been submitted for analysis. If the tests conclude that there is no fecal contamination it will be considered jurisdictional.

The group returned to MAA offices to review information pertaining to all jurisdictional resources associated with the BWI Marshall airfield including but not limited to: comprehensive water resource mapping (includes streams, wetlands, wetland buffers, stormwater management facilities and floodplains), individual wetland delineation reports, and permit authorizations. MAA indicated that copies of all reports and documentation are available. MAA explained to the agencies that the comprehensive water resources map is a work in progress and discussed specific areas planned for revision. Both agencies requested copies of the comprehensive water resources mapping once updates have been made.

The meeting adjourned at 11:45 am.

The above statements represent a true and accurate account of the discussion during this meeting to the best of my knowledge. If there are any conflicts, misrepresentations or omissions with the above statements please contact our office at (410) 329-3100 within fourteen (14) days of this date.

cc: All Attendees
Russ Ruffing, JMT

MEMORANDUM

TO: Robin Bowie, MAA and Meeting Attendees (see below)
DATE: January 24, 2011
FROM: Leyla E. Lange, JMT
PROJECT: Proposed Airport Improvements at Baltimore/Washington International Thurgood Marshall Airport

RE: Preliminary Mitigation Meeting

On January 21, 2011, a meeting was held at MAA offices to discuss potential options for MAA to provide compensatory mitigation for unavoidable impacts due to proposed Airport Improvement Projects at Baltimore/Washington International Thurgood Marshall Airport (BWI Marshall).Those in attendance included:

Robin Bowie	MAA	410-859-7103	rbowie@bwiairport.com
John Hurt	MAA	410-859-7384	jhurt@bwiairport.com
Dennis McMonigle	AA County	410-222-7908	dmcmonigle@aacounty.org
Ginger Ellis	AA County	410-222-4240	gellis@aacounty.org
Richard Kibby	USACE	410-962-0694	richard.kibby@usace.army.mil
Kelly Flint	MDE	410-537-3536	kflint@mde.state.md.us
David Walbeck	MDE	410-537-3831	dwalbeck@mde.state.md.us
Leyla Lange	JMT	301-938-2677	llange@jmt.com

Ms. Bowie welcomed the group and provided a brief overview of the proposed Airport Improvement Projects to be completed by MAA over the next four years. Most of the improvements are associated with the Congressional Mandate for Runway Safety Area (RSA) Compliance by December 31, 2011. Relocation of navigational aids (NAVAIDS) to FAA standard locations will be necessary due to the RSA Improvements; standard locations of NAVAIDS are dictated by FAA Airfield Design Criteria. Ms. Bowie also explained the need for MAA to provide compensatory mitigation for any unavoidable impacts off-site of the BWI Marshall Campus due to the potential for attracting hazardous wildlife to the airfield.

The group discussed the worst case scenario of impacts. The fact that avoidance and minimization efforts during the design phase will further reduce the impacts was discussed. To be conservative, MAA is basing compensatory mitigation requirements on the worst case scenario, which has been calculated as 4,055 linear feet of stream and 1.5 acres of nontidal wetlands.

During previous discussions, COE suggested that MAA reach out to local governments to see if any "shovel-ready" projects are available for MAA to fund. The preferred watershed for compensatory mitigation is the Patapsco/Baltimore Harbor. Additional opportunities may be considered out of

watershed if necessary. Mr. McMonigle suggested two nearby sites for which restoration designs have been largely completed. The Kingswood Outfall Project is a stream restoration project with the opportunity for creation of pocket wetlands within the floodplain. The Furnace Avenue Project is an older State Highway Administration design that was never implemented to provide stability and restore fish passage within Stony Run by removing the Furnace Avenue culvert. Mr. McMonigle will arrange a field visit to familiarize the group with both sites. A third option would be Lake Marion; however, no design work has been performed and the community might object to any alterations of the existing pond.

The funding mechanism was discussed. Ms. Bowie explained that funds for mitigation will be allocated within the grant for the Environmental Assessment currently underway. MAA will need Anne Arundel County to provide a cost per linear foot for stream restoration as well as a cost per square foot of wetland mitigation. Coordination among MAA, FAA, and Anne Arundel County must be initiated as soon as possible so that an agreement can be signed. Anne Arundel County will utilize their agreement with State Highway Administration as a boilerplate. COE review of the agreement is necessary but COE will not be a signatory of the document. Ms. Ellis will provide Ms. Bowie with costs for stream restoration and wetland creation for budgetary purposes.

The January 26th presentation at the Joint Evaluation Meeting was discussed. MAA will have a one-hour time slot beginning at 9:00 am. The focus of the presentation will be on the potential impacts and the proposed mitigation strategy. Anne Arundel County will attend to show support for partnering with MAA on future potential mitigation projects. Mr. Kibby suggested that Ms. Bowie reintroduce the concept of the Stony Run Mitigation Bank at the JE, stressing that it is Commercially Zoned and could be developed if MAA did not own it.

MAA reviewed the most current version of the revised Comprehensive Water Resources map with COE and MDE and discussed additional areas for revision. The map could be stamped by COE for the Preliminary JD.

The meeting adjourned at 11:45 am.

The above statements represent a true and accurate account of the discussion during this meeting to the best of my knowledge. If there are any conflicts, misrepresentations or omissions with the above statements please contact our office at (410) 329-3100 within fourteen (14) days of this date.

cc: All Attendees
Russ Ruffing, JMT

MEMORANDUM

TO: Robin Bowie, MAA and Meeting Attendees (see below)
DATE: March 11, 2011
FROM: Leyla E. Lange, JMT
PROJECT: Proposed Airport Improvements at Baltimore/Washington International Thurgood Marshall Airport

RE: Monthly Mitigation Meeting

On March 11, 2011, a meeting was held at MAA offices to discuss potential options for MAA to provide compensatory mitigation for unavoidable impacts due to proposed Airport Improvement Projects at Baltimore/Washington International Thurgood Marshall Airport (BWI Marshall). Those in attendance included:

Robin Bowie	MAA	410-859-7103	rbowie@bwiairport.com
John Hurt	MAA	410-859-7384	jhurt@bwiairport.com
Dennis McMonigle	AA County	410-222-7908	dmcmonigle@aacounty.org
Richard Kibby	USACE	410-962-0694	richard.kibby@usace.army.mil
Kelly Flint	MDE	410-537-3536	kflint@mde.state.md.us
David Walbeck	MDE	410-537-3831	dwalbeck@mde.state.md.us
Leyla Lange	JMT	301-938-2677	llange@jmt.com

Ms. Bowie welcomed the group and explained the reason for the meeting was to follow-up on the field review of potential mitigation sites so that a primary candidate site can be identified to meet compensatory mitigation requirements for unavoidable impacts to jurisdictional wetlands and waters of the U.S.

The group discussed the sites for which field visits were conducted. The group agreed that the Furnace Avenue culvert replacement/stream stabilization project would not be desirable as it would mostly be armoring of the stream for stability purposes and little opportunity for reconnection of the stream to its floodplain as well as replacement of lost functions and values. Additionally, significant coordination with the railroad could be required.

The Kingswood Development project provides ample opportunity for stream restoration on a previously restored reach; however, no opportunities for wetland mitigation are presented at this site. The International Drive project site provides opportunities for both wetland mitigation and stream restoration; however, the site is directly within the approach/departure airspace for Runway 15L-33R and would not likely be approved by FAA due to wildlife hazard concerns. Additionally, this is a stormwater management facility associated with a private development which could pose additional coordination issues.

Additional stream restoration sites were discussed; however, the primary candidate will be the Kingswood Development unless a site is identified that provides opportunity for wetland mitigation in addition to stream restoration.

The group discussed potential sites for wetland mitigation on MAA-owned property outside of approach/departure airspaces. MAA will contact Ms. McCarthy to determine if MD DNR's Wildlife and Heritage Service has identified any areas for wetland restoration/enhancement within the Stony Run Non-tidal Wetlands of Special State Concern (NTWSSC). Mr. Hurt and Ms. Lange will also conduct a field investigation to identify potential sites for invasive species removal or other wetland enhancement opportunities. Mr. Walbeck suggested that a mechanism could be worked out by associating preservation credits for purchase of the Stony Run NTWSSC with compensatory mitigation for the Midfield Cargo Complex impacts and utilizing the successful portion of Site 3 as compensatory mitigation for the forthcoming EA projects. Non-successful areas of Site 3 could then be further enhanced as necessary for additional credit.

Mr. Walbeck queried MAA on the status of the easement for MAA-owned property within the Stony Run NTWSSC and will provide protective covenance language to Ms. Bowie. This language has been utilized by Maryland State Highway Administration for long-term protection of wetlands and other jurisdictional resources on state-owned property.

MAA provided the group an update on the anticipated impacts. Impacts to jurisdictional resources have decreased since the last meeting and will likely continue to do so throughout the design process. Permanent impacts to jurisdictional wetlands have decreased to approximately 0.5 acre and stream impacts have decreased to less than 4,000 linear feet. Revised impact numbers will be checked for accuracy before providing to the agencies in tabular form.

The group discussed ratios for mitigation. Anticipated replacement ratios for stream impacts will likely be 1:1 linear feet but this will be verified by Mr. Kibby. MDE replacement ratios for permanent wetland impacts will be 2:1 for impacts to forested/scrub-shrub wetlands and 1:1 for emergent wetlands. Impacts to wetlands within the COE jurisdictional SWM pond will be considered temporary as there will be replacement within the same system through expansion of the basin replacing the lost capacity.

Ms. Bowie explained that the draft MOU language that was provided to MAA by AA County did not seem applicable to the proposed agreement between MAA and AA County. Ms. Bowie and Ms. Ellis will have to work directly to develop appropriate language for the MOU. Mr. McMonigle will provide Ms. Ellis with a copy of an MOU held by AA County for an MDE grant that may serve as a better template.

The next meeting will be held on April 15, 2011 at 9:00 am in MAA's VCR Conference Room.

The meeting adjourned at 10:15 am.

The above statements represent a true and accurate account of the discussion during this meeting to the best of my knowledge. If there are any conflicts, misrepresentations or omissions with the above statements please contact our office at (410) 329-3100 within fourteen (14) days of this date.

cc: All Attendees
Russ Ruffing, JMT

MEMORANDUM

TO: Robin Bowie, MAA and Meeting Attendees (see below)
DATE: April 15, 2011
FROM: Leyla E. Lange, JMT
PROJECT: Proposed Airport Improvements at Baltimore/Washington International Thurgood Marshall Airport

RE: Monthly Mitigation Meeting

On April 15, 2011, a meeting was held at MAA offices to discuss compensatory mitigation for unavoidable impacts due to proposed Airport Improvement Projects at Baltimore/Washington International Thurgood Marshall Airport (BWI Marshall). Those in attendance included:

Robin Bowie	MAA	410-859-7103	rbowie@bwiairport.com
John Hurt	MAA	410-859-7384	jhurt@bwiairport.com
Ginger Ellis	AA County	410-222-4240	gellis@aacounty.org
Dennis McMonigle	AA County	410-222-7908	dmcmonigle@aacounty.org
Kelly Flint	MDE	410-537-3536	kflint@mde.state.md.us
David Walbeck	MDE	410-537-3831	dwalbeck@mde.state.md.us
Leyla Lange	JMT	301-938-2677	llange@jmt.com

Ms. Bowie welcomed the group and explained the reason for the meeting was to continue discussions on MAA's proposal to meet compensatory mitigation requirements for unavoidable impacts to jurisdictional wetlands and waters of the U.S for projects presented in the Environmental Assessment (EA) currently in preparation.

Mr. Hurt provided mapping reflecting the results of the Preliminary Jurisdictional Determination held on January 11, 2011. MAA assumes the boundaries of jurisdictional resources to be accurate for the purposes of worst case scenario impact calculations for the EA, which were provided in draft form. The group discussed the most recent impact calculations. Changes include classification of impacts to the Muddy Bridge Branch stormwater management pond from permanent to temporary and inclusion of temporary impacts due to obstruction clearing within wetlands. MAA would like MDE's confirmation that the amount of proposed obstruction clearing would not constitute a conversion of PFO to either PSS or PEM, and therefore would be considered temporary and would not require mitigation. Mr. Walbeck will visit these areas with Mr. Hurt to evaluate.

Mr. Walbeck informed the group that mitigation ratios for permanent PEM impacts may increase to 1.5:1 by fall 2011. Mitigation ratios for permanent PFO/PSS impacts remain at 2:1 and conversions from PFO to PSS remain at 1:1. USACE (not in attendance) will confirm mitigation ratios for stream impacts.

The group discussed additional opportunities identified by MAA for compensatory wetland mitigation. During a recent visit to the Sachs Branch stream restoration site, MAA observed a large area of "incidental" wetland creation. Additionally, MAA has identified (photos provided to meeting attendees) a large emergent wetland area within the Stony Run floodplain, previously a forested wetland that could be reforested to mask open water and reduce the potential for the area to attract potentially hazardous wildlife. Mr. Walbeck will visit this area with Mr. Hurt to evaluate. MAA has not identified any other areas for potential wetland enhancement.

The status of the Memorandum of Understanding was discussed. The template will be based on the MDE cost-share agreement for grants. AA County will look into per linear foot costs, which are expected not to exceed $1,000/linear foot. Alternatively, the MOU could be structured to cover the cost of an identified project in its entirety. The typical turn-around time for project implementation through AA County, which is a total of four years (three years plus one year construction time), will also need to be incorporated into the MOU. Ms. Bowie and Ms. Ellis will continue to coordinate on drafting the MOU.

The group discussed the timing of permits for impacts and mitigation. Two permits will likely be issued: one for the impacts and a separate one to perform the mitigation. Depending on the independence of phasing for project implementation, it is possible that more than one permit could be issued for the impacts based on independent utility (e.g., obstruction removal within wetlands).

Directly following the meeting, Mr. Hurt and Mr. Walbeck will perform a field visit of the areas requiring evaluation referenced above. The next meeting is scheduled for May 20, 2011 at 9:00 am in MAA's VCR Conference Room.

The meeting adjourned at 10:15 am.

The above statements represent a true and accurate account of the discussion during this meeting to the best of my knowledge. If there are any conflicts, misrepresentations or omissions with the above statements please contact our office at (410) 329-3100 within fourteen (14) days of this date.

cc: All Attendees
Stacey Quesinberry, URS
Russ Ruffing, JMT

MEMORANDUM

TO: Robin Bowie, MAA and Meeting Attendees (see below)
DATE: May 2, 2011
FROM: Leyla E. Lange, JMT
PROJECT: Proposed Airport Improvements at Baltimore/Washington International Thurgood Marshall Airport

RE: Permitting Meeting

On April 25, 2011, a meeting was held at MAA offices to discuss specific requirements for the Maryland Department of the Environment (MDE) permitting process for unavoidable impacts to state jurisdictional resources associated with proposed Airport Improvement Projects at Baltimore/Washington International Thurgood Marshall Airport (BWI Marshall). Those in attendance included:

Robin Bowie	MAA	410-859-7103	rbowie@bwiairport.com
John Hurt	MAA	410-859-7384	jhurt@bwiairport.com
Judy Broersma	MDE	410-537-3769	jbroersma@mde.state.md.us
Leyla Lange	JMT	301-938-2677	llange@jmt.com

Ms. Bowie provided Ms. Broersma with minutes from all previous agency coordination meetings regarding both permitting and proposed compensatory mitigation for unavoidable impacts associated with projects at BWI Marshall through 2015. Mr. Hurt provided Ms. Broersma with a copy of the comprehensive resource mapping, which has been updated to reflect the results of the Preliminary Jurisdictional Determination conducted on January 11th, 2011. These boundaries will be utilized for calculation of impacts for the Environmental Assessment (EA) currently in preparation. The group discussed MAA's approach for calculation of worst-case scenario impacts (provided in tabular format) to regulatory agencies in order to verify "permit-ability" of the proposed projects as well as determine compensatory mitigation requirements for all alternatives presented in the EA.

The group discussed the status of coordination with USACE, which has agreed to act as a cooperating agency with FAA for the EA. Additionally, at the suggestion of USACE, MAA is partnering with Anne Arundel County to identify and fund a stream restoration project to meet USACE requirements for compensatory mitigation. A preferred site has been identified and a Memorandum of Understanding between MAA and the County will detail requirements of each party to ensure all permit conditions are fulfilled.

Ms. Broersma confirmed that proposed impacts to the lower stormwater management pond (fill required for glide slope relocation) would be considered temporary if an equivalent square footage of expansion is provided. Removal of 30% of a forest canopy due to clearing of obstructions is only exempt within wetland buffers. Ms. Broersma accepted the MAA proposal to perform selective removal of identified tree obstructions providing replacements using lower growing and low wildlife attractive species.

The group discussed MDE's public notice requirements. Because USACE is a cooperating agency for the EA, FAA/MAA's public notice for availability of the EA can also serve as public notice for USACE. MDE will put the project on separate public notice. The group discussed the potential for permitting obstruction removals within wetlands separate from the remainder of the EA projects as having independent utility. This is feasible; however, public notice could be required due to impacts within buffers of Non-tidal Wetlands of Special State Concern. Ms. Bowie explained that MAA has coordinated with Ms. Katharine McCarthy (MDNR Wildlife and Heritage Service) and received concurrence that the proposed obstruction clearing would not significantly impact potential swamp pink habitat and therefore a Biological Assessment would not be required for the EA. MAA will schedule a field visit for Ms. Broersma to assess permit requirements for obstruction clearings within MDE regulated wetlands or their buffers.

The meeting adjourned at 11:45 am.

The above statements represent a true and accurate account of the discussion during this meeting to the best of my knowledge. If there are any conflicts, misrepresentations or omissions with the above statements please contact our office at (410) 329-3100 within fourteen (14) days of this date.

cc: All Attendees
Stacey Quesinberry, URS
Russ Ruffing, JMT

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MEMORANDUM

TO: Robin Bowie, MAA and Meeting Attendees (see below)
DATE: May 20, 2011
FROM: Leyla E. Lange, JMT
PROJECT: Proposed Airport Improvements at Baltimore/Washington International Thurgood Marshall Airport

RE: Monthly Permitting /Mitigation Coordination Meeting

On May 20, 2011, a meeting was held at MAA offices to discuss permitting and compensatory mitigation for unavoidable impacts due to proposed Airport Improvement Projects at Baltimore/Washington International Thurgood Marshall Airport (BWI Marshall). Those in attendance included:

Robin Bowie	MAA	410-859-7103	rbowie@bwiairport.com
John Hurt	MAA	410-859-7384	jhurt@bwiairport.com
Dennis McMonigle	AA County	410-222-7908	dmcmonigle@aacounty.org
Richard Kibby	USACE	410-962-0694	richard.kibby@usace.army.mil
Elder Ghigiarelli	MDE	410-537-3763	eghigiarelli@mde.state.md.us
Kelly Flint	MDE	410-537-3536	kflint@mde.state.md.us
David Walbeck	MDE	410-537-3831	dwalbeck@mde.state.md.us
Judy Broersma	MDE	410-537-3769	jbroersma@mde.state.md.us
Leyla Lange	JMT	301-938-2677	llange@jmt.com

Ms. Bowie welcomed the group and explained the reason for the meeting was to continue discussions on MAA's proposal to permitting and meeting compensatory mitigation requirements for unavoidable impacts to jurisdictional wetlands and waters of the U.S for projects presented in the Environmental Assessment (EA) currently in preparation while still meeting the deadline of 12/31/15 for completion of RSA improvements per the Congressional Mandate.

Ms. Bowie explained to the group that impacts associated with the proposed relocation of the Glide Slope for Runway 33R may change as a result of Ohio University's modeling efforts. Additionally, USDA Wildlife Service's personnel will not support reconfiguration of the lower stormwater management pond to provide compensatory wetland mitigation for impacts associated with placement of the Glide Slope for Runway 33R, which is consistent with their position regarding on-site stream relocation. Reconfiguration of the pond may be required to offset storage volume for stormwater displaced by fill to accommodate the siting of the Glide Slope.

The group discussed the timing for submission of permit applications. No applications would be submitted until after the final EA has been approved and FAA has issued a finding. A draft EA is anticipated to be submitted for agency review this summer with a final document and anticipated FAA Finding of No Significant Impact to be issued in early 2012.

With respect to packaging of permits, obstruction removals would likely qualify as having independent utility and could be permitted by MDE separately from the remainder of the EA projects. USACE authorization is not anticipated to be necessary for proposed obstruction removals. MDE suggested that this application package could be substantially completed prior to approval of the final EA, so that once an FAA finding has been given, the package could be submitted for authorization. Due to some of the anticipated tree removal activities being located within 100-foot buffers of Wetlands of Special State Concern, the project (inclusive of all wetland and wetland buffer impacts) would be required to be put on Public Notice. Any potential compensatory mitigation requirements for these impacts would be addressed by on-site replacement with a lower growing species of trees known to not attract potentially hazardous wildlife to the area.

A separate application requesting authorization for the worst case scenario of impacts associated with all other activities would be submitted with a phased approach to the overall single, complete project, similar to authorization of design-build projects. Phases would be associated with major efforts for individual runways as follows: Phase I – Runway 10-28; Phase II – Runway 15R-33L; and Phase III – Runway 15L-33R. Authorization would be issued on a phase-by-phase basis with a requirement for avoidance and minimization of impacts to continue through subsequent design (and construction) efforts. Authorization to move to a subsequent phase would be addressed through permit modification requests and presentation of an updated impact tracking matrix. In order to meet the requirements of the Compensatory Mitigation Rule, a condition would be included in the authorization that construction for mitigation projects commence prior to or concurrent with construction activities (anticipated to be completed by 12/31/15).

At USACE's suggestion, MAA is partnering with Anne Arundel County to fulfill compensatory mitigation requirements for stream impacts. The Phase I Conceptual Mitigation Plan for EA projects (with the exception of obstruction removals that were previously discussed) will reference the MOU. Permit authorization would be conditional based on approval of Phase II Mitigation Plans and full design review. MDE requested that language be specifically included in the MOU to state that the County has agreed to perform compensatory stream mitigation for MAA on County property. Mr. Kibby will check to see if this is acceptable for USACE authorization.

Ms. Bowie explained to the group that MAA has identified potential areas on MAA-owned property to perform compensatory mitigation for nontidal wetland impacts. Anyone wishing to either visit areas of obstruction removals or proposed mitigation activities should contact Mr. Hurt, who will make arrangements.

The next meeting is scheduled for June 24, 2011 from 9:00 am to 10:30 am. The focus of this meeting will primarily be structuring of the proposed MOU/reimbursable agreement between MAA and the County with representatives from the Capital Improvement Programs for both agencies. Additionally, the responsibilities of each agency with respect to the permit application for the proposed mitigation to be performed will be further discussed.

The meeting adjourned at 10:30 am.

The above statements represent a true and accurate account of the discussion during this meeting to the best of my knowledge. If there are any conflicts, misrepresentations or omissions with the above statements please contact our office at (410) 329-3100 within fourteen (14) days of this date.

cc: All Attendees
Stacy Quesinberry, URS
Russ Ruffing, JMT

MEMORANDUM

TO: Robin Bowie, MAA and Meeting Attendees (see below)
DATE: June 27, 2011
FROM: Leyla E. Lange, JMT
PROJECT: Proposed Airport Improvements at Baltimore/Washington International Thurgood Marshall Airport

RE: Monthly Permitting /Mitigation Coordination Meeting

On June 24, 2011, a meeting was held at MAA offices to discuss permitting and compensatory mitigation for unavoidable impacts due to proposed Airport Improvement Projects at Baltimore/Washington International Thurgood Marshall Airport (BWI Marshall). Those in attendance included:

Robin Bowie	MAA	410-859-7103	rbowie@bwiairport.com
John Hurt	MAA	410-859-7384	jhurt@bwiairport.com
Merrilyn Williams	MAA	410-859-7439	mwilliams@bwiairport.com
Dennis McMonigle	AA County	410-222-7908	dmcmonigle@aacounty.org
Ginger Ellis	AA County	410-222-4240	gellis@aacounty.org
Richard Kibby	USACE	410-962-0694	richard.kibby@usace.army.mil
Kelly Flint	MDE	410-537-3536	kflint@mde.state.md.us
David Walbeck	MDE	410-537-3831	dwalbeck@mde.state.md.us
Judy Broersma	MDE	410-537-3769	jbroersma@mde.state.md.us
Leyla Lange	JMT	301-938-2677	llange@jmt.com

Ms. Bowie welcomed the group and explained the reason for the meeting was to continue discussions on MAA's proposal to permitting and meeting compensatory mitigation requirements for unavoidable impacts to jurisdictional wetlands and waters of the U.S for projects presented in the Environmental Assessment (EA) currently in preparation while still meeting the deadline of 12/31/15 for completion of RSA improvements per the Congressional Mandate.

Self introductions were provided for the benefit of Ms. Williams, Director of MAA's Office of Capital Programs, who will be working closely with Environmental Planning to help develop the Memorandum of Understanding /Reimbursable Agreement (MOU/RA). The rationale behind (and proposed structure of) the MOU/RA was discussed by the group. Components of the MOU/RA that must be clearly defined with respect to responsibilities include (but are not limited to): the work being performed is to provide compensatory mitigation for unavoidable impacts to waters of the US associated with EA projects and is predicated on the anticipated Finding of No Significant Impact; who will be responsible for preparation/submission of permit application; a cost per linear foot of stream restoration; post-construction monitoring responsibilities, etc.

Timing of both agencies appropriations and procurement requirements was discussed. Ms. Ellis explained that if necessary, mid-year appropriation for unanticipated revenue could be supported

through emergency legislation; however, MAA prefers to meet the County's fall cycle for preparation of their Capital Program. A separate meeting will be held between Anne Arundel County and MAA to structure the MOU/RA after August 1, 2011. Ms. Ellis will provide a list of attendees to Ms. Bowie, who will set up the meeting to be held at MAA.

MAA anticipates that the Preliminary Draft EA will be distributed for concurrent COE and MDE review within two weeks. Ms. Bowie reminded the group to review and provide comments on meeting minutes. To date, the only comment received has been to revise a date referenced in the text of the minutes from the meeting held on May 20, 2011. All attendees indicated that the content of all other meeting minutes to date are accurate.

With respect to packaging of permits, obstruction removals would likely qualify as having independent utility and could be permitted by MDE separately from the remainder of the EA projects. USACE authorization is not anticipated to be necessary for proposed obstruction removals. MDE suggested that this application package could be substantially completed prior to approval of the final EA, so that once an FAA environmental finding has been given, the package could be submitted for authorization. Due to some of the anticipated tree removal activities being located within 100-foot buffers of Wetlands of Special State Concern, the project (inclusive of all wetland and wetland buffer impacts) would be required to be put on a Public Notice separate from the public notice for the EA document. MAA proposes to address select tree removal within wetlands or their buffers by on-site replacement with a lower growing species of trees known to not attract potentially hazardous wildlife to the area.

The permit package for the remainder of the EA projects would be submitted after an FAA environmental finding has been issued. Three phases are still anticipated with the majority of impacts occurring in Phase II. Impacts anticipated to be associated with Phase I projects have been re-sequenced into Phase II.

Ms. Bowie explained to the group that MAA has identified potential areas on MAA-owned property to perform compensatory mitigation for nontidal wetland impacts. Mr. Walbeck requested MAA provide a map and aerial photograph depicting the location of the potential areas for evaluation.

The next meeting is scheduled for July 29, 2011 from 9:00 am to 10:30 am.

The meeting adjourned at 10:35 am.

The above statements represent a true and accurate account of the discussion during this meeting to the best of my knowledge. If there are any conflicts, misrepresentations or omissions with the above statements please contact our office at (410) 329-3100 within fourteen (14) days of this date.

cc: All Attendees
Stacy Quesinberry, URS
Russ Ruffing, JMT

MEMORANDUM

TO: Robin Bowie, MAA and Meeting Attendees (see below)
DATE: August 1, 2011
FROM: Leyla E. Lange, JMT
PROJECT: Proposed Airport Improvements at Baltimore/Washington International Thurgood Marshall Airport

RE: Monthly Permitting /Mitigation Coordination Meeting

On July 29, 2011, a meeting was held at MAA offices to discuss permitting and compensatory mitigation for unavoidable impacts due to proposed Airport Improvement Projects at Baltimore/Washington International Thurgood Marshall Airport (BWI Marshall). Those in attendance included:

Robin Bowie	MAA	410-859-7103	rbowie@bwiairport.com
John Hurt	MAA	410-859-7384	jhurt@bwiairport.com
Richard Kibby	USACE	410-962-0694	richard.kibby@usace.army.mil
Kelly Flint	MDE	410-537-3536	kflint@mde.state.md.us
David Walbeck	MDE	410-537-3831	dwalbeck@mde.state.md.us
Judy Broersma	MDE	410-537-3769	jbroersma@mde.state.md.us
Leyla Lange	JMT	301-938-2677	llange@jmt.com

Ms. Bowie welcomed the group and explained the reason for the meeting was to continue discussions on MAA's proposal to permitting and meeting compensatory mitigation requirements for unavoidable impacts to jurisdictional wetlands and waters of the U.S for projects presented in the Environmental Assessment (EA) currently in preparation while still meeting the deadline of 12/31/15 for completion of RSA improvements per the Congressional Mandate.

Representatives from Anne Arundel County were unable to attend the meeting. A separate meeting specific to structuring the Memorandum of Understanding/Reimbursable Agreement between MAA and the County will be held in early August to finalize the structure of the document and further discuss details necessary to incorporate into the final. The meeting is tentatively scheduled for the week of August 8, 2011. Results of the meeting will be reported to the group at the next monthly permitting/mitigation meeting.

Ms. Bowie provided an update to the group on the status of the Preliminary Draft EA document as well as the schedule for release of the draft to the public. FAA has provided comments on the Preliminary Draft document, which MAA has already incorporated. MAA's goal is to incorporate COE comments into a revised document for FAA to review by August 10th so that a draft document can be released for public and full agency comment as soon as possible .

The group reviewed general and specific comments regarding the document. Ms. Broersma voiced concern over the Purpose and Need being overly detailed potentially restricting future changes to

projects covered by the document. Ms. Bowie explained that the detail was being provided at the direction of FAA specifically to properly identify specific FAA design standards and funding mechanisms for future efforts. Additionally, COE has reviewed, commented on, and approved the Purpose and Need.

COE and MDE requested additional information on avoidance and minimization efforts associated with each alternative, particularly with respect to wetlands and streams. Ms. Bowie explained that this Environmental Assessment is a broad brush perspective of the impacts associated mostly with build/no-build scenarios, with a goal of receiving a finding from the FAA based on "permitability" of the proposed projects. Additional information regarding avoidance and minimization of unavoidable impacts will be provided to support the forthcoming permit applications for individual projects. FAA's format for an EA document is being followed, which is why impacts to streams, wetlands and floodplains are presented separately throughout Section 4.0.

The meeting centered around suggested changes to the EA such as: Citations for state regulations were requested for nontidal wetlands, streams and floodplains within Section 3.0; in stream restrictions for Use I waters should be changed to reflect the correct closure date of March 1st; avoidance and minimization verbiage should be strengthened throughout Section 4.0; any manuals referenced in the body of the text should be included within the references section; and a summary table of impacts associated with the preferred alternatives for each project should be included in Section 4.0. Ms. Bowie stated that revised Sections 2 and 4 with revisions incorporated will be provided to all on August 1, 2011, for review with comments due on August 5, 2011.

MDE requested a site visit for areas of obstruction clearing within the 100-foot buffer of the Nontidal Wetlands of Special State Concern be held in the fall.

The meeting adjourned at 11:15 am with no meeting for August being scheduled. Meetings will resume in September depending on the status of the EA document and distribution to the public.

The above statements represent a true and accurate account of the discussion during this meeting to the best of my knowledge. If there are any conflicts, misrepresentations or omissions with the above statements please contact our office at (410) 329-3100 within fourteen (14) days of this date.

cc: All Attendees
Stacy Quesinberry, URS
Russ Ruffing, JMT

MEMORANDUM

TO: Robin Bowie, MAA and Meeting Attendees (see below)
DATE: August 29, 2011
FROM: Leyla E. Lange, JMT
PROJECT: Proposed Airport Improvements at Baltimore/Washington International Thurgood Marshall Airport

RE: Mitigation Coordination Meeting – Memorandum of Understanding Between Maryland Aviation Administration and Anne Arundel County

On August 10, 2011, a meeting was held at Anne Arundel County offices to discuss the reimbursable agreement/Memorandum of Understanding between the Maryland Aviation Administration (MAA) and Anne Arundel County (AA County or the County) to provide compensatory mitigation for unavoidable impacts due to proposed Airport Improvement Projects at Baltimore/Washington International Thurgood Marshall Airport (BWI Marshall). Those in attendance included:

Robin Bowie	MAA	410-859-7103	rbowie@bwiairport.com
John Hurt	MAA	410-859-7384	jhurt@bwiairport.com
Merrilyn Williams	MAA	410-859-7439	mwilliams@bwiairport.com
Ginger Ellis	AA County	410-222-4240	gellis@aacounty.org
Ken Fleming	AA County	410-222-2544	kfleming@aacounty.org
Chris Phipps	AA County	410-222-7540	cphipps@aacounty.org
Leyla Lange	JMT	301-938-2677	llange@jmt.com

Self-introductions were provided. Ms. Lange provided an overview of the rationale behind the proposed Memorandum of Understanding between MAA and the County. MAA is in the process of preparing an Environmental Assessment (EA) for Proposed Airport Improvements that will occur through 2015. A large component of the improvements focuses on the Runway Safety Areas (RSAs) and the Congressional Mandate to bring all RSAs into compliance with FAA standards by December 31, 2015. The proposed improvements that are addressed in the EA will result in unavoidable impacts to jurisdictional resources including streams, floodplains, and nontidal wetlands and their buffers. In order to streamline the permitting process, representatives from the U.S. Army Corps of Engineers (USACE), a cooperating agency for preparation of the EA, suggested that MAA approach Anne Arundel County to fund a stream restoration project to satisfy compensatory mitigation requirements for unavoidable stream impacts. This strategy would enable MAA to move forward with the proposed projects without having to expend significant time and effort to scope, design and implement a stream restoration project, which could delay permit authorization. According to USACE, if MAA and the County can agree upon a stream restoration project and document the partnering approach in a well-structured Memorandum of Understanding (MOU), permit authorization can occur.

Ms. Bowie provided the group an update on the status of the EA document. The document is currently in preliminary draft stage and has been reviewed by representatives from both USACE and the Maryland Department of the Environment (MDE). MAA is currently responding to these comments and

anticipates a Draft EA to be available for public review and comment in September of 2011. MAA anticipates FAA issuing an environmental finding either in late December 2011 or January 2012. MAA holds monthly meetings with representatives from USACE, MDE and the County to discuss unavoidable impacts to jurisdictional resources and associated mitigation requirements. All impacts are being presented as a worst-case scenario with the understanding that avoidance and minimization efforts will continue through final design.

The group discussed the benefits as well as the potential unforeseen costs to the County that could be associated with this approach. Unanticipated issues might arise that would require the County to dedicate additional funds not previously allocated. For example, the linear footage determined to be in need of restoration may exceed the amount MAA would be committed to funding, requiring the County to fund the additional cost. Also, dedication of County staff support would also be anticipated as the project would have to be managed throughout the life of the project (i.e., design, procurement, construction, and monitoring phases). These costs would have to be justified and allocated for within the budget; the County would have to create legislation for funding of the project.

The schedule was discussed. If construction were to start in January 2015, appropriation would need to occur in 2014. The County would need a project request for 2013. Presentation of the project would be required at the following milestones: Public Advisory Board meeting in February and County Council in April. Appropriation of funds would occur in July. In order to make this schedule, a copy of the executed MOU would be required by spring 2012. MAA will draft the MOU and circulate for comment. The goal is to receive all legal approvals by December 2011 so that it can be provided to MDOT in January 2012 for subsequent presentation to the Board of Public Works in February or March 2012.

MAA committed to supporting the County where it can and to the extent it is able. MAA will prepare the MOU as well as a Project Description that can be utilized as supporting documentation for any requests for funding or approvals. MAA will also look into funding a planning level study to support the project. As the project would occur on County-owned property, MAA would not seek any credit for the project towards meeting Total Maximum Daily Load (TMDL) allocations; this could be translated into a monetary benefit to justify expenditure of County resources.

The meeting adjourned at 10:30 am.

The above statements represent a true and accurate account of the discussion during this meeting to the best of my knowledge. If there are any conflicts, misrepresentations or omissions with the above statements please contact our office at (410) 329-3100 within fourteen (14) days of this date.

cc: All Attendees
Stacy Quesinberry, URS
Russ Ruffing, JMT

MEMORANDUM

TO: Robin Bowie, MAA and Meeting Attendees (see below)
DATE: September 16, 2011
FROM: Leyla E. Lange, JMT
PROJECT: Proposed Airport Improvements at Baltimore/Washington International Thurgood Marshall Airport

RE: Permitting Meeting

On September 16, 2011, a meeting was held at MAA offices (with a subsequent visit to the field) to discuss potential stream restoration opportunities to satisfy compensatory mitigation for unavoidable impacts to jurisdictional resources associated with proposed Airport Improvement Projects at Baltimore/Washington International Thurgood Marshall Airport (BWI Marshall). Those in attendance included:

Robin Bowie	MAA	410-859-7103	rbowie@bwiairport.com
John Hurt	MAA	410-859-7384	jhurt@bwiairport.com
Richard Kibby	USACE	410-962-0694	richard.kibby@usace.army.mil
Leyla Lange	JMT	301-938-2677	llange@jmt.com

Ms. Bowie explained to Mr. Kibby that as a result of the recent storm events, MAA has identified several areas of significant deterioration within active stream channels on MAA-owned property that will need to be addressed and wanted USACE to evaluate the potential for restoration of these areas to serve as compensatory mitigation for the above referenced projects. Ms. Bowie further explained that USDA Wildlife Services has been out to evaluate the areas and support restoration of these areas as the work would consist of stabilization and would not increase the attractiveness of the area to potentially hazardous wildlife. This has been documented in an e-mail from USDA Wildlife Services to Ms. Bowie.

The group discussed the reaches proposed for restoration, which include approximately 3,000 linear feet (lf) of Kitten Branch (main stem), directly downstream of the MD 170 culvert and two perennial tributaries of Kitten Branch, each with approximately 500 lf of restoration potential. A field visit of each area was conducted by Mr. Kibby, Mr. Hurt and Ms. Lange. After reviewing the three segments proposed for restoration, Mr. Kibby agreed that the areas are degraded and would benefit from restoration practices. Mr. Kibby requested that MAA also receive concurrence from MDE.

The group reconvened with Ms. Bowie at MAA offices after the field review and discussed the potential impacts to the schedule of the Section 404 permit authorization. Mr. Kibby explained to the group that he did not believe the proposed change in mitigation strategy would negatively impact the authorization of the Section 404 permit; however, he would need to discuss the changes with both Mr. DaVia and Ms. Bachur of USACE. Mr. Kibby anticipates being prepared to report on this issue at the next monthly mitigation meeting, which is scheduled for September 23, 2011. Mr. Hurt will reach out to Ms. Flint for a field visit.

The meeting adjourned at 11:15 am.

The above statements represent a true and accurate account of the discussion during this meeting to the best of my knowledge. If there are any conflicts, misrepresentations or omissions with the above statements please contact our office at (410) 329-3100 within fourteen (14) days of this date.

cc: All Attendees
Stacey Quesinberry, URS
Russ Ruffing, JMT

MEMORANDUM

TO: Robin Bowie, Meeting Attendees (see below) and MAA Files
DATE: September 27, 2011
FROM: Leyla E. Lange, JMT
PROJECT: Proposed Airport Improvements at Baltimore/Washington International Thurgood Marshall Airport

RE: Mitigation/Permitting Meeting

On September 23, 2011, a meeting was held at MAA offices (with a subsequent visit to the field) to discuss potential options for MAA to provide compensatory mitigation for unavoidable impacts to jurisdictional resources associated with proposed Airport Improvement Projects at Baltimore/Washington International Thurgood Marshall Airport (BWI Marshall). Those in attendance included:

Robin Bowie	MAA	410-859-7103	rbowie@bwiairport.com
John Hurt	MAA	410-859-7384	jhurt@bwiairport.com
Dennis McMonigle	AA County	410-222-7908	dmcmonigle@aacounty.org
Joseph DaVia	USACE	410-962-5691	joseph.davia@usace.army.mil
Richard Kibby	USACE	410-962-0694	richard.kibby@usace.army.mil
Kelly Flint	MDE	410-537-3536	kflint@mde.state.md.us
David Walbeck	MDE	410-537-3831	dwalbeck@mde.state.md.us
Leyla Lange	JMT	301-938-2677	llange@jmt.com

Ms. Bowie explained to the group that as a result of recent large storm events, MAA has identified several areas of significant deterioration within active stream channels on MAA-owned property and is seeking concurrence from both USACE and MDE that restoration of these areas would satisfy compensatory mitigation requirements for the EA projects. USDA Wildlife Services has concurred that stabilization of these areas would not increase the attractiveness of the area to potentially hazardous wildlife. Mr. Kibby with USACE reviewed the areas on September 16, 2011 and concurred that they would be suitable as compensatory mitigation. A field meeting has been scheduled with MDE to directly follow this meeting to review the areas and evaluate the suitability as compensatory mitigation. If MDE grants concurrence, the effort being pursued with AA County will be curtailed; however, there will still be the potential for MAA to partner with AA County on TMDL issues.

Ms. Bowie provided the group with an update on the status of the EA document. MAA received comments from FAA on the 2nd Preliminary Draft EA, which had all comments provided by USACE and MDE incorporated, on September 16, 2011. MAA and its consultant have addressed all of FAA's comments in a matrix that has been provided to FAA for concurrence. Once concurrence has been received, the document will be revised and with FAA's approval, will be released as a Draft EA for public review and comment. Ms. Bowie explained to the group that an issue has arisen regarding the reliability of the Glide Slope signals associated with Runway 15L-

33R in the proposed locations. FAA is currently evaluating the modeling results to support a modification of standards to allow the Glide Slopes to remain in their current locations. This change will result in a decrease in impacts to both streams and wetlands/wetland buffers. Because the issue has not yet been resolved, MAA proposes to leave the discussion of potential impacts associated with this project as is; USACE concurred as this is still a potential alternative and removing the discussion at this point could trigger a supplement NEPA evaluation should the alternative be reconsidered in the future.

The group discussed the schedule for the Draft EA document. A Public Workshop will be held 30 days after the notice of availability of the Draft EA is published in the newspaper. During the Public Workshop, a request for a public hearing can be made; however, typically public hearings are not held by FAA unless specifically requested. Written comments are collected from attendees at the Public Workshop and those that prove to be relevant and germane to the projects being evaluated will be considered and addressed in the final document. USACE will likely be present for the Public Workshop.

The group discussed the permitting for the projects. Two separate permits will be sought: one for obstruction removals (as this activity has independent utility from the remainder of the projects) and one for the RSA improvements and all associated work. Because there is no dredge or fill material being proposed to be discharged to waters of the US associated with removal of tree obstruction, USACE authorization will not be necessary for this activity. This should be clearly stated in the cover letter transmitting the permit application for Obstruction Removals.

The phasing of the RSA Improvements permit was discussed. Ms. Bowie explained to the group that as design has been progressing, it appears that the majority (possibly all) of the impacts to USACE/MDE jurisdictional resources associated with the RSA Improvements will occur in Phase II. Mr. DaVia stressed that USACE will only authorize impacts associated with the least environmentally damaging practicable alternative. Ms. Bowie explained that this may not be preferred alternative selected by MAA/FAA and the issue would require further resolution between the Draft EA and Final EA in order to support a Finding of No Significant Impact. Mr. DaVia requested a field meeting be held with the design engineers for Runway 15R-33L RSA improvements to review the environmental constraints associated with the work to be performed and the specific impacts anticipated with each alternative, with an emphasis on the potential for avoidance and minimization. Costs will be factored into the practicability comparison of the various alternatives.

The group discussed the timing of permit authorization for the RSA Improvements. USACE will not issue authorization until a Phase II Mitigation Plan has been approved. Design plans for stream mitigation may need to be at an advanced stage before the Phase II Mitigation Plan can be approved, but this will be confirmed with Ms. Bachur of USACE.

A field visit was scheduled to directly follow this meeting for Mr. Walbeck and Ms. Flint (both of MDE) to review the potential areas for wetland enhancement (Mr. Walbeck) and stream

restoration (Ms. Flint). Results of that meeting will be reported to the group in a separate set of meeting minutes.

The next meeting was scheduled for Friday, October 21, 2011 at 9:00 am.

The meeting adjourned at 11:15 am.

The above statements represent a true and accurate account of the discussion during this meeting to the best of my knowledge. If there are any conflicts, misrepresentations or omissions with the above statements please contact our office at (410) 329-3100 within fourteen (14) days of this date.

cc: All Attendees
Stacey Quesinberry, URS
Russ Ruffing, JMT

MEMORANDUM

TO: Robin Bowie, Meeting Attendees (see below) and MAA Files
DATE: October 28, 2011
FROM: Leyla E. Lange, JMT
PROJECT: Proposed Airport Improvements at Baltimore/Washington International Thurgood Marshall Airport

RE: Mitigation/Permitting Meeting

On October 21, 2011, a meeting was held at MAA offices to discuss the proposed revisions to the EA and potential options for MAA to provide compensatory mitigation for unavoidable impacts to jurisdictional resources associated with proposed Airport Improvement Projects at Baltimore/Washington International Thurgood Marshall Airport (BWI Marshall). Those in attendance included:

Robin Bowie	MAA	410-859-7103	rbowie@bwiairport.com
John Hurt	MAA	410-859-7384	jhurt@bwiairport.com
Joseph DaVia	USACE	410-962-5691	joseph.davia@usace.army.mil
Richard Kibby	USACE	410-962-0694	richard.kibby@usace.army.mil
Kelly Flint	MDE	410-537-3536	kflint@mde.state.md.us
David Walbeck	MDE	410-537-3831	dwalbeck@mde.state.md.us
Leyla Lange	JMT	301-938-2677	llange@jmt.com

Ms. Bowie explained that the EA is continuing to be revised based on ongoing analysis and results of modeling for the proposed Glide Slope relocations associated with Runway 15L/33R. It is anticipated that the FAA evaluation of the modeling results will support a modification of standards ("MOS") to allow the Glide Slopes to remain in their current locations; therefore, the 15L/33R Glide Slope project was proposed to be removed from the EA. This is due to the length of time that will be required to complete modeling and analysis to identify the optimal configuration for the Glide Slope. The removal of the Runway 15L/33R Glide Slope will result in a reduction of total impacts, which will be reflected in the updated EA and tables. Mr. DaVia, concurred with this decision; however, it is the MAA's understanding that that future impacts proposed to establish glide slopes may trigger a supplemental NEPA evaluation.

Ms. Bowie indicated that the consultant responsible for the EA preparation is currently working on the revisions requested by FAA and anticipates having a complete revised document by early next week. Both USACE and MDE requested the opportunity to review the revised Preliminary Draft EA. The group agreed that the revised document can be provided in an electronic format with all changes clearly indicated using track changes. The agencies committed to reviewing the document and providing comments within approximately one week of its receipt.

The group was provided with an update on the current design status for the Runway 15R/33L RSA improvements, which is currently at the 30% design stage identifying impacts to Kitten

Branch and Fork Branch. Mr. DaVia expressed concern regarding design proceeding for a selected alternative without a FONSI issued. Ms. Flint indicated that MDE may have additional review comments, including a more robust presentation of alternatives analysis upon receipt of the Joint Permit Application (JPA).

A Draft Compensatory Mitigation Plan was presented to the agencies for review and comment. An updated, revised mitigation plan will be incorporated as an appendix to the EA. The mitigation document will need to be reviewed by Beth Bachur (USACE) to determine compliance with the Federal mitigation rule and an acceptable site protection mechanism will need to be determined. Based on agency concurrence of the suitability of lower Kitten Branch stream restoration reaches, the stream restoration design effort has commenced with Michael Baker selected as the design firm. Currently the scope for the project is being developed and an Independent Fee Estimate (IFE) must be performed before notice-to-proceed can be issued. At this point, data collection (geomorphic and benthic macroinvertebrates) for the restoration reaches can commence. The stream restoration design consultant will make recommendations for areas in need of restoration and this information will be presented to USACE and MDE for concurrence before detailed restoration design efforts begin. Ms. Lange is the assigned task manager for the stream restoration effort. Wetland delineations adjacent to the proposed stream restoration reaches are being conducted in house by MAA.

The MAA is also conducting a site search to identify areas on MAA property suitable for wetland mitigation. USACE and MDE indicated that if total of wetland impact is less than ½ acre then fee in lieu payment into the State Nontidal Wetlands Compensation Fund may be an acceptable option to wetland creation.

The MAA will coordinate the preparation of a JPA for the removal of tree obstructions with Ms. Broersma (MDE). The removal of trees only and no associated ground disturbance will not require USACE authorization since there is no proposed discharge of dredge or fill material to waters of the US. This will be clearly stated in the cover letter transmitting the permit application for Obstruction Removals.

The group discussed the timing of permit authorization for the RSA Improvements. USACE will not issue authorization until a Final Compensatory Mitigation Plan has been approved. Design plans for stream mitigation may need to be at an advanced stage before the Final Compensatory Mitigation Plan can be approved, but this will be confirmed with Ms. Bachur of USACE. The group also discussed the potential for banking of stream mitigation credits if the amount of mitigation provided exceeds the required amount of compensatory mitigation. Mr. DaVia stated that this would have to go through the approval process for mitigation banking including development of a prospectus and mitigation bank instrument. USACE will issue public notice within 30 days of receiving the complete mitigation bank prospectus.

A field meeting will be scheduled either November 1st or 2nd for agencies to review the areas of impact associated with Runway 15R/33L and discuss further opportunities to avoid and minimize impacts.

The meeting adjourned at 11:15 am.

The above statements represent a true and accurate account of the discussion during this meeting to the best of my knowledge. If there are any conflicts, misrepresentations or omissions with the above statements please contact our office at (410) 329-3100 within fourteen (14) days of this date.

cc: All Attendees
Stacey Quesinberry, URS
Russ Ruffing, JMT

MEMORANDUM

TO: Robin Bowie, Meeting Attendees (see below) and MAA Files
DATE: November 4, 2011
FROM: Leyla E. Lange, JMT
PROJECT: Proposed Airport Improvements at Baltimore/Washington International Thurgood Marshall Airport

RE: USACE/MDE Pre-application Meeting

On November 1, 2011, a pre-application meeting was held at MAA offices for the forthcoming Joint Permit Application requesting authorization of unavoidable impacts to Section 404 resources associated with the proposed improvements to Runway 15R/33L. The meeting was held primarily to discuss the alternatives associated with the glide slope relocation for Runway 15R and potential options for MAA to further minimize unavoidable impacts to jurisdictional resources while maintaining compliance with FAA design standards at Baltimore/Washington International Thurgood Marshall Airport (BWI Marshall). Those in attendance included:

Robin Bowie	MAA	410-859-7103	rbowie@bwiairport.com
John Hurt	MAA	410-859-7384	jhurt@bwiairport.com
Joseph DaVia	USACE	410-962-5691	joseph.davia@usace.army.mil
Richard Kibby	USACE	410-962-0694	richard.kibby@usace.army.mil
Kelly Flint	MDE	410-537-3536	kflint@mde.state.md.us
Kevin Sullivan	USDA	410-349-8055	kevin.sullivan@usda.gov
Jeremy Smith	USDA	410-859-7367	jsmith12@bwiairport.com
Cedric K. Johnson	ADCI	410-300-4227	cjohnson@adci-corp.com
Stacy Quesinberry	URS	410-891-9333	stacy.quesinberry@urs.com
Tracy Hollida	Baker	410-689-3412	thollida@mbakercorp.com
Michele Monde	Baker	410-689-3417	mmonde@mbakercorp.com
Dave Leslie	Baker	410-689-3479	dleslie@mbakercorp.com
Alan Peljovich	JMT	410-859-7142	apeljovich@jmt.com
Leyla Lange	JMT	301-938-2677	llange@jmt.com

Ms. Bowie welcomed the group and self-introductions were provided by all in attendance. The following roles were identified: JMT is serving as the Program Management Team for the RSA Improvements; Michael Baker Corporation (with ADCI as a subconsultant) is the Design Team responsible for the design of Runway 15R/33L; URS is preparing the Environmental Assessment for the proposed improvements; USDA Wildlife Services provide Wildlife Hazard Management for BWI Marshall; and USACE/MDE are the permitting authorities for activities that cause impacts to resources protected under Section 404 of the Clean Water Act.

Mr. Johnson provided an overview of the project components including original alternatives considered to minimize impacts as presented at the Joint Evaluation (JE) Meeting held on January 26, 2011. Since that time, additional survey has been obtained and designs have

progressed to a 30% level based on updated topography, property lines, and security fence locations that must be considered in the design while still meeting FAA standards. Differences in topography varied more than 10' in some areas. Additionally, results of design vehicle simulations for the perimeter roadway and Transportation Security Administration (TSA) off-set requirements associated with the perimeter security fence have introduced additional constraints to the alignment of the perimeter roadway and the associated stream crossing. These factors have been incorporated into all of the revised alternatives being presented and carried forward. Mr. Johnson explained to the group that FAA is adamant that any improvements undertaken at BWI Marshall Airport meet established design standards and that these criteria in conjunction with security requirements for the facility are unwavering and provide rigid parameters for design alternatives.

The group discussed the proposed location for the Glide Slope equipment for Runway 15R. The shelter must be located outside the Runway Object Free Area (ROFA) which, for this runway, extends 400 feet from the centerline of the runway. This minimum off-set distance is a requirement and there is no flexibility to bring the facility any closer to the runway centerline. A distance of 413' from the runway centerline is indicated to account for the 3' shift in the runway and locate the Glide Slope shelter and antenna outside the ROFA.

The group also discussed the types of Glide Slopes available and the differences between them. The extents of the various components including grading areas and the Glide Slope Critical Areas associated with both Capture Effect and Side Band systems were reviewed noting the differences in extents for each. FAA is requiring a Capture Effect system for Runway 15R to provide the greatest reliability of signal; therefore, all designs utilized dimensions associated with this type of system for grading limits and critical areas.

Mr. Johnson presented revisions to each alternative and impacts associated with each alternative based on 30% design information. Currently there are four build alternatives: straight culvert, bent culvert and two culvert/retaining wall combinations. (Note: all alternatives also include a retaining wall associated with the proposed perimeter roadway but this feature does not cause any additional impacts to jurisdictional resources.) Mr. Johnson explained that based on the updated survey and constraints established by the location of the security fence and the limits of the Glide Slope Critical Area and the associated grading area, the retaining wall option as presented at the JE meeting in January is no longer feasible. The advantages and disadvantages associated with each of the current alternatives were reviewed with respect to airport operations, safety of maintenance personnel and environmental impacts. Scheduling of construction was also discussed with respect to implications of not meeting the congressional mandate by the deadline of December 31, 2015.

Retaining walls in this area pose problems with respect to safety of maintenance personnel (fall protection required at the top of retaining walls) and as a result, potential interference with the Glide Slope signals. Two alternative configurations of retaining walls were considered: one with wall placement at the limit of the grading area and one with wall placement at the limit of the Glide Slope Critical Area. Neither of these alternatives provides opportunity for reduction of

impacts. Locating the retaining wall at the Glide Slope Critical Area would provide the least potential for signal interference; however, this alternative has the greatest environmental impact.

The group discussed the advantages and disadvantages of the alternative culvert alignments. The straight culvert (in-stream) alternative would require temporary diversion of the stream flow to construct the culvert while the bent culvert option would enable the construction of the culvert off-line without impacting the existing stream until it is diverted into the newly constructed culvert. The straight culvert (in-stream) option has the least permanent stream impacts; the bent culvert has the most linear feet of permanent impacts to the stream channel.

The feasibility of implementing a temporary stream diversion to enable construction of the straight culvert option was discussed and the agencies will provide additional guidance on implementation during the field visit. Large stream diversions are routine and should not be discounted from consideration as a means to decrease permanent impacts. Ms. Flint stated that a temporary stream diversion would allow construction to proceed within the existing channel during the in-stream construction restriction period as long as it is installed prior to March 1st and remain in place until after June 15th. The diversion channel must be designed for the two year storm if it is intended to remain in place more than two weeks.

The group discussed the stream relocation alternative that was presented at the JE Meeting in January 2011. This alternative was dropped from further consideration due to concerns of USDA Wildlife Services regarding the potential to increase the attractiveness of the area to potentially hazardous wildlife. Mr. Sullivan stated that USDA does not have a policy in place that prohibits stream relocations from occurring on airfields but considers such a situation to not follow the FAA Advisory Circular 150-5200-3B. Mr. Sullivan stated that USDA would not support any alternative that includes a relocated stream channel for Runway 15R/33L and will provide a letter stating this position.

The group conducted a field review to the area of impact associated with the proposed location for the Runway 15R Glide Slope as well as proposed Taxiway D holdpad location to further evaluate the potential to minimize impacts. USACE and MDE requested that the designers reconsider implementation of a temporary stream diversion to further minimize impacts. USACE and MDE also requested that documentation for the Perimeter Roadway Study as well as the design vehicle specifications (including turning radii) be provided to support the proposed alignment for the perimeter roadway in this area and that this information be incorporated into the alternatives discussion in the Environmental Assessment.

The meeting adjourned approximately 1:15 pm.

The above statements represent a true and accurate account of the discussion during this meeting to the best of my knowledge. If there are any coflicts, misrepresentations or omissions with the above statements please contact our office at (410) 329-3100 within fourteen (14) days of this date.

cc: All Attendees
Russ Ruffing, JMT

MEMORANDUM

TO: Robin Bowie, MAA and Meeting Attendees (see below)
DATE: January 23, 2012
FROM: Leyla E. Lange, JMT
PROJECT: Proposed Airport Improvements at Baltimore/Washington International Thurgood Marshall Airport

RE: Permitting Meeting

On January 20, 2012, a meeting was held at MAA offices to discuss the proposed revisions to the EA and potential options for MAA to provide compensatory mitigation for unavoidable impacts to jurisdictional resources associated with proposed Airport Improvement Projects at Baltimore/Washington International Thurgood Marshall Airport (BWI Marshall). Those in attendance included:

Robin Bowie	MAA	410-859-7103	rbowie@bwiairport.com
John Hurt	MAA	410-859-7384	jhurt@bwiairport.com
Richard Kibby	USACE	410-962-0694	richard.kibby@usace.army.mil
Kelly Flint	MDE	410-537-3536	kflint@mde.state.md.us
David Walbeck	MDE	410-537-3831	dwalbeck@mde.state.md.us
Michele Monde	Baker	410-689-3417	mmonde@mbakercorp.com
Alan Peljovich	JMT	410-859-7142	apeljovich@jmt.com
Leyla Lange	JMT	301-938-2677	llange@jmt.com

Ms. Bowie introduced two attendees to the group. Michele Monde is the Environmental Manager for Michael Baker Jr., Inc. responsible for the development of design for the 15R/33L Runway Safety Area (RSA) improvements project as well as the stream restoration that will be performed as compensatory mitigation for all unavoidable impacts. All unavoidable impacts result from the 15R/33L RSA improvements project. Alan Peljovich with JMT is the Program Manager for the overall RSA Improvements Program.

Ms. Bowie explained that the Draft EA was available for public review as of December 16, 2011. The deadline for agency comments on the Draft EA is January 27th and deadline for public comments is February 9th. A public workshop/open house is scheduled for January 25th from 4:00 to 8:00 pm at the MAA Offices (991 Corporate Boulevard, Assembly Room A/B) to serve as a forum for public review and discussion of the Draft EA. The group reviewed the information proposed to be presented at the public workshop regarding mitigation of unavoidable impacts including aerial photography of the proposed restoration areas, individual photographs of existing degraded areas, and the proposed method and objectives for the restoration design.

The group discussed preliminary agency comments on the Draft EA and Compensatory Mitigation Plan. Mr. Walbeck stated that the proposed wetlands mitigation contained in the Draft EA and Compensatory Mitigation Plan is vague and lacking in detail. Ms. Flint and Mr. Kibby will submit comments no later than January 27th. With respect to wetland mitigation, the MAA

intends to evaluate the proposed Kitten Branch stream restoration reach for wetlands mitigation opportunities, including enhancement and creation; however, if the full wetlands mitigation requirement cannot be met through on-site mitigation, then payment into the State Nontidal Wetlands Compensation Fund may be requested. Mr. Walbeck also noted that earlier review comments he provided had not been incorporated into the current Draft EA including need to verify calculation of impacts for the selected alternatives. Mr. Walbeck stated that MDE may have additional comments upon review of a formal project application. Ms. Bowie requested the comments be submitted formally in writing and informed the group that any agency comments submitted directly to her would also be resubmitted to Bob Rosenbush at the State Clearinghouse for his records as the State Clearinghouse is responsible for tracking agency comments on environmental documents. MAA understands and expects additional agency review comments upon submittal of the JPA since the permit application will include detailed engineering/design plans.

The group discussed the timing of the permit application with respect to timing of the construction packages. It was explained that the Runway 10/28 RSA project, which has no unavoidable impacts, will be started in the fall of 2012 with completion due in 2013. During that timeframe, some of the grading/construction elements of 15R/33L must be constructed in order to maintain a construction program schedule to meet the Congressional Mandate for RSA compliance by 12/31/15. It was explained that MAA intends to submit one JPA for authorization for all construction packages for 15R/33L. Due to the complexity of the Runway 15R/33L project, the project will be divided into five individual construction packages that include: 1) Stream Diversion; 2) Earthwork; 3) RWY 15R Deicing Pad & TXY P; 4) RWY 15R-33L & Taxiway D Hold Pad; 5) NAVAIDS. Ms. Lange advised that the major RSA improvements for this runway have a proposed Notice to Proceed/construction start date of July 2012 for the stream diversion package. The aggressive phasing of the individual construction packages is necessary for the project to be completed by the deadline without having to close both major runways simultaneously. The schedule and timing for all construction packages is reflective of construction seasons and takes into consideration the in-stream Time of Year construction restrictions. Mr. Kibby requested a schedule associated with all the packages.

The group discussed the status of the stream restoration task. Ms. Lange indicated that due to the aggressive schedule for construction, the mitigation design plans will not be fully developed prior to the anticipated Notice to Proceed for the stream diversion construction package. Mr. Kibby indicated that internal coordination at USACE is needed to determine the level of mitigation design detail needed for the USACE to issue a permit authorizing construction activity impacting wetlands/waters of the US. Beth Bachur at USACE is the person responsible for making this determination. Typically, USACE will not authorize impacts until mitigation design plans are at 100%. Ms. Flint indicated that she did not see a problem with MDE providing authorization with design plans at less than 100%. Mr. Kibby indicated some leeway may be possible.

A field review of the wetlands delineation is to be scheduled for February/March for a “preliminary JD” by the USACE. MDE (Judy Broersma) will also be invited to participate in the

field review. Additionally, direct coordination with Judy Broersma is needed for a permit decision regarding the removal of tree obstructions. The removal of trees identified as obstructions will be accomplished by identifying specific trees to be removed manually. Because no dredge or fill material will be discharged into federally regulated wetlands or waters of the US, USACE authorization will not be required.

Minutes of this meeting will be provided no later than Monday, January 23rd. Additionally, preliminary schedule details for both the construction packages and restoration package will be provided. The schedule dates being provided are approximate and are subject to change based on issuance of the FONSI. A request for meeting dates will be sent out to schedule the preliminary JD. The next meeting will be held on February 17th at 9:00 am.

The meeting adjourned at 10:30 am.

The above statements represent a true and accurate account of the discussion during this meeting to the best of my knowledge. If there are any conflicts, misrepresentations or omissions with the above statements please contact our office at (410) 329-3100 within fourteen (14) days of this date.

cc: All Attendees
Stacey Quesinberry, URS
Russ Ruffing, JMT

MEMORANDUM

TO: Robin Bowie, MAA and Meeting Attendees (see below)
DATE: February 21, 2012
FROM: Leyla E. Lange, JMT
PROJECT: Proposed Airport Improvements at Baltimore/Washington International Thurgood Marshall Airport

RE: Permitting Meeting

On February 17, 2012, a meeting was held at MAA offices to discuss the status of the Environmental Assessment (EA) and requirements to obtain authorization under Section 404 of the Clean Water Act for unavoidable impacts to jurisdictional resources associated with proposed Airport Improvement Projects at Baltimore/Washington International Thurgood Marshall Airport (BWI Marshall). Those in attendance included:

Robin Bowie	MAA	410-859-7103	rbowie@bwiairport.com
John Hurt	MAA	410-859-7384	jhurt@bwiairport.com
Joseph DaVia	USACE	410-962-5691	joseph.davia@usace.army.mil
Kelly Flint	MDE	410-537-3536	kflint@mde.state.md.us
David Walbeck	MDE	410-537-3831	dwalbeck@mde.state.md.us
Judy Broersma	MDE	410-537-3769	jbroersma@mde.state.md.us
Michele Monde	Baker	410-689-3417	mmonde@mbakercorp.com
Alan Peljovich	JMT	410-859-7142	apeljovich@jmt.com
Leyla Lange	JMT	301-938-2677	llange@jmt.com

Ms. Bowie informed the group that the agency comments received to date on the Draft EA were not extensive and a Comment Response Matrix is being prepared. Comments were received from Anne Arundel County, MDE, USACE (electronic) and FAA. USACE will provide their comments on letterhead within the week. No comments were received from the public and no members of the public attended the Public Workshop held at MAA on January 25, 2012. Mr. George Cardwell with Anne Arundel County Government was the only individual outside the Runway Safety Area (RSA) team that attended the Public Workshop.

All germane comments will be incorporated into the Preliminary Final EA document, which is scheduled to be submitted to FAA during the week of February 27th. MAA will be drafting the Finding of No Significant Impact (FONSI) for FAA's review and signature. Mr. DaVia indicated that USACE will need its own decision document in order to authorize the Section 404 permit; however, as a cooperating agency, they will adopt information as necessary from the Final EA document. The Final EA document will be re-advertised and made available to the public for review.

The group discussed the schedule of construction packages for the Runway 15R-33L package. No earth disturbance activities are proposed prior to 7/24/12, which is the anticipated Notice-to-

Proceed date for the construction of the stream diversion package. MAA anticipates receiving authorization for the RSA permit application by July 24, 2012; however, if authorization is not received by this date, the contractor will be made aware that no impacts to jurisdictional resources can occur prior to receipt of authorization. Mr. DaVia indicated that authorization of the RSA permit will be contingent on approval of the Compensatory Mitigation Plan; however, at a minimum, full size construction drawings for the proposed stream restoration (30% to 60% design level) will be required in order for the Compensatory Mitigation Plan to be approved.

The group discussed the status of the stream restoration effort, which is proposed as compensatory mitigation. Mr. DaVia inquired whether the MAA has considered addressing uncontrolled runoff of untreated impervious surfaces upstream of the proposed restoration reaches. MAA will implement measures to control runoff from untreated impervious surfaces as a component of the proposed projects and elsewhere within the BWI Marshall campus where practicable. Additionally, the stream restoration design will take into account discharges associated with existing conditions and proposed future development. In order to comply with the Chesapeake Bay Phase II WIP requirements, MAA will provide treatment for 20% of existing impervious surfaces by 2017.

Ms. Monde informed the group that the detailed topographic survey is still being performed and is anticipated to be completed in March. Additional data collection that has occurred to date include establishing and surveying 20-30 cross-sections, collecting data to determine Bank Erosion Hazard Index (BEHI), and performing sediment sampling throughout the restoration reaches. Biological sampling to establish baseline conditions is scheduled to be conducted in April.

The group discussed the type of restoration activities that are being proposed. From observations made during field investigations to collect data, Ms. Monde explained that the majority of the restoration would be Priority 1 and would involve reconnecting the stream with its floodplain. This would be accomplished by raising the invert of the stream and establishing a new channel in locations. Portions of the existing channel would be filled and could be designed to become pockets of forested wetland creation. Ms. Flint asked whether Baker had constructed successful projects with the proposed techniques in a coastal plain setting. Ms. Monde explained that Baker has several completed projects in North Carolina that demonstrate these techniques. Ms. Monde will provide Baker's qualifications for stream restoration. Both MDE and USACE requested that the proposed stream restoration design minimize impacts to the floodplain by avoiding clearing of large trees wherever possible.

The group reviewed the draft RSA permit application. Temporary impacts will be included in the final RSA permit application. USACE and MDE suggested incorporating by reference appropriate sections of the EA within the permit application to support discussions regarding alternatives analysis as well as avoidance and minimization of impacts to jurisdictional resources. Avoidance and minimization measures will also be quantified within the permit application. The group reviewed the draft impact plates and impact matrix. USACE and MDE requested 24"x36" sheets of the impact plate index maps (Plates 1 and 2) be included with the

RSA permit application to facilitate the review of impacts. Both agencies also requested 24"x36" copies of all permit application drawings (which can be mailed separately from the permit applications). Both agencies also requested design drawings for the individual construction packages as they are available. The group discussed that the RSA permit application is reflective of the final built condition and design drawings associated with the five individual construction packages will not directly correlate with the information portrayed on the impact plates. This is largely due to the fact that the individual construction packages have been developed based on both the nature of work to be performed as well as phasing of the overall RSA Program; some packages will overlap.

The group reviewed the Draft Compensatory Mitigation Plan. While all 12 elements are included in the plan, some sections may need to be expanded to provide additional detail. The mitigation work plan needs to be expanded. Types of activities proposed for mitigation must be identified and quantified. Ms. Lange explained that this information is currently being generated based on observations and data collection. The group will schedule a field meeting to walk the entirety of the proposed restoration reaches and discuss restoration activities to be considered at specific locations for incorporation into the concept level design.

Ms. Lange explained that the anticipated date for submission of the RSA permit application is February 29, 2012; therefore, any comments on either the impact plates or the Draft Compensatory Mitigation Plan must be received by the end of next week. The anticipated date for the project to be advertised on public notice is April 1, 2012.

With respect to the Obstruction Clearing permit application, Ms. Broersma requested that the permit application be submitted and a field visit will be scheduled after the application has been reviewed. The permit application must include graphics depicting individual tree obstructions within all wetlands and wetland buffers and clearly define measures that will be implemented to further avoid and/or minimize impacts.

The next meeting was tentatively scheduled for March 16, 2012 (NOTE: directly following the meeting this date was changed to March 23, 2012 and will incorporate the field visit and review of components of the conceptual stream restoration design).

The meeting adjourned at 10:30 am.

The above statements represent a true and accurate account of the discussion during this meeting to the best of my knowledge. If there are any conflicts, misrepresentations or omissions with the above statements please contact our office at (410) 329-3100 within fourteen (14) days of this date.

cc: All Attendees
Stacey Quesinberry, URS

Russ Ruffing, JMT

MEMORANDUM

TO: Robin Bowie, MAA and Meeting Attendees (see below)
DATE: March 30, 2012
FROM: Leyla E. Lange, JMT
PROJECT: Proposed Airport Improvements at Baltimore/Washington International Thurgood Marshall Airport

RE: Permitting/Mitigation Meeting

On March 23, 2012, a meeting was held at MAA offices to discuss the status of the Environmental Assessment (EA) and requirements to obtain authorization under Section 404 of the Clean Water Act for unavoidable impacts to jurisdictional resources associated with proposed Airport Improvement Projects at Baltimore/Washington International Thurgood Marshall Airport (BWI Marshall). Those in attendance included:

Robin Bowie	MAA	410-859-7103	rbowie@bwiairport.com
John Hurt	MAA	410-859-7384	jhurt@bwiairport.com
Joseph DaVia	USACE	410-962-5691	joseph.davia@usace.army.mil
Richard Kibby	USACE	410-962-0694	richard.kibby@usace.army.mil
Kelly Flint	MDE	410-537-3536	kflint@mde.state.md.us
David Walbeck	MDE	410-537-3831	dwalbeck@mde.state.md.us
Michele Monde	Baker	410-689-3417	mmonde@mbakercorp.com
Dave Leslie	Baker	410-689-3475	dleslie@mbakercorp.com
Jake McLean	Baker	828-350-1408	jmclean@mbakercorp.com
Leyla Lange	JMT	301-938-2677	llange@jmt.com

Self-introductions were provided; new to the group is Jake McLean who is the lead designer for the stream restoration project that will serve as compensatory mitigation for the unavoidable impacts to Section 404 resources.

Ms. Bowie provided an update on the status of the Preliminary Final EA, which is currently in review by FAA's Regional Office, as well as the Joint Permit Applications (JPA). The JPA for the Obstruction Removal project was submitted to MDE on March 8, 2012. This application is only anticipated to require MDE authorization with no Public Notice required.

The JPA for the RSA Improvements Project was submitted on March 2, 2012. A revised cover letter was submitted on March 5, 2012 to reflect the impacts contained within the application. Copies of the JPA packages were recently received by the MDE reviewers. Ms. Flint requested the list of adjacent property owners so that the project could be put on Public Notice. This information will be provided directly to both MDE and USACE. A separate Public Notice will be issued by USACE; however, a joint Public Hearing may be considered. The group discussed the potential benefit of proactively scheduling a Public Hearing rather than waiting until a request is made, which may add several extra weeks to the review process. The anticipated Notice-to-Proceed date for the Stream Diversion Package is late July 2012. MDE and USACE

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will further explore the best way to proceed based on the constraints associated with the project schedule. A conference call was tentatively scheduled for 10:00 am on 3/30/12 to discuss the path forward for putting the project on Public Notice and scheduling a Public Hearing.

The group discussed the status of design for the Stream Diversion/Culvert Installation package associated with Runway 15R-33L. The package is currently at the 60% design stage and is being submitted to MDE for Erosion and Sediment Control review and approval. No stormwater management will be required for this package. Full size sets of the design drawings and copies of the Engineer's Reports were provided to both MDE and USACE reviewers per the request made at the February permit coordination meeting.

Mr. McLean provided the group with an update on the status of the stream restoration design. Approximately 90% of the detailed topographic survey has been collected. The design will proceed with LIDAR data for the area in which topographic survey has not yet been obtained. The geomorphic survey has been performed and much of the data has been processed. Biological benchmark data has not yet been collected.

Mr. McLean presented the preliminary conceptual design for the stream restoration project. Elements of the design are still being evaluated as the design progresses. Both Priority 1 (raising channel to elevation of existing floodplain) and Priority 2 (excavation of floodplain to allow reconnection) restoration activities are primarily being proposed. In some areas, incision of the channel is so severe that in order to reconnect the stream with its floodplain, relocation of the channel will be necessary. The group discussed methods by which channel relocation could occur without disturbance of large areas of mature forest within the floodplain. The design team will consider utilization of relic or abandoned channels in order to minimize disturbance for the purposes of channel relocation. The group also discussed specific practices to be utilized in the design and expressed that any deviations from currently approved practices should be supported with examples of successful implementation in other projects, preferably in the Coastal Plain Physiographic Province (e.g., use of submerged logs within the channel for vertical control).

The group also discussed presentation of the stream restoration project at the next monthly Joint Evaluation meeting. This will provide other agencies an overview of where MAA is with respect to the permitting process, the proposed mitigation package as well as potential schedule constraints. Mr. Hurt will request a timeslot be allocated to MAA at the April JE meeting. MAA will still host the monthly permit coordination meeting the week prior to the JE presentation so that the proposed information to be presented at the JE meeting can be reviewed and commented on by the entire group; requested revisions would be incorporated prior to the presentation. After the presentation, the design team will evaluate comments made by other regulatory agencies for incorporation into the overall design.

The next meeting is scheduled for April 20, 2012. Presentation of the stream restoration project to the JE team is scheduled for April 25, 2012.

The office portion of the meeting adjourned at approximately 10:30 am and most meeting attendees visited the proposed stream restoration reaches to review the project extents and evaluate specific areas of concern.

The above statements represent a true and accurate account of the discussion during this meeting to the best of my knowledge. If there are any conflicts, misrepresentations or omissions with the above statements please contact our office at (410) 329-3100 within fourteen (14) days of this date.

cc: All Attendees
Stacey Quesinberry, URS
Russ Ruffing, JMT

Maryland Aviation Administration

Martin O'Malley
Governor

Anthony G. Brown
Lt. Governor

Beverley K. Swaim-Staley
Secretary

Paul J. Wiedefeld, A.A.E.
Executive Director

April 20, 2012

Mr. Elder A. Ghigiarelli, Jr.
Deputy Program Administrator
Federal Consistency Coordinator
Wetlands and Waterways Program
Maryland Department of the Environment
1800 Washington Boulevard
Baltimore MD 21230

Dear Mr. Ghigiarelli:

SUBJECT: Federal Coastal Zone Management Program (CZMP) Consistency Certification for the Environmental Assessment (EA) for Proposed Airport Improvements at Baltimore/Washington International Thurgood Marshall Airport (BWI Marshall)

As required by Federal Aviation Administration (FAA) Order 1050.1E, Appendix A, Paragraph 3.2(b)(1), the Maryland Aviation Administration (MAA) is hereby certifying that it is the finding of MAA that the proposed activities, including all of the projects listed and discussed in detail in the aforementioned EA, comply with the enforceable policies of Maryland's approved management program and will be conducted in a manner consistent with such program.

We look forward to continuing to work with you through the Phases identified in your letter towards completion of the proposed projects identified in our EA.

If you need any additional information or have any questions, please contact me at 410-859-7103 or via email me at rbowie@bwiairport.com.

Sincerely,

Robin M. Bowie

Robin M. Bowie, Manager
Division of Environmental Planning

cc: David M. Cohen, Esquire, Region Legal Counsel, FAA

TECHNICAL MEMORANDUM
OU/AEC TM XXXX

Site Analysis and Recommendation for Proposed Glide slope Relocations (Standard Option) for Runway 15R and 33L at Baltimore-Washington International Airport

The glide slope systems serving Runway 15R and 33L at the Baltimore-Washington International (BWI) Airport have been analyzed to determine the effect of the terrain variations on the systems at their proposed new locations. The two systems are planned for relocation and the entire glide slope critical area (GSCA) will be graded. The model results indicate that a capture effect system will perform within tolerance limits for the proposed location on runway 15R while the results indicate that both the SBR and CE systems will perform within tolerance limits at the relocation site for Runway 33L.

by

Simbo Odunaiya, Ph.D.

Avionics Engineering Center
School of Electrical Engineering and Computer Science
Ohio University
Athens, Ohio 45701-2979

June 2011

Prepared for
URS

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I. INTRODUCTION AND BACKGROUND

The Baltimore-Washington International (BWI) Airport is planning to relocate the glide slope antennas serving R/W 15R and R/W 33L at BWI. The antenna for R/W 15R glide slope needs to be relocated to support a new landing threshold, on the other hand R/W 33L glide slope antenna which is currently located on the west side of the runway is being proposed for relocation to the east side of the runway. The proposed location for the glide slope antenna is relatively free of reflectors except for a line of trees that may be removed. URS has asked Ohio University to analyze both of these glide slope systems at the new locations to determine the performance of the glide slope within a CAT I ILS operation for R/W 15L and R/W 33R.

Computer Modeling is now routinely used in these cases and has proven to be a cost-efficient and relatively risk-free method of predicting ILS performance given various multi-path environments. The Ohio University model proposed to be used in this study is the Ohio University Glide Slope Model (OUGS). This model is based on the Uniform Theory of Diffraction for Electromagnetic Scattering and it is used to predict the performance of a glide slope system within a non-uniform terrain environment.

A. Site Data

A site visit was conducted at the BWI Airport to appraise the situation firsthand. The existing and proposed sites were inspected. Figure 1 is a Google map showing the immediate vicinity of the proposed glide slope for runway 15R. The system currently serving this runway is a sideband reference (SBR) system located 1147 feet from the threshold and offset 273 feet from the runway centerline to the right of the approach. The proposed system will be located on the same side of the runway as the existing system, but at larger offset of 413 feet. Due to the proposed relocation of the threshold the proposed system is also being located backwards from the existing threshold which puts it very close to the edge of a ditch area. Figure 2 is photograph taken during the site visit that shows a close up of the ditch area. The plan is to fill the ditch area. The prepared ground plane initially starts with a gradual up slope in the glide slope critical areas (GSCA) and then changes to a gradual down slope before it makes a sharp drop. The elevation at the proposed glide slope location after preparation will be 130 feet.

The site inspection also revealed a large building (the Northrop Grumman building) located between 2000 feet and 2900 feet in front of the GS system but offset about 260 feet from the glide slope centerline at a height of 47.6 feet. This building has the potential to affect GS system performance.

Figure 3 is a Google map that shows the immediate area of the proposed glide slope for Runway 33L. The current system on this runway is a null reference (NR) system which is located 947 feet from the threshold and offset 270 feet from the runway centerline to the right of the approach. The relocated system will be moved to the other side of the runway and will be set back at 979 feet from the threshold and offset 979 feet from Runway centerline to the left of the approach.

Figure 1. Google map showing the immediate vicinity of the proposed Runway 15R GS.

Figure 2. Photograph showing ditch area near proposed site for Runway 15R relocated GS.

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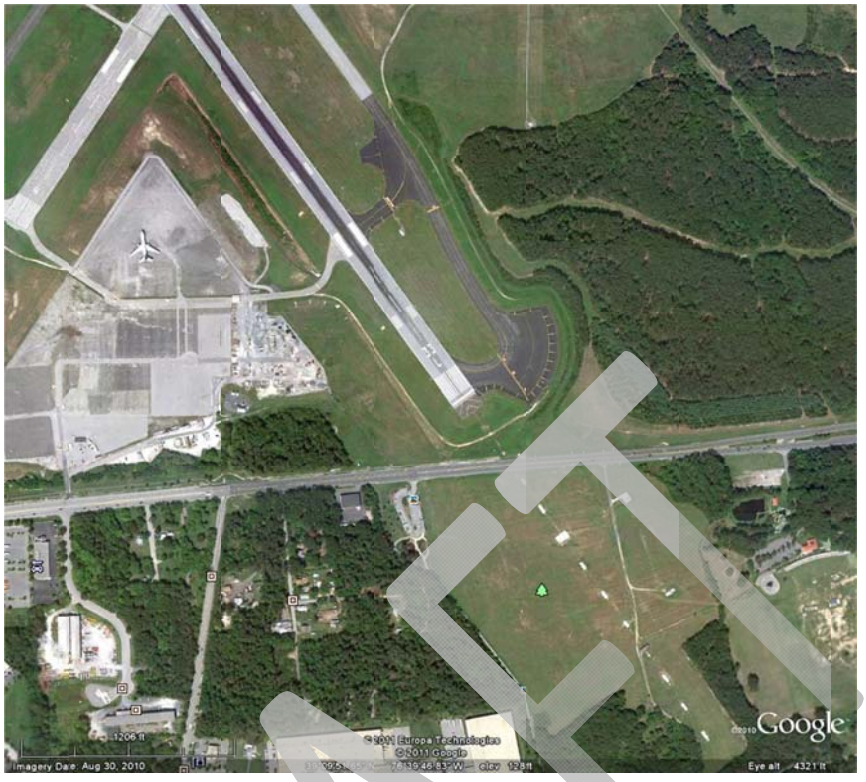

Figure 3. Google map showing the immediate area of the proposed Runway 33L GS.

Figure 4. Photograph showing the proposed location for the relocated GS on Runway 33L.

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The proposed location will fall in an area that requires filling and grading. Figure 4 shows the area that will be filled. A line of trees also visible in figure is a potential source of multipath for the proposed system.

The proposed ground plane for this relocated glide slope is a short ground plane. The elevation at the glide slope is 129 feet. The terrain has a sharp drop-off after the short ground plane. The lowest point after the short ground plane is about 93 feet MSL at about 3800 feet from the GS location. The ground plane essentially stays below the GS elevation even in the area beyond 3800 feet.

II. MODELING RESULTS

A. Modeling Parameters

The approach in this study is to model two systems each for both of the relocated GS systems. The modeling will be done for the CE and the SBR systems. Areas of the terrain will be modified to also determine the most effective ground modifications to minimize any adverse effects identified.

A summary of the site data for both of the relocated glide slope systems is as shown in Table 1. These data will be used along with the data from the AutoCAD files supplied by URS in the modeling of the glide slope.

Table 1. Facility parameter used in simulations

Parameter	**Runway 15R Glide Slope**		**Runway 33L Glide Slope**	
Equipment	CE	SBR	CE	SBR
Setback (feet)	1109	1109	979	979
Offset (feet)	R413	R413	L410	L410
Antenna ground elevation (feet MSL)	130	130	129	129
Threshold Elevation (feet MSL)	137.5	137.5	131.2	131.2
Alignment (deg)	3.0	3.0	3.0	3.0

B. Runway 15R

The ground data used for this modeling effort has been supplied by URS. The modeled ground plane is as shown in Figure 5. Again this shows that the prepared area of the terrain starts as a gradual upward slope and then slopes down dramatically for a truncated ground plane.

1. Sideband Reference

The model results for a SBR system show that there will be challenges for this system at this site. The challenges are essentially due to the nature of the site. The result indicates a performance at 130% of tolerance limits for CAT I operation. Tolerance limits are set for different categories of ILS operations. More information on tolerances and the limits are provided in Appendix A.
This is unacceptable as it goes out of prescribed limits. It is possible to adjust the ground plane to bring the performance within tolerance limits, however it may not leave any margin for other effects.

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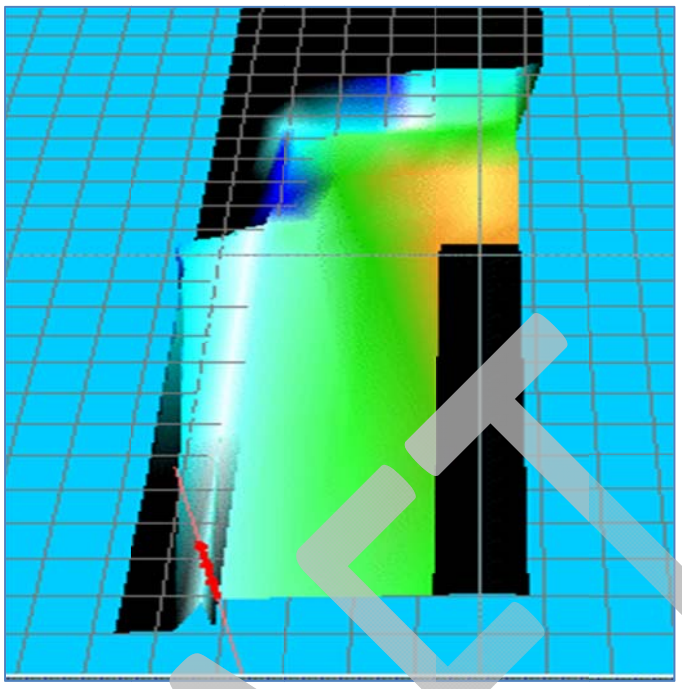

Figure 5. Runway 15R graded area as modeled in the OUGS.

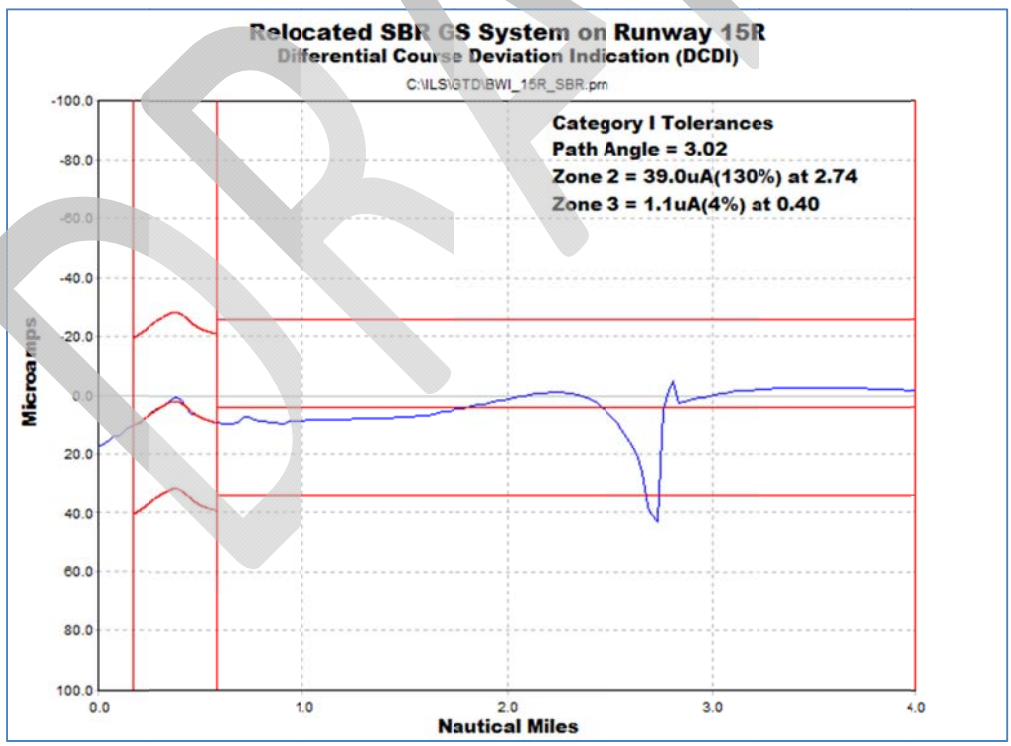

Figure 6. Approach flight profile result for SBR GS system on Runway 15R.

2. Capture Effect

The model result for a CE system shows that the CE system will perform satisfactorily with the

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terrain as it is. The modeled system result shown in Figure 7 indicates a roughness of 43% of tolerance limits in CAT I operation. This is an acceptable level of performance.

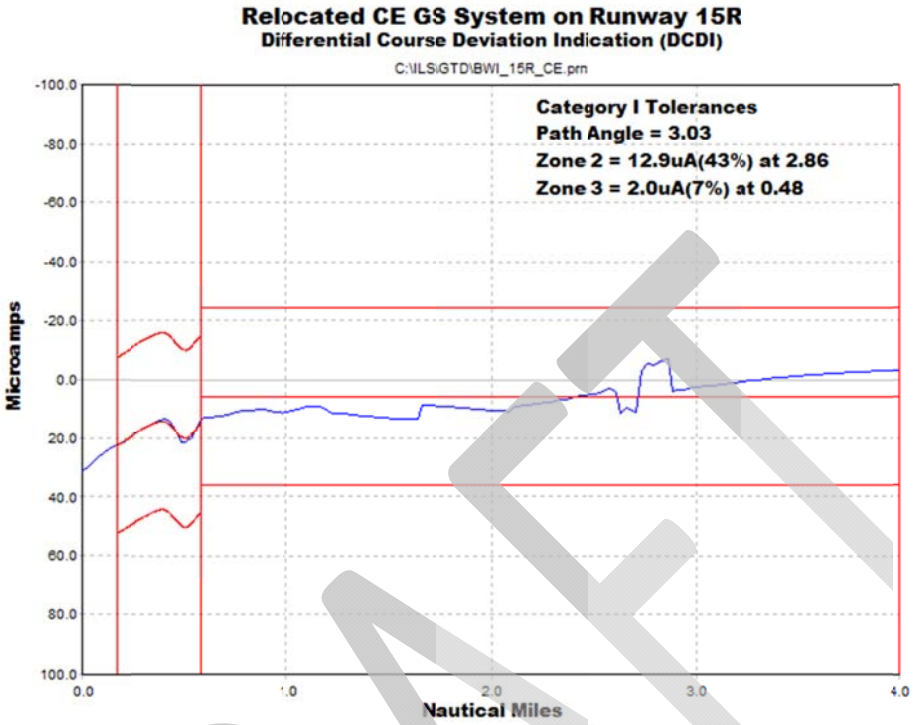

Figure 7. Approach flight profile for a CE GS system on Runway 15R.

3. Northrop Grumman Building

The Northrop Grumman building has been modeled using the Ohio University Navigation and Landing Performance Prediction Model (OUNPPM). The result obtained for a CE system is as shown in Figure 8 below. The result shows that the effect of the building is noticeable but falls within tolerance limits at less than 10% of CAT I limits.

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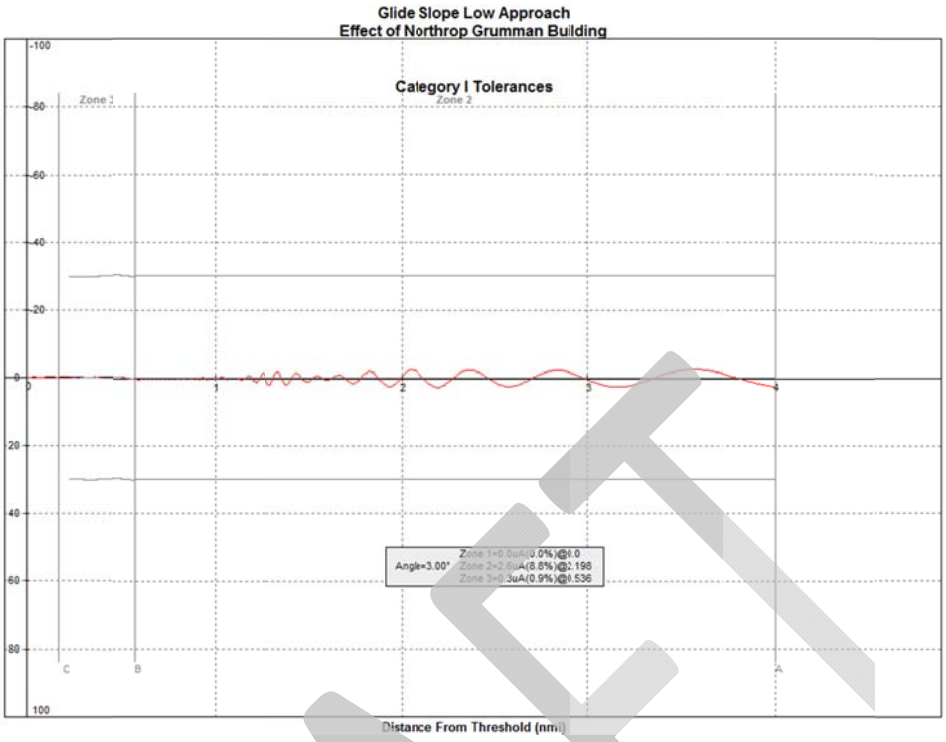

Figure 8. Model result showing the effect of the Northrop Grumman building on relocated GS on Runway 15R.

C. Runway 33L

The modeled ground plane for Runway 33L is as shown in Figure 9. This ground plane is essentially a short ground plane that drops sharply to elevations that are much below the glide slope antenna elevation. When there is a sharp drop-off of this nature with no other ground place rising beyond the point of drop-off it means only the initial path forming ground plane is illuminated by the GS. In this case as long as the initial plane is long enough, almost all the different systems should be able to perform satisfactorily at this location.

1. Sideband Reference System

The model result obtained for a SBR system is as shown in Figure 10. The system performance is at 51% of tolerance limits for CAT I operations. The system roughness is significant but still well within tolerance limits. The roughness is due to the terrain discontinuities as the terrain falls sharply from the initial slope to very low elevations.

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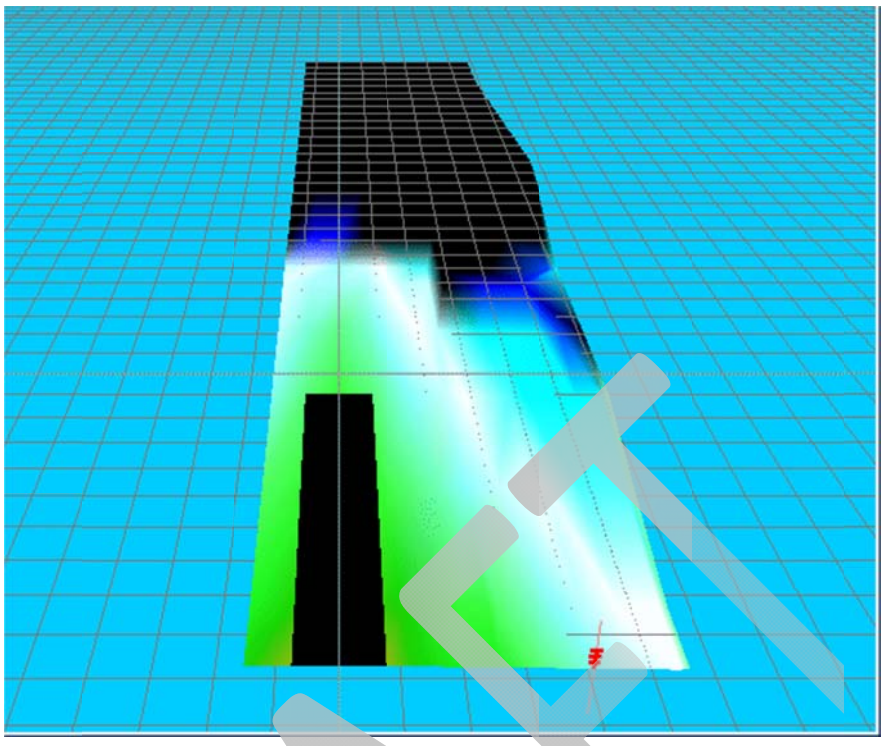

Figure 9. Runway 33L terrain profile as modeled in the OUGS model.

2. Capture Effect System

The result for the CE system is as shown in Figure 11. This result also indicates that a CE effect system will perform satisfactorily at the proposed location. The performance predicted is 39% of CAT I tolerances in Zone 2.

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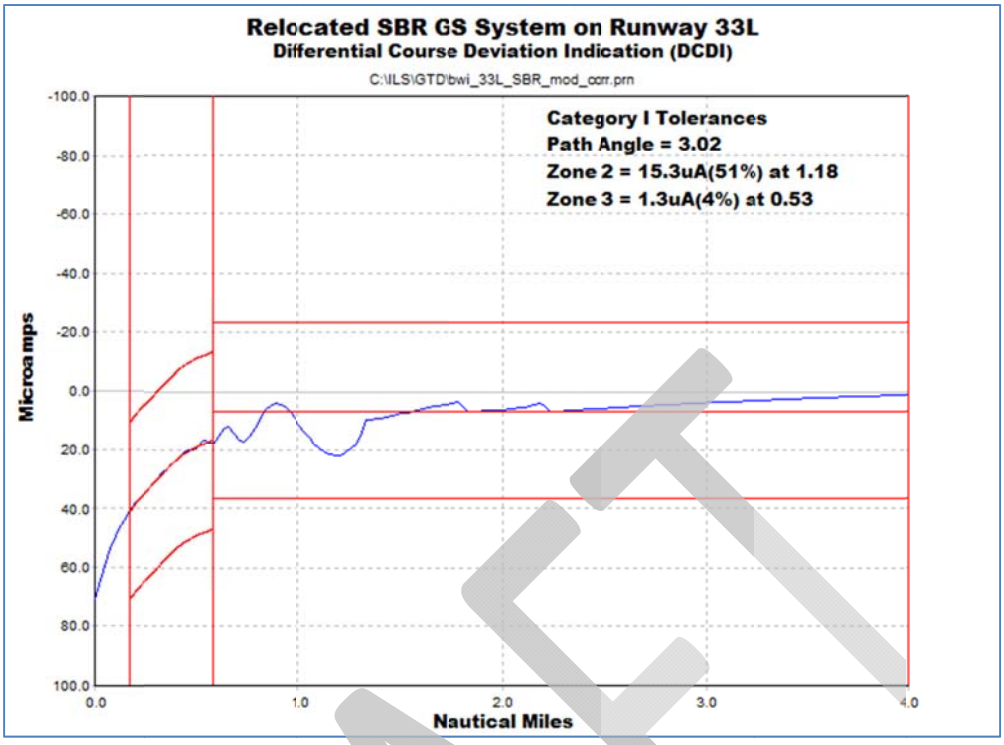

Figure 10. Approach flight profile for SBR GS system on runway 33L.

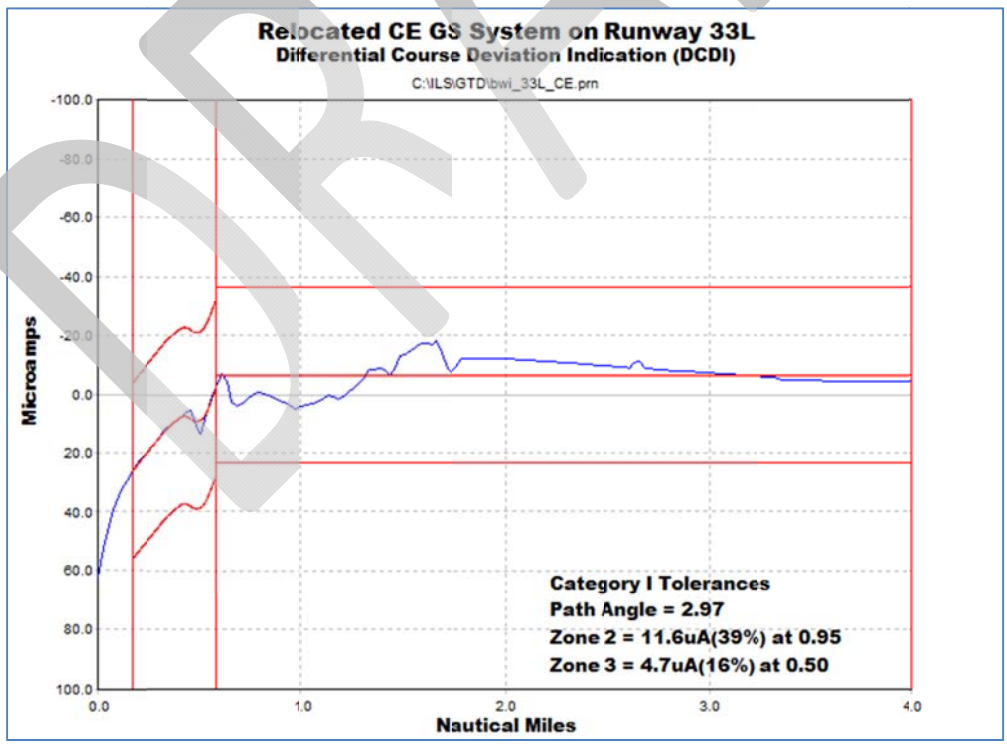

Figure 11. Approach flight profile for a CE GS system on Runway 33L.

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3. Line of Trees Near GS Antenna

The line of trees shown in Figure 4, which are located near the proposed relocation site for the Runway 33L GS, has been modeled using the Ohio University Navigation and Landing Performance Prediction Model (OUNPPM). The result obtained for a CE system is as shown in Figure 12 below. The result shows that the effect of the trees is noticeable but acceptable. The system performance with the trees falls within tolerance limits at 35% of CAT I limit. The data used for modeling the trees has been assumed at a worst case scenario and tree heights of 60 feet have been used.

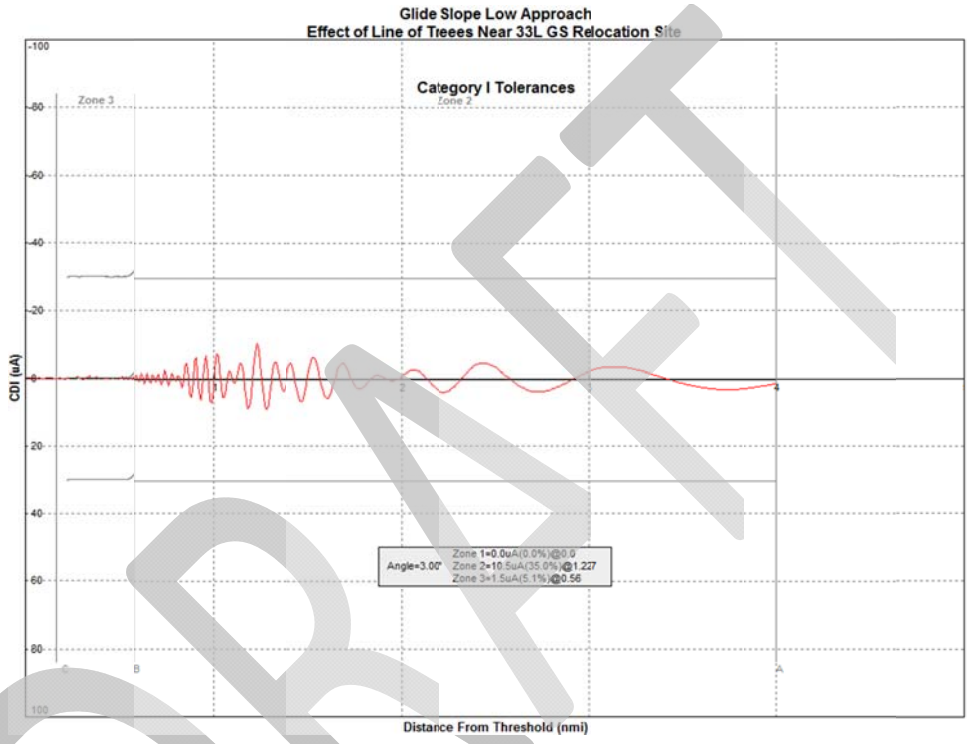

Figure 12. Approach flight profile showing the effect of the line of trees near relocation site for Runway 33L GS.

III. CONCLUSIONS

Based on the analysis results presented the conclusions reached with regards to the proposed relocation of Runway 15R and 33R GS systems are as follows:

Runway 15R

1. A SBR system will not perform within tolerance limits at the proposed location with the proposed terrain grading.
2. A CE effect system will perform within tolerance limits at the proposed site with the proposed terrain grading.
3. The effect of the Northrop Grumman building on the GS at the proposed relocation site is insignificant.

Runway 33L

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1. A SBR will perform within tolerance limits at the proposed relocation site with the proposed terrain grading.
2. A CE system will perform within tolerance limits at the proposed relocation site with the proposed terrain grading.

IV. REFERENCES

[1] FAA Order 6750.16D, "Siting Criteria for Instrument Landing Systems," Federal Aviation Administration, February 2005.

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V. APPENDIX A.

ILS ZONES AND TOLERANCES

There are different points along the ILS approach which are defined and used to differentiate a segment or zone along the approach path. The ILS Points and Zones are shown in Figure A- 1 and are defined as follows:

ILS Point A is an imaginary point on the glide path or localizer on-course measured along the runway centerline extended, in the approach direction, 4 nautical miles from the runway threshold.

ILS Point B is an imaginary point on the glide path or localizer on-course measured along the runway centerline extended, in the approach direction, 3,500 feet from the runway threshold.

ILS Point C is a point through which the downward extended straight portion of the glide path, at the commissioned angle, passes, at a height of 100 feet above the horizontal plane containing the runway threshold.

ILS Point D is a point 12 feet above the runway centerline and 3,000 feet from the runway threshold in the direction of the localizer.

ILS Point E is a point 12 feet above the runway centerline and 2,000 feet from the stop end of the runway in the direction of the runway threshold.

ILS Zone 1 is the region beginning from the coverage limit of the localizer or glide slope to ILS Point A.

ILS Zone 2 is the region between ILS Point A and ILS Point B.

ILS Zone 3 is the region between ILS Point B and ILS Point C used for evaluation of Category I ILS. The region between ILS Point B and the runway threshold is used for evaluations of Category II and III facilities.

ILS Zone 4 is the region between runway threshold and ILS Point D.

ILS Zone 5 is the region between ILS Point D and ILS Point E.

Table A-1 provides a summary of the localizer course structure limits for each of the ILS Zones. The actual or announced course alignment is the arithmetic mean of all values one nautical mile from threshold to the threshold. In addition, for Category II and III analysis, ILS Zones 4 and 5 have a separate zone alignment. This zone alignment is determined by the arithmetic mean of all values within the corresponding zone.

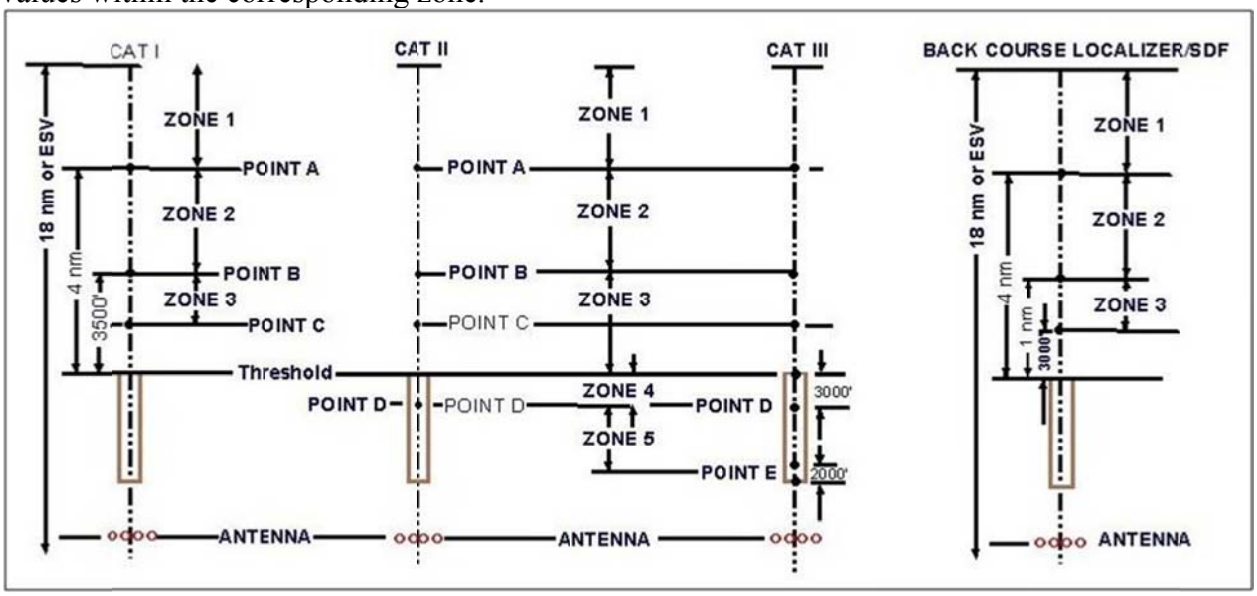
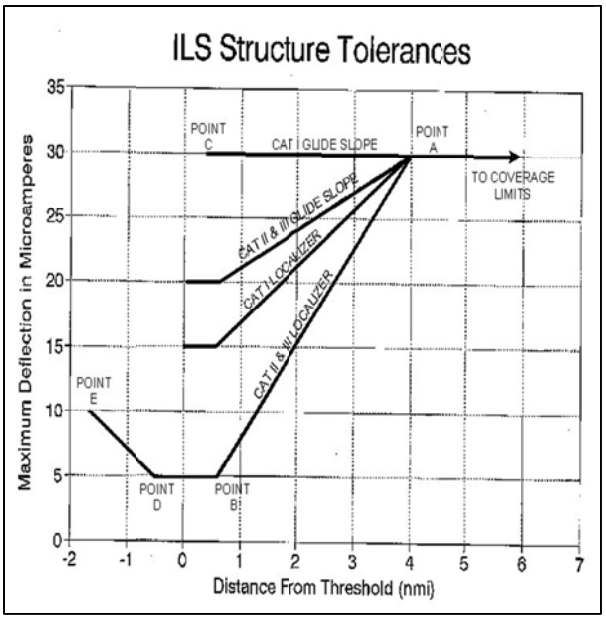


Figure A- 1. ILS point and zones.



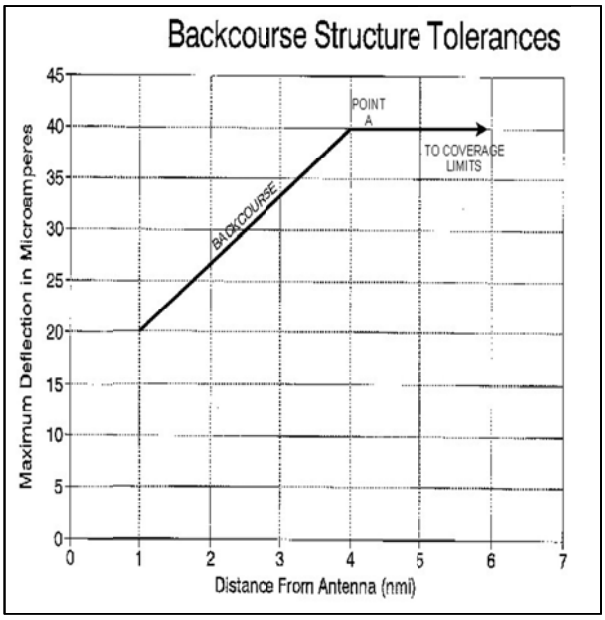


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Table A- 1. Localizer course structure tolerances.

Zone	Reference	Tolerance
Zone 1	From the average course signal	CAT I/II/III: ∀30 uA to ILS Point A. Backcourse: ∀40 uA to ILS Point A.
Zone 2	From the actual course alignment	CAT I: ∀30 uA at Point A; linear decrease to ∀15 uA at Point B. CAT II/III: ∀30 uA at Point A; linear decrease to ∀5 uA at Point B. BACKCOURSE: ∀40 uA at Point A; linear decrease to ∀20 uA at Point B.
Zone 3	From the actual course alignment	CAT I: ∀15 uA at Point B; ∀15 uA at Point C. CAT II/III: ∀5 uA at Point B; ∀5 uA at Threshold. BACKCOURSE: ∀20 uA at Point B; ∀20 uA at Point C.
Zone 4	From Zone 4 course alignment	CAT II/III: ∀5 uA at Threshold; ∀5 uA at Point D.
Zone 5	From Zone 5 course alignment	CAT II/III: ∀5 μA at Point D; ∀10 uA at Point E.

Table A- 2 provides a summary of the glide path structure tolerances for each of the ILS Zones.

The actual or announced path angle is the arithmetic mean of all values from ILS Point A to Point B.

Figure A- 2 and Figure A- 3 show a graphical representation of the structure tolerance brackets applied to each ILS zone.

Based on the above information, the course alignment or path angle, and the maximum percent of tolerance for each zone can be calculated. An example analysis for the localizer and glide slope is shown in Figure A-4 and Figure A-5, respectively.

Table A- 2. Glide slope structure tolerances.

Zone	Reference	Tolerance
Zone 1	From graphical average path	CAT I: ∀30 uA CAT II/III: ∀30 μA
Zone 2	From actual path angle	CAT I: ∀30 uA CAT II/III: 30 uA at Point A, then linear decrease to 20 uA at Point B.
Zone 3	From graphical average path	CAT I: ∀30 uA CAT II/III: ∀20 uA

TECHNICAL MEMORANDUM
OU/AEC TM XXXX

Site Analysis and Recommendation for Proposed Glide slope Relocations for Runway 10 and 28 at Baltimore-Washington International Airport

The glide slope systems serving Runway 10 and 28 at the Baltimore-Washington International (BWI) Airport have been analyzed to determine the effect of the terrain variations on the systems at their proposed new locations. The two systems are planned for relocation and the entire glide slope critical area (GSCA) will be graded. The model results show that a capture effect system will perform within CAT III tolerance limits at the relocation site for Runway 10 while the results indicate that both null reference and capture effect systems will perform within CAT I tolerance limits for the proposed location on Runway 28.

by

Simbo Odunaiya, Ph.D.

Avionics Engineering Center
School of Electrical Engineering and Computer Science
Ohio University
Athens, Ohio 45701-2979

September 2011

Prepared for
URS

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I. INTRODUCTION AND BACKGROUND

The Baltimore-Washington International (BWI) Airport is planning to relocate the glide slope antennas serving R/W 10 and R/W 28 at BWI. The relocation sites for both antennas are still on the same side of the runway but slightly further away from the runway centerline. The proposed locations for the glide slope antenna is relatively free of reflectors except for a line of trees that may be removed. URS has asked Ohio University to analyze both of these glide slope systems at the new locations to determine the performance of the R/W 10 glide slope within a CAT III ILS operation and for R/W 28 within a CAT I ILS operation.

Computer Modeling is now routinely used in these cases and has proven to be a cost-efficient and relatively risk-free method of predicting ILS performance given various multi-path environments. The Ohio University model proposed to be used in this study is the Ohio University Glide Slope Model (OUGS) and the Ohio University Navigation and Landing Performance Prediction Model (OUNPPM). The OUGS is based on the Uniform Theory of Diffraction for Electromagnetic Scattering and it is used to predict the performance of a glide slope system within a non-uniform terrain environment. The OUNPPM, on the other hand, is based on the Physical Optics Method for analyzing scattering from large structures like hangars fences, and aircraft.

A. Site Data

A site visit was conducted at the BWI Airport to appraise the situation firsthand. The existing and proposed sites were inspected. Figure 1 is a Google map showing the immediate vicinity of the proposed glide slope for runway 10. The system currently serving this runway is a capture effect system located 1014 feet from the threshold and offset 399 feet from the runway centerline to the right of the approach. The proposed system will be located on the same side of the runway as the existing system, but at a larger offset of 467 feet. Figure 2 is a photograph taken during the site visit that shows the general terrain in front of the glide slope. The elevation at the proposed glide slope location after preparation will be 137 feet.

The site inspection also reveals a fenced parking area for trucks and other utility vehicles near the proposed GS location. The fence runs almost parallel to the runway centerline and is offset from the centerline by about 645 feet. This fence has the potential to affect GS system performance especially as the proposed location will be closer to the fence than the existing system.

Figure 3 is a Google map that shows the immediate area of the proposed glide slope for Runway 28. The current system on this runway is a null reference (NR) system which is located 956 feet from the threshold and offset 375 feet from the runway centerline to the left of the approach. The relocated system will be on the same side of the runway and will be about the same setback but offset 410 feet from Runway centerline to the left of the approach. The ground elevation at the proposed location will be 128.5 feet.

The proposed location will fall in an area that is essentially free of other potential scatterers except for the line of trees to the left of the approach. Figure 4 is a picture taken during the site visit that shows the existing system.

Figure 1. Google map showing the immediate vicinity of the proposed Runway 10 GS.

Figure 2. Photograph showing ditch area near proposed site for Runway 10 relocated GS.

Figure 3. Google map showing the immediate area of the proposed Runway 28 GS.

Figure 4. Photograph showing the proposed location for the relocated GS on Runway 28.

II. MODELING RESULTS

A. Modeling Parameters

The approach in this study is to model all possible antenna configurations for both of the relocated GS systems. However, because the GS on R/W 10 will be operating in CAT III ILS operations only, a capture effect system will be modeled. On the other hand both a null reference and a capture effect system will be modeled for R/W 28. Areas of the terrain will be modified to also determine the most effective ground modifications to minimize any adverse effects identified.

A summary of the site data for both of the relocated glide slope systems is as shown in Table 1. These data will be used along with the data from the AutoCAD files supplied by URS in the modeling of the glide slope.

Table 1. Facility parameter used in simulations

Parameter	**Runway 10 Glide Slope**	**Runway 28 Glide Slope**	
Equipment	Capture Effect	Null Reference	Capture Effect
Setback (feet)	1014	956	956
Offset (feet)	R467	L410	L410
Antenna ground elevation (feet MSL)	137	130	130
Alignment (deg.)	3.0	3.0	3.0
Category of Operation	III	I	I

B. Runway 10

1. Terrain Result

The ground data used for this modeling effort has been supplied by URS. Figure 1 below shows the proposed ground plane as has been modeled with the Ohio University glide slope (OUGS) terrain effects prediction model. The model result for a CE system shows that the CE system will perform satisfactorily with the proposed terrain as it is. The modeled system result shown in Figure 6 indicates a roughness of 15% of tolerance limits in CAT III operation. This is an acceptable level of performance. Tolerance limits have been set for different categories of ILS operations. The limits for CAT III performance is tighter than for CAT I. More information on tolerances and the limits are provided in Appendix A.

2. Structures Result

The only structural potential source of multipath observed at the site is the fence on the right of the approach. This fence is about 1535 feet long and is offset about 645 feet from the runway centerline. The OUNPPM has been used to model the effect of this fence on the performance of the proposed relocated GS. The result obtained is as shown in Figure 7. The result shows that the effect of the fence is noticeable and significant but falls within tolerance limits at less than 60% of CAT III limits.

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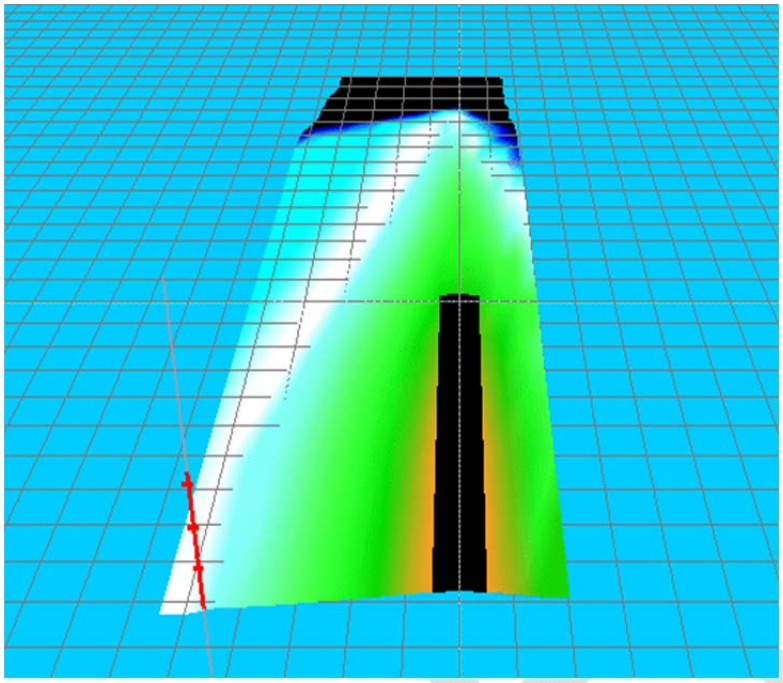

Figure 5. Runway 10 graded area as modeled in the OUGS.

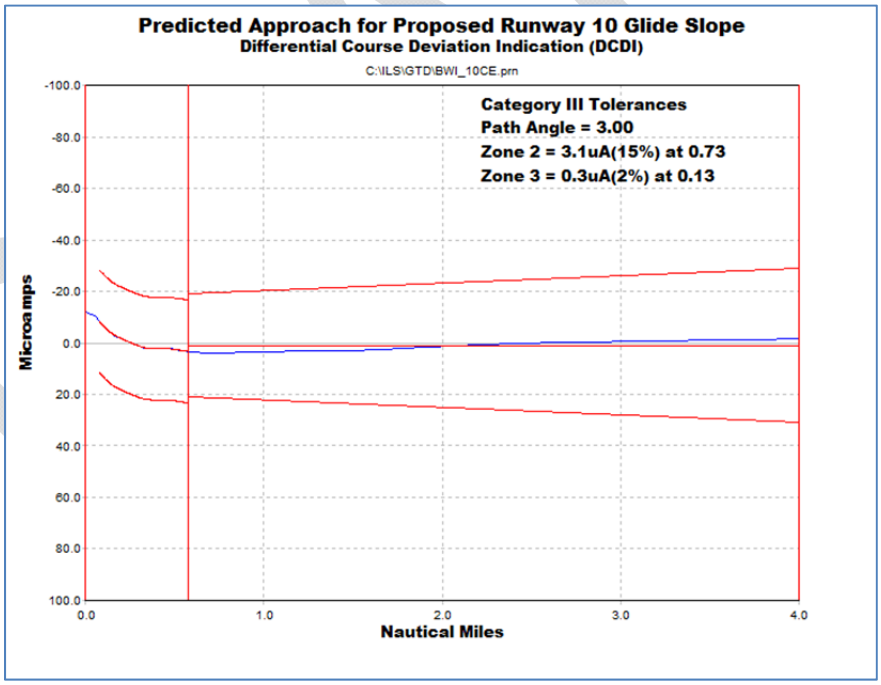

Figure 6. Approach flight profile result for terrain effects on CE GS system on Runway 10.

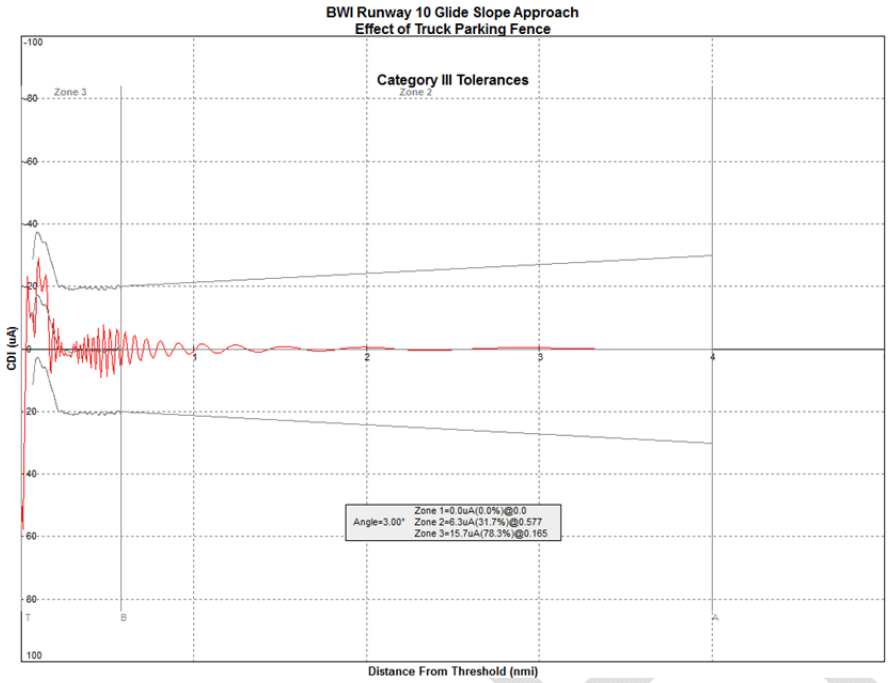

Figure 7. Effect of truck parking fence on approach flight profile for a CE GS system on Runway 10.

C. Runway 28

The modeled ground plane for Runway 28 is as shown in Figure 8. This ground plane will fit in within what the FAA Order 6750.16D refers to as a Type 3 Site. The site is has a standard cleared area which then goes into a downward slope with a brief upslope on the centerline of the runway. Few of these types of site will perform with null reference systems, while most of these sites will perform well a capture effect system.

1. Null Reference System

The model result obtained for a NR system is as shown in Figure 9. The system performance is at 57% of tolerance limits for CAT I operations. The system roughness is significant but still well within tolerance limits. The roughness is due to the terrain discontinuities in the area leading to the mound for R/W 10 localizer. Sharp discontinuities like this are not physical and are due to the model limitations. While the effect of the terrain discontinuity will be apparent, it is safe to assume that it will not be as high as predicted.

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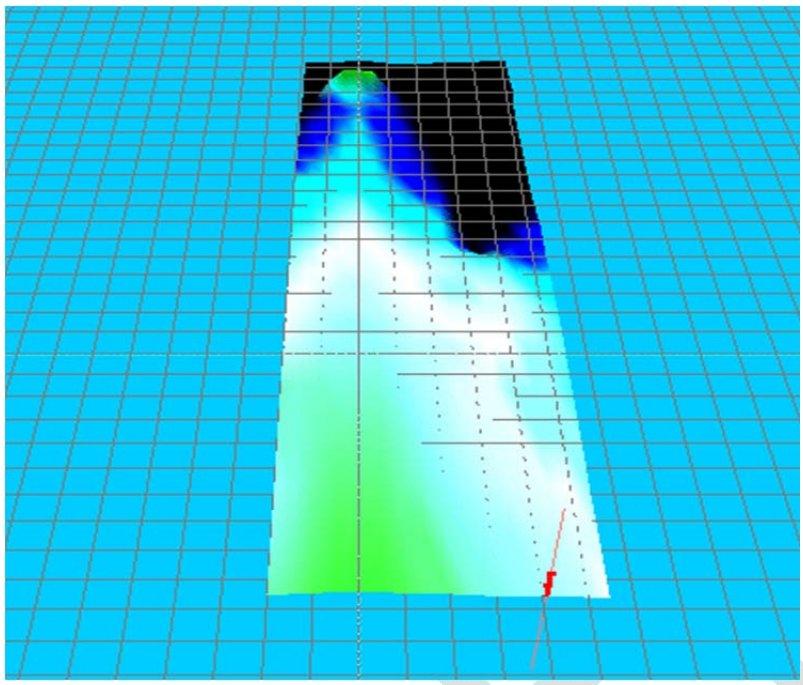

Figure 8. Runway 33L terrain profile as modeled in the OUGS model.

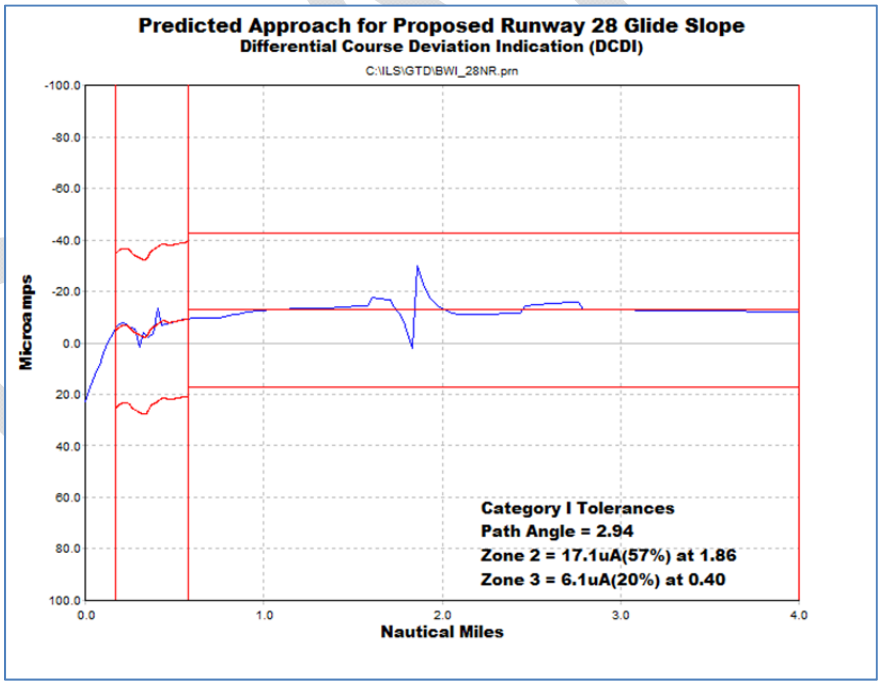

Figure 9. Predicted result for a proposed NR GS system on runway 28.

2. Capture Effect System

The result for the CE system is as shown in Figure 10. This result also indicates that a CE effect system will perform satisfactorily at the proposed location. The performance predicted is 75% of CAT I tolerances in Zone 2. The same issue identified with the NR system is also applicable here. It is however noted that contrary to intuition the null reference system seem to be performing much better than the capture effect system. This does happen and has been observed in the past at other sites.

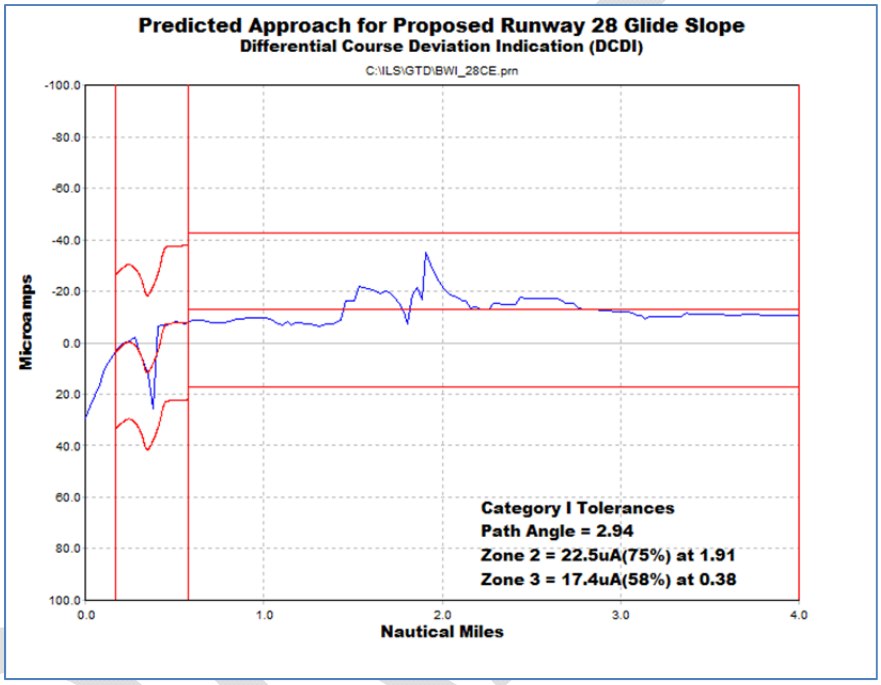

Figure 10. Predicted Result for a proposed CE GS system on Runway 28.

3. Line of Trees near GS Antenna

The line of trees which is located near the proposed relocation site for the Runway 28 GS has also been modeled using the Ohio University Navigation and Landing Performance Prediction Model (OUNPPM). The result obtained for a CE system is as shown in Figure 11 below. The result shows that the effect of the trees is noticeable but acceptable. The system performance with the trees falls within tolerance limits at 17.9% of CAT I tolerance limits. The data used for modeling the trees have been assumed at a worst case scenario and tree heights of 60 feet have been used.

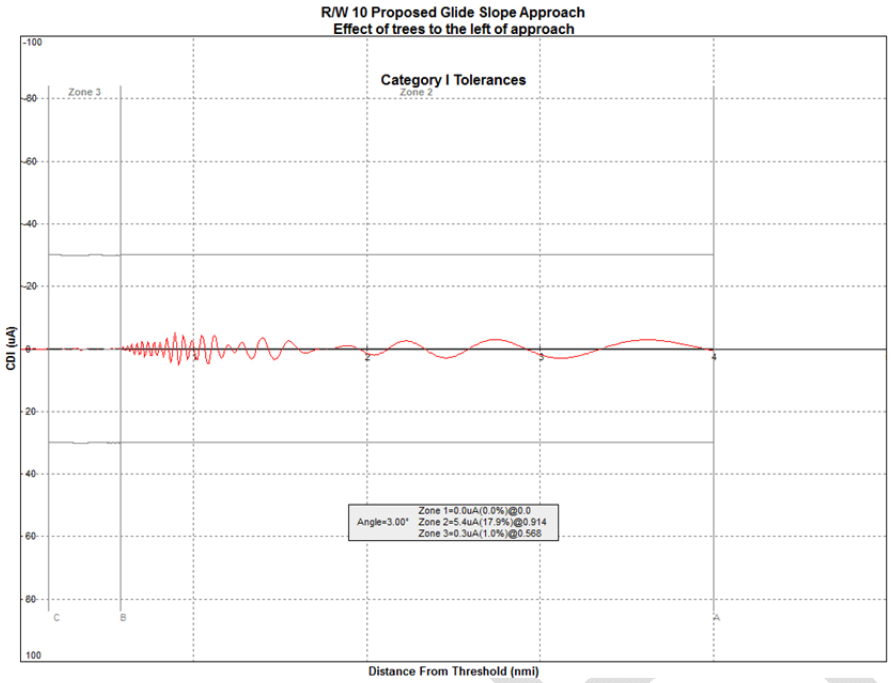

Figure 11. Approach flight profile showing the effect of the line of trees near relocation site for Runway 28 GS.

III. CONCLUSIONS

Based on the analysis results presented, the conclusions reached with regards to the proposed relocation of Runway 10 and 28 GS systems are as follows:

Runway 10

1. A CE effect system will perform within tolerance limits at the proposed site with the proposed terrain grading.
2. The effect of the truck parking fence on the GS at the proposed relocation site is significant but still within tolerance limits. This effect can be reduced by moving system closer to the runway centerline.

Runway 28

1. A NR will perform within tolerance limits at the proposed relocation site with the proposed terrain grading.
2. A CE system will perform within tolerance limits at the proposed relocation site with the proposed terrain grading.
3. The effect of the line of trees, near the proposed relocation site, on the left of the approach, is acceptable.

IV. REFERENCES

[1] FAA Order 6750.16D, "Siting Criteria for Instrument Landing Systems," Federal Aviation Administration, February 2005.

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V. APPENDIX A.

ILS ZONES AND TOLERANCES

There are different points along the ILS approach which are defined and used to differentiate a segment or zone along the approach path. The ILS Points and Zones are shown in Figure A- 1 and are defined as follows:

ILS Point A is an imaginary point on the glide path or localizer on-course measured along the runway centerline extended, in the approach direction, 4 nautical miles from the runway threshold.

ILS Point B is an imaginary point on the glide path or localizer on-course measured along the runway centerline extended, in the approach direction, 3,500 feet from the runway threshold.

ILS Point C is a point through which the downward extended straight portion of the glide path, at the commissioned angle, passes, at a height of 100 feet above the horizontal plane containing the runway threshold.

ILS Point D is a point 12 feet above the runway centerline and 3,000 feet from the runway threshold in the direction of the localizer.

ILS Point E is a point 12 feet above the runway centerline and 2,000 feet from the stop end of the runway in the direction of the runway threshold.

ILS Zone 1 is the region beginning from the coverage limit of the localizer or glide slope to ILS Point A.

ILS Zone 2 is the region between ILS Point A and ILS Point B.

ILS Zone 3 is the region between ILS Point B and ILS Point C used for evaluation of Category I ILS. The region between ILS Point B and the runway threshold is used for evaluations of Category II and III facilities.

ILS Zone 4 is the region between runway threshold and ILS Point D.

ILS Zone 5 is the region between ILS Point D and ILS Point E.

Table A-1 provides a summary of the localizer course structure limits for each of the ILS Zones. The actual or announced course alignment is the arithmetic mean of all values one nautical mile from threshold to the threshold. In addition, for Category II and III analysis, ILS Zones 4 and 5 have a separate zone alignment. This zone alignment is determined by the arithmetic mean of all values within the corresponding zone.

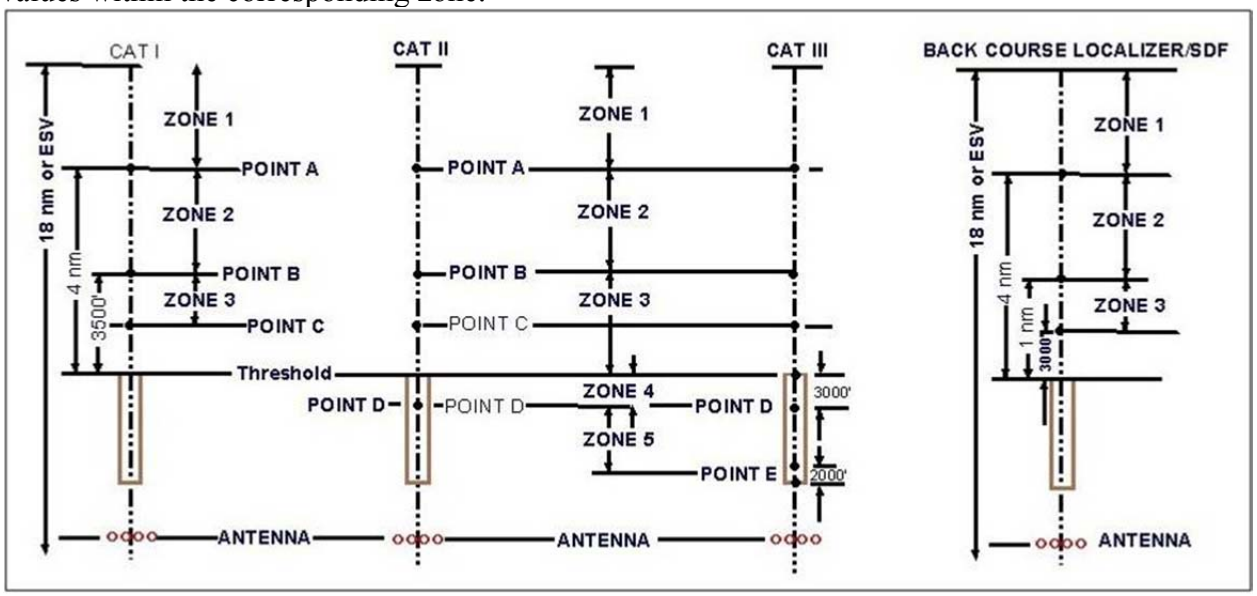

Figure A- 1. ILS point and zones.

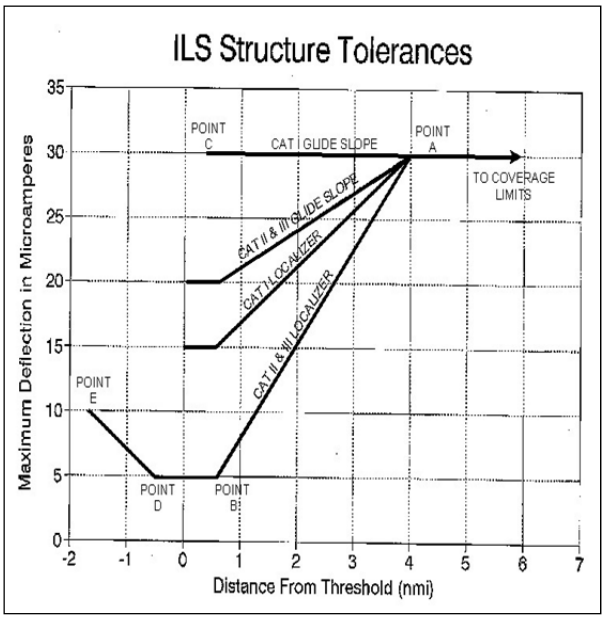

Figure A- 2. ILS structure tolerances

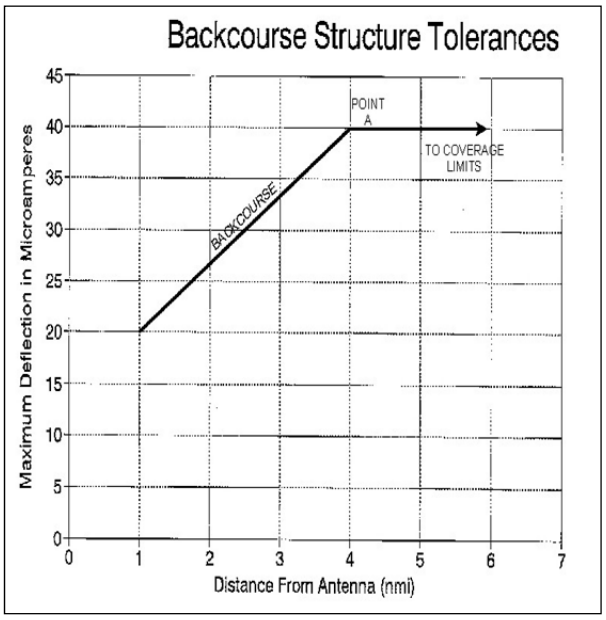

Figure A- 3. ILS structure tolerances

Table A- 1. Localizer course structure tolerances.

Zone	Reference	Tolerance
Zone 1	From the average course signal	CAT I/II/III: ∀30 uA to ILS Point A. Backcourse: ∀40 uA to ILS Point A.
Zone 2	From the actual course alignment	CAT I: ∀30 uA at Point A; linear decrease to ∀15 uA at Point B. CAT II/III: ∀30 uA at Point A; linear decrease to ∀5 uA at Point B. BACKCOURSE: ∀40 uA at Point A; linear decrease to ∀20 uA at Point B.
Zone 3	From the actual course alignment	CAT I: ∀15 uA at Point B; ∀15 uA at Point C. CAT II/III: ∀5 uA at Point B; ∀5 uA at Threshold. BACKCOURSE: ∀20 uA at Point B; ∀20 uA at Point C.
Zone 4	From Zone 4 course alignment	CAT II/III: ∀5 uA at Threshold; ∀5 uA at Point D.
Zone 5	From Zone 5 course alignment	CAT II/III: ∀5 μA at Point D; ∀10 uA at Point E.

Table A- 2 provides a summary of the glide path structure tolerances for each of the ILS Zones.

The actual or announced path angle is the arithmetic mean of all values from ILS Point A to Point B.

Figure A- 2 and Figure A- 3 show a graphical representation of the structure tolerance brackets applied to each ILS zone.

Based on the above information, the course alignment or path angle, and the maximum percent of tolerance for each zone can be calculated. An example analysis for the localizer and glide slope is shown in Figure A-4 and Figure A-5, respectively.

Table A- 2. Glide slope structure tolerances.

Zone	Reference	Tolerance
Zone 1	From graphical average path	CAT I: ∀30 uA CAT II/III: ∀30 μA
Zone 2	From actual path angle	CAT I: ∀30 uA CAT II/III: 30 uA at Point A, then linear decrease to 20 uA at Point B.
Zone 3	From graphical average path	CAT I: ∀30 uA CAT II/III: ∀20 uA

CONTRACT NO. MAA-AE-01-006

Baltimore Washington International Airport

PERIMETER ROAD STUDY ADDENDUM

NORTHWEST QUADRANT

Prepared for

Maryland Department of Transportation
Maryland Aviation Administration
Planning and Environmental Services

Prepared by

PB Aviation

MAY 26, 2004

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1.0 PURPOSE OF THE ADDENDUM

The Maryland Aviation Administration (MAA) requested that PB Aviation prepare an addendum to the 2002 Perimeter Road Study addressing a set of key issues related to the proposed Baltimore / Washington International Airport (BWI) perimeter road in the airport's northwest quadrant. These issues included:

- Changing the maximum grade for the roadway;
- Revising the recommended alternative for the roadway in the northwest quadrant;
- Updating the concept level cost estimate for the roadway in the northwest quadrant; and
- Assessing critical issues related to the location of the proposed Kitten Branch crossing and the issues related to potentially moving the crossing further south.

This summary report addresses each of these issues and serves as an addendum to the prior report produced in 2002. It is also intended to support future perimeter roadway planning and design work.

2.0 THE ORIGINAL PERIMETER ROADWAY STUDY

Currently BWI does not have an adequate, secure non-licensed vehicle roadway (NLVR) system. This lack of a road system limits the efficient and safe flow of vehicles and cargo from one part of the airfield to another. In addition to access, circulation, and safety limitations, it also hinders the ability of emergency response and security vehicles to quickly navigate the airport property to respond to emergency situations and potential security threats. It was for these other related reasons, that MAA initiated the original Perimeter Road Study. The primary goals for the perimeter road included:

- Improve on-airport access and circulation for cargo, maintenance, operations, security, and emergency response vehicles;
- Minimize the need for such vehicles to cross active airfield surfaces or penetrate Federal Aviation Regulation (FAR) Part 77 surfaces or other restricted areas;
- Deter vehicle runway incursions; and
- Provide on-airport access between the Midfield Cargo Complex and the passenger terminal area and Cargo North Complex.

The study included the development of a series of alternatives designed to meet the objectives listed above while taking into account aviation restrictions, topography, environmental resources and other critical issues. The study presented the alternative concepts, benefits and drawbacks for each, and conclusions for implementation. The study was completed in June 2002.

3.0 ROADWAY DESIGN CRITERIA MODIFICATIONS

In the 2002 study a set of concept level roadway design criteria were established in order to develop potential roadway alternatives and associated cost estimates. The criteria addressed general horizontal and vertical design criteria and cross section elements as shown in Table 1 below.

Since 2002 a decision has been made to reduce the maximum grade to 3% for the roadway in the northwest quadrant (3 feet or less of rise per 100 feet of roadway). This decision was made to better accommodate tugs and ARFF vehicles. These are the design vehicles for the project.[1]

This change will result in increased earthwork quantities as well as additional potential for environmental impacts. However, the change was determined to better meet the project need, which is for a route across the northwest quadrant of the airport that can adequately serve the cargo hauling and emergency / security access needs between the main terminal and the midfield cargo area.

Table 1: Roadway Design Criteria

	25 MPH DESIGN SPEED	**35 MPH DESIGN SPEED**	**45 MPH DESIGN SPEED**
Type of Road	Local	Local	Local
Terrain	Rolling	Rolling	Rolling
Design Speed	25MPH	35 MPH	45MPH
Lane Width	12'	12'	12'
Shoulder Width	4'	4'	4'
Min. Radius	185'	380'	660'
Length of Runoff	105'	120'	140'
Max. Grade	~~5%~~ **3%**	~~5%~~ **3%**	~~5%~~ **3%**
Clear Zone	10'	10'	10'

Source: A Policy on Geometric Design of Highways and Streets, AASHTO, Washington D.C., 1990.

4.0 RECOMMENDED ALTERNATIVE

4.1 Previous June 2002 Study

In the 2002 study a series of concept level alternatives were developed and evaluated for the perimeter roadway in the northeast quadrant of the airport. This included alternatives that remained close to the fence line, alternatives that crossed the hill north of the Airport Surveillance Radar (ASR) site, alternatives that crossed the hill south of the ASR, and alternatives that ran near the runways and taxiways. (For a complete discussion of these alternatives please refer to the June 2002 report.)

[1] Fuel trucks are not expected to use the roadway except in the rare event that the Midfield Fuel Farm is inoperable.

In that report two alternatives were put forward as preferred alternatives for future planning and design. The major difference between the two alternatives was that one was located north of the ASR and the second was located south of the ASR.

4.2 Recommended Alternatives

Over the past two years additional discussions have been held internal to MAA and with the FAA. At a Feb 4, 2004 meeting with the Baltimore Air Traffic Control Tower, it was decided that the northern route around the ASR was the preferred route. This alternative (listed as Segment 5 in the prior study) offers a fairly direct route across the quadrant and it is located approximately 300 feet from the ASR site. This potential route is shown as Perimeter Road Option A on the attached Figure 4-1, which has been updated from the previous study (see the new legend in the lower right corner of the sheet).

A few other modifications have been made to the alternative in the vicinity of the two runway ends. The most significant of these changes routes the roadway further west around the end of Runway 10 to completely avoid the Runway Safety Area / Object Free Area. To accomplish this, the roadway will parallel the existing public roads in the vicinity of Aviation Boulevard.

A review of the profile for Segment 5 indicates that it is feasible to reduce the maximum grade to 3%, while maintaining the same corridor. However, the potential for environmental impacts is likely to increase with a wider limit of disturbance for the roadway. The conceptual cost estimate is also expected to increase, due to more extensive earthwork quantities, as discussed below.

As was stated previously, the reason for the change was to better meet the needs of the project. A road with modest grades and few curves is compatible with the needs of the heavy vehicles (such as tugs with trailers and ARFF vehicles) that could be expected to use the roadway. Steep grades will hinder vehicle traffic, but they can also create difficult conditions, especially in winter, for tugs and other vehicles that are typically driven on level surfaces.

Recently, a proposal has been put forward to extend Northrop Grumman's apron area south of their current facility at the end of Taxiway W as shown in Figure 4-1. If this project is implemented, the perimeter roadway will need to shift south approximately 400 feet. This appears to be feasible as shown with Option B and is discussed in more detail below.

4.3 Cost Estimates

The estimated cost for the new Option A alternative is expected to be higher than the previously recommended alternative due to the increased earthwork, additional length and construction requirements at the end of Runway 10, the adjustments in the vicinity of the end of Runway 15R, and inflation. The change from using Segment 4 to using Segment 5 will also affect the total project cost. The cost for Option B will be slightly

higher than that for Option A because the alignment is 300 feet longer and must contend with steeper slopes on the hill west of the Kitten branch and Taxiway W.

In order to prepare concept level cost estimates, earthwork quantities were estimated for each alignment as shown on the attached Tables 2 and 3. In addition, the length of the road and the estimated bridge deck area were considered. Simple percentages were used to calculate other supporting numbers in a manner consistent with the estimates done in the original study. The standard planning level factors (including a 25% planning contingency) were then added to the cost. The cost of the bridge is shown on these cost estimates as an approximately $1 million item, however when the applicable percentages (design, contingency, etc.) are added the cost is approximately $1.6 million. The total new estimated capital cost for Option A is $7.1 million, while the estimate for Option B is $7.5 million.

5.0 KITTEN BRANCH CROSSING ISSUES

5.1 Project Location

The Kitten Branch runs parallel to Runway 15R-33L on the west side of the runway. The perimeter road must cross the Kitten Branch to reach the west side of the airfield. Figure 1 shows the location of the Kitten Branch as well as the general topography of the area.

5.2 Topography and Key Features

The Kitten Branch is a perennial stream draining a large section of the airport property. It is classified as a Use I stream and is also listed as one of the “waters of the US”, indicating that it is regulated by the Corp of Engineers. There are numerous wetlands in the area as shown on the attached Figure 1. The entire Kitten Branch bottom area is in the 100-year flood plain according to available mapping. There are also forested areas throughout the area, both lining the stream and then in larger areas to the south. Some of these areas are forest conservation areas.

The topography of the area is a valley with steep slopes on either side. Runway 15R-33L is on the east side of the valley and Taxiway W is on the west side of the valley. The airport owns most of the land along the Kitten Branch, except for the northwest potion of the valley, which is owned by Northrop Grumman.

5.3 Initial Study

The initial planning study for the perimeter road selected the crossing location shown on the attached Figure 1. This location was determined to be a feasible crossing location, that limited potential environmental impacts, while still serving the competing needs of the various roadway users (such as tugs, emergency vehicles, security patrols, FAA vehicles, and other MAA vehicles).

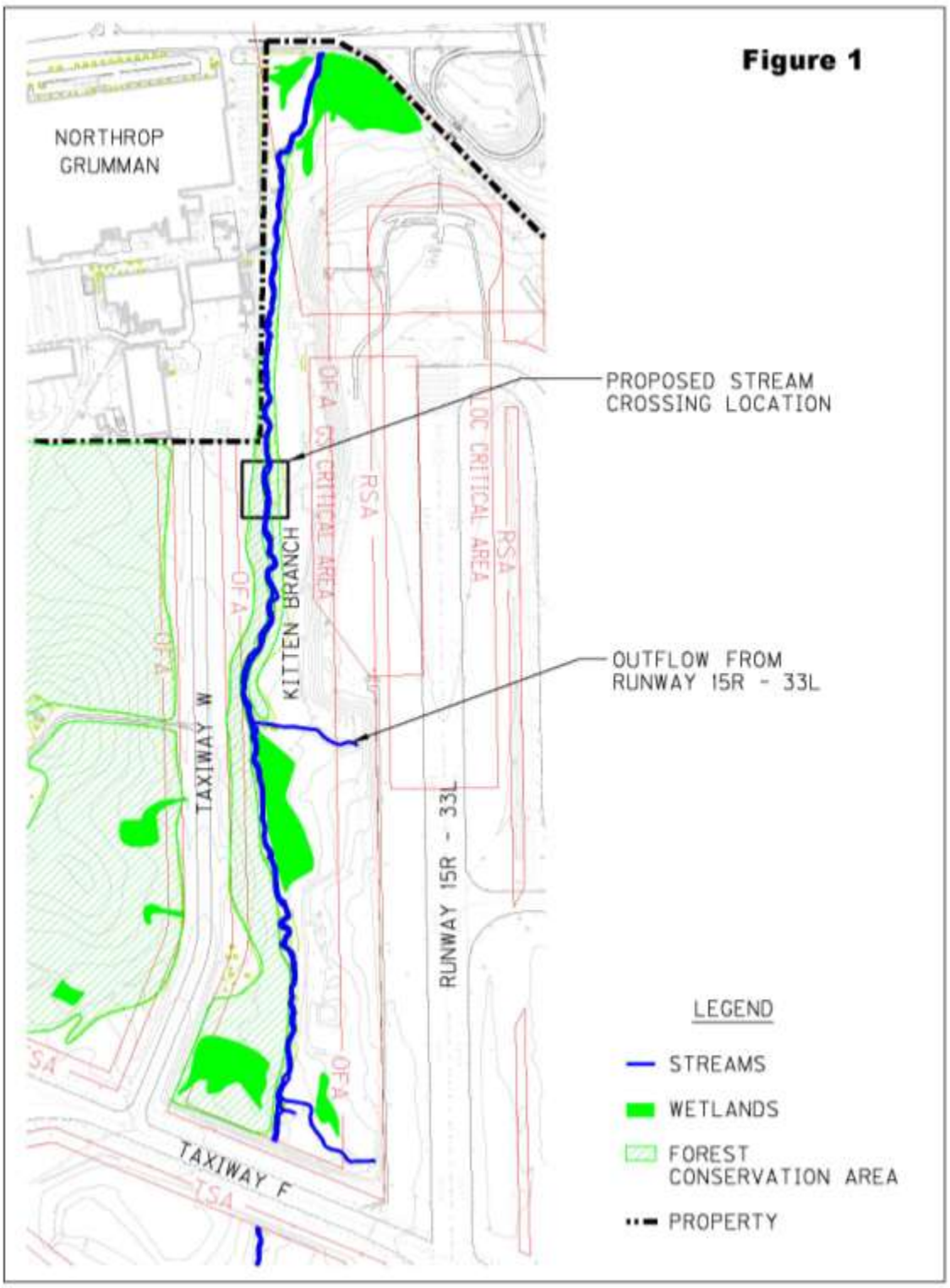


Figure 1
NORTHROP
GRUMMAN
PROPOSED STREAM
CROSSING LOCATION
OUTFLOW FROM
RUNWAY 15R - 33L
KITTEN BRANCH
TAXIWAY W
TAXIWAY F
RUNWAY 15R - 33L
OFA
RSA
LOC CRITICAL AREA
LEGEND
STREAMS
WETLANDS
FOREST
CONSERVATION AREA
PROPERTY

5.4 Key Issues Related to the Crossing Location

There have been recent discussions regarding possible alternate, more southern stream crossing locations. In response, a list of the key issues related to the crossing of Kitten Branch has been prepared and is given below:

- Crossing the Kitten Branch south of the outfall from Runway 15R-33L (800 feet south of the proposed location) would be difficult due to the presence of wetlands, additional streams, steep slopes, and a significant elevation difference between the valley bottom and the upper elevation near Taxiway W.
- The Northrop Grumman property limits a crossing in the north. If Northrop Grumman extends their apron area to the south that would shift the perimeter road to the south approximately 400 feet.
- The presence of a floodplain throughout the valley makes a northern crossing preferable to limit the length the road is in the floodplain.
- The presence of the Kitten Branch itself discourages running further south than necessary, to limit longitudinal stream impacts.
- The forest stand at the south end of the valley is a forest conservation area (and a wetland), discouraging unnecessary impacts to this area.
- There appears to be a break in the riparian buffer (essentially the stream bank vegetative buffer area) near the southern end of the potential crossing area shown on Figure 1. This is about 250 feet south of the proposed crossing location.
- A more northern crossing is better for safety and security, as it keeps vehicles further away from the active airfield.
- A northern crossing may result in a lower overall length for the roadway (the bridge lengths appear to be similar).
- A northern stream crossing works well with a perimeter road passing over the hill north of the ASR. However, the crossing could be shifted south and still cross north of the ASR.

5.5 Other Issues of Importance

There are a few other issues that are important to consider in this analysis that may have an effect on the location and will certainly have an effect on the design. They include:

- Determining whether the crossing is a bridge or culvert is very important. In the planning study the initial view was that a bridge would be required due to environmental resource issues (stream, wetland, and floodplain). If a culvert was determined to be acceptable, this could significantly reduce the cost of the crossing. However, the permitting and regulatory agencies such as the Maryland Department of the Environment (MDE) are expected to prefer a bridge because it can be used to minimize environmental impacts.

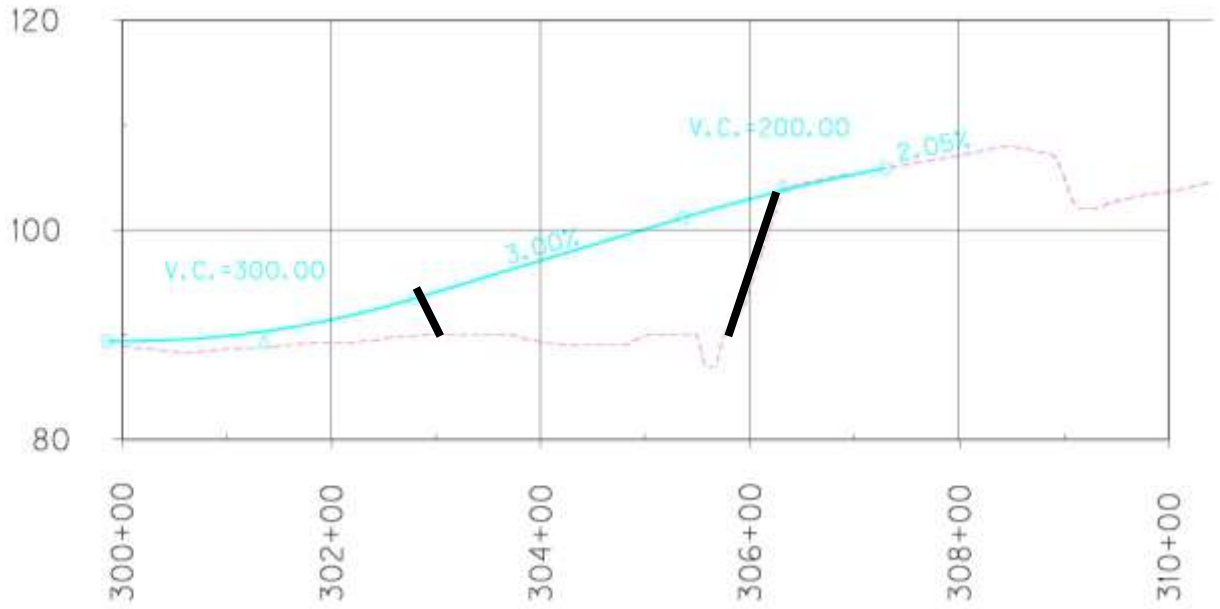
- Additional fill or structure on the east side of the Kitten Branch (in the floodplain) may be beneficial (from a design and cost perspective) to achieve a 3% maximum grade for the roadway with no impacts to Taxiway W. However, the

US Army Corp. of Engineers and MDE may discourage additional fill in the floodplain. This could mean a longer bridge structure to span the entire floodplain. Regardless, a hydrology and hydraulics (H&H) study will be necessary to demonstrate that the proposed structure will not change the hydrology either upstream or downstream. The design may have to be modified until the modeling shows no change in upstream or downstream flood conditions (zero rise determination).

- North of the outflow from Runway 15R-33L there are a few locations with sufficient valley bottom area to achieve the necessary roadway radius for the east bridge approach to construct a crossing perpendicular to the stream, without impacting the runway hillside, environmental resources, or existing stormwater facilities. (This is more difficult south of the outflow from Runway 15R-33L.)

- The floodplain in the area of the proposed crossing is just under 200 feet wide. Depending on the crossing angle and the point of departure for the bridge on the east side of the stream, it has been estimated that a bridge in this vicinity could be as much as 250 feet long as shown below. This 250-foot estimate appears to be valid for a crossing 400 feet south as well.

Figure 2: Conceptual Profile for Proposed Kitten Branch Crossing



- The topography and environmental constraints lend themselves to a crossing located somewhere in the vicinity of the proposed crossing, but certainly not more than 800 feet south of the proposed crossing. The exact crossing location can be defined in conjunction with the environmental and design process;

however it is clear from the planning study that a location within or just south of the proposed location is a reasonable crossing point.

5.6 Kitten Branch Crossing Conclusions

Figure 1 shows many of the issues related to a crossing of the Kitten Branch. Based on the items listed above and the environmental resources shown in Figure 1, a crossing north of the outfall from Runway 15R-33L is recommended. The exact location for this crossing can be determined in the environmental and design process. However, at the planning level it appears that the currently proposed location (or a location no more than 400 feet to the south) would be a preferred crossing location. A crossing in this vicinity is expected to minimize environmental impacts (stream, wetland, floodplain, and riparian buffer), reduce distance and travel time, limit costs, yield a high level of operational efficiency, and provide a reasonable design with good safety and security. Therefore, either Options A or B appear to be feasible and reasonable for implementation, though Option B is somewhat longer and has an estimated cost that is $400,000 higher than Option A.

Table 2
OPTION A
Northwest Quadrant
Capital Cost Estimate
Perimeter Road Study
Baltimore/Washington International Airport

Description (see notes)	Quanity	Units	Unit Cost $	Total
1. Preliminary (24% 3, 4)	-	-	-	$578,936
2. Cleaning and Grubbing	10	AC	$10,000	$100,000
3. Excavation	91,250	CY	$10	$912,500
4. Paving (11,100 LF)	39,467	SY	$38	$1,499,733
5. Drainage (22% 2, 3)	-	-	-	$222,750
6. Bridge	9750	SF	$100	$975,000
7. Landscaping (10% 2, 3)	-	-	-	$101,250
Subtotal - Construction Cost Estimate				$4,390,169
8. Misc. Construction Allowance (8%)				$351,214
Subtotal				$4,741,383
9. Planning Contingency (25%)				$1,185,346
Subtotal				$5,926,729
10. Estimated Design Fee (12%)				$711,207
11. Estimated CMI Fee (8%)				$474,138
Total				$7,112,074

PB Aviation May 26, 2004

General Notes:

1. Preliminary - Includes mobilization, site preparation, installation of erosion/siltation controls.
2. Cleaning and Grubbing - Cleaning and Grugging of 70' wide stump and restoration of non-paved areas.
3. Excavation - All excavation assumed to be "unclassified" excavation. Detailed rock profile should be conducted prior to design.
4. Paving - Assume 4" bituminous surface + 6" bituminous base + 12" crushed aggregate + prepared subgrade with geotextile fabric.
5. Drainage - Includes culverts, swales, etc.
6. Bridge - Required to cross Kitten Branch near R/W 15R. Assume 250 foot long bridge, 39 feet wide (two 12-foot lanes, two 6-foot shoudlers, two 1.5 foor barriers).
7. Landscaping - Along Aviation Blvd. at South end of segment.
8. Design Contingency - Allows for pre-preliminary level of analysis.
10. Estimated Design Fee - Includes surveys and geotechnical investigation.
11. Estimated CMI Fee - Construction inspection and quality assurance testing.
12. The cost estimate does not include environmental mitigation or detailed archeological work

Table 3
OPTION B
Northwest Quadrant
Capital Cost Estimate
Perimeter Road Study
Baltimore/Washington International Airport

Description (see notes)	Quanity	Units	Unit Cost $	Total
1. Preliminary (24% 3, 4)	-	-	-	$616,864
2. Cleaning and Grubbing	10	AC	$10,000	$100,000
3. Excavation	103,000	CY	$10	$1,030,000
4. Paving (11,400 LF)	40,533	SY	$38	$1,540,267
5. Drainage (22% 2, 3)	-	-	-	$248,600
6. Bridge	9750	SF	$100	$975,000
7. Landscaping (10% 2, 3)	-	-	-	$113,000
Subtotal - Construction Cost Estimate				$4,623,731
8. Misc. Construction Allowance (8%)				$369,898
Subtotal				$4,993,629
9. Planning Contingency (25%)				$1,248,407
Subtotal				$6,242,036
10. Estimated Design Fee (12%)				$749,044
11. Estimated CMI Fee (8%)				$499,363
Total				$7,490,444

PB Aviation May 26, 2004

General Notes:

1. Preliminary - Includes mobilization, site preparation, installation of erosion/siltation controls.
2. Cleaning and Grubbing - Cleaning and Grugging of 70' wide stump and restoration of non-paved areas.
3. Excavation - All excavation assumed to be "unclassified" excavation. Detailed rock profile should be conducted prior to design.
4. Paving - Assume 4" bituminous surface + 6" bituminous base + 12" crushed aggregate + prepared subgrade with geotextile fabric.
5. Drainage - Includes culverts, swales, etc.
6. Bridge - Required to cross Kitten Branch near R/W 15R. Assume 250 foot long bridge, 39 feet wide (two 12-foot lanes, two 6-foot shoudlers, two 1.5 foor barriers).
7. Landscaping - Along Aviation Blvd. at South end of segment.
8. Design Contingency - Allows for pre-preliminary level of analysis.
10. Estimated Design Fee - Includes surveys and geotechnical investigation.
11. Estimated CMI Fee - Construction inspection and quality assurance testing.
12. The cost estimate does not include environmental mitigation or detailed archeological work

APPENDIX E
NOISE TECHNICAL APPENDIX

1 FUNDAMENTALS OF AIRCRAFT NOISE

A variety of noise metrics are used to assess airport noise impacts. Noise metrics are used to describe individual noise events (such as a single operation of an aircraft taking off overhead) or groups of events (such as the cumulative effect of numerous aircraft operations, the collection of which creates a general noise environment or overall exposure level). Both types of descriptors are helpful in explaining how people tend to respond to a given noise condition. Descriptions of these metrics are provided below.

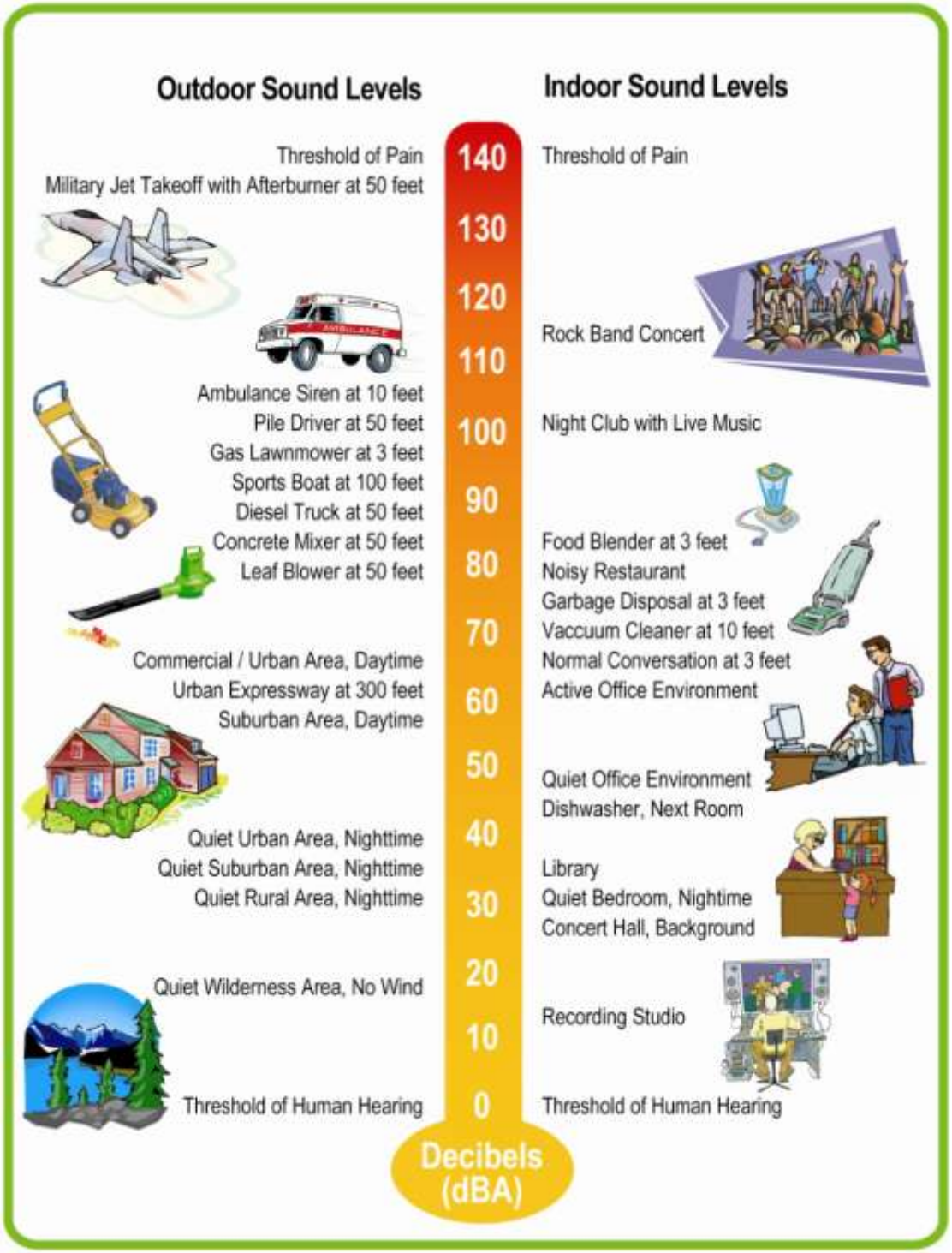
Decibel, (dB) – Sound is a complex physical phenomenon consisting of complex minute vibrations traveling through a medium, such as air. These vibrations are sensed by the human ear as sound pressure. Because of the vast range of sound pressure detectable by the human ear, sound pressure level (SPL) is represented on a logarithmic scale known as decibels (dB). A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet (laboratory-type) listening conditions. A SPL of 120 dB begins to be felt inside the ear as discomfort and pain at approximately 140 dB. Most environmental sounds have SPLs ranging from 30 to 100 dB.

Because decibels are logarithmic, they cannot be added or subtracted directly like other (linear) numbers. For example, if two sound sources each produce 100 dB, when they are operated together they will produce 103 dB, not 200 dB. Four 100 dB sources operating together again double the sound energy, resulting in a total SPL of 106 dB, and so on. In addition, if one source is much louder than another, the two sources operating together will produce the same SPL as if the louder source were operating alone. For example, a 100 dB source plus an 80 dB source produce 100 dB when operating together. Two useful rules to remember when comparing SPLs are: (1) most people perceive a 6 to 10 dB increase in SPL between two noise events to be about a doubling of loudness, and (2) changes in SPL of less than about 3 dB between two events are not easily detected outside of a laboratory.

A-Weighted Decibel, (dBA) – Frequency, or pitch, is a basic physical characteristic of sound and is expressed in units of cycles per second or hertz (Hz). The normal frequency range of hearing for most people extends from about 20 to 20,000 Hz. Because the human ear is more sensitive to middle and high frequencies (i.e., 1000 to 4000 Hz), as compared to low frequencies, a frequency weighting called “A” weighting is applied. The internationally standardized "A" filter approximates the sensitivity of the human ear and helps in assessing the perceived loudness of various sounds. In this document all sound levels are A-weighted sound levels and the adjective "A-weighted" has been omitted.

Figure E-1 depicts common indoor and outdoor sound levels. A quiet rural area during the nighttime may be 30 dBA or lower while the operator of a typical gas lawn mower may experience a level of 90 dBA. Similarly, the level in a library may be 30 dBA or lower while the listener at a rock band concert may experience levels near 110 dBA.

FIGURE E-1
COMMON OUTDOOR AND INDOOR SOUND LEVELS



Source: URS Corporation, 2008

Maximum A-Weighted Noise Level, (L_{max}) – Sound levels vary with time. For example, the sound increases as an aircraft approaches, then falls and blends into the ambient or background as the aircraft recedes into the distance. Because of this variation, it is often convenient to describe a particular noise "event" by its highest or maximum sound level (L_{max}). Note L_{max} describes only one dimension of an event; it provides no information on the cumulative noise exposure generated by a sound source. In fact, two events with identical L_{max} may produce very different total exposures as one may be of very short duration, while the other may be much longer.

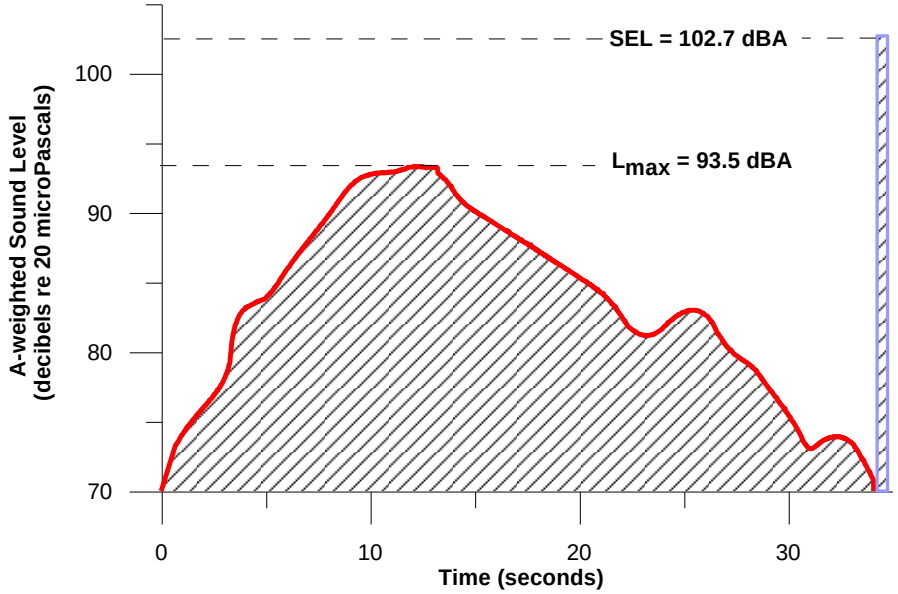
Sound Exposure Level, (SEL) – The most common measure of noise exposure for a single aircraft flyover is the SEL. SEL is a summation of the A-weighted sound energy at a particular location over the true duration of a noise event normalized to a fictional duration of one second. The true duration is defined as the amount of time the noise event exceeds background levels. For events lasting more than one second, SEL does not directly represent the sound level heard at any given time, but rather provides a measure of the net impact of the entire acoustic event.

The normalization to the fictional duration of one second enables the comparison of noise events with differing true duration and/or maximum level. Because the SEL is normalized to one second, it will almost always be larger in magnitude than the L_{max} for the event. In fact, for most aircraft events, the SEL is about 7 to 12 dB higher than the L_{max}. Additionally, since it is a cumulative measure, a higher SEL can result from either a louder or longer event, or some combination.

As SEL combines an event's overall sound level along with its duration, SEL provides a comprehensive way to describe noise events for use in modeling and comparing noise environments. Computer noise models, such as the one employed for this document, base their computations on these SELs.

Figure E-2 shows an event's "time history," the variation of sound level with time. For typical sound events experienced by a fixed listener, like a person experiencing an aircraft flying by, the sound level rises as the source (or aircraft) approaches the listener, peaks and then diminishes as the aircraft flies away from the listener. The area under the time history curve represents the overall sound energy of the noise event. The L_{max} for the event shown in the figure was 93.5 dBA. Compressing the event's total sound energy into one second to compute its SEL yields 102.7 dBA.

FIGURE E-2
COMPARISON OF MAXIMUM SOUND LEVEL (L_{MAX}) AND SOUND EXPOSURE LEVEL (SEL)



Source: URS Corporation, 2007.

Equivalent Sound Level, (L_{eq}) -- Equivalent sound level (abbreviated L_{eq}) is a measure of the exposure resulting from the accumulation of A-weighted sound levels over a particular period of interest (e.g., an hour, an 8-hour school day, nighttime, or a full 24-hour day). However, because the length of the period can be different depending on the time frame of interest, the applicable period should always be identified or clearly understood when discussing the metric. Such durations are often identified through a subscript, for example $L_{eq(8)}$ or $L_{eq(24)}$.

Conceptually, L_{eq} may be thought of as a constant sound level over the period of interest that contains as much sound energy as the actual time-varying sound level with its normal "peaks" and "dips." In the context of noise from typical aircraft flight events and as noted earlier for SEL, L_{eq} does not represent the sound level heard at any particular time, but rather represents the total sound exposure for the period of interest. Also, it should be noted that the "average" sound level suggested by L_{eq} is not an arithmetic value, but a logarithmic, or "energy-averaged," sound level. Thus, loud events tend to dominate the noise environment described by the L_{eq} metric.

Day-Night Average Sound Level, (DNL or L_{dn}) - Time-averaged sound levels are measurements of sound levels averaged over a specified length of time. These levels provide a measure of the average sound energy during the measurement period. For the evaluation of community noise effects, and particularly aircraft noise effects, the Day-Night Average Sound Level (DNL) is used. DNL is similar to the Equivalent Sound Level (L_{eq}) except that DNL compensates for the widely assumed increase in people's sensitivity to noise during nighttime hours. Each aircraft operation occurring between 10:00 p.m. and 7:00 a.m. is treated as if it were 10 operations. Logarithmically, this is the equivalent of adding 10 dB to the noise level of each nighttime operation. This penalty is intended to correspond to the drop in

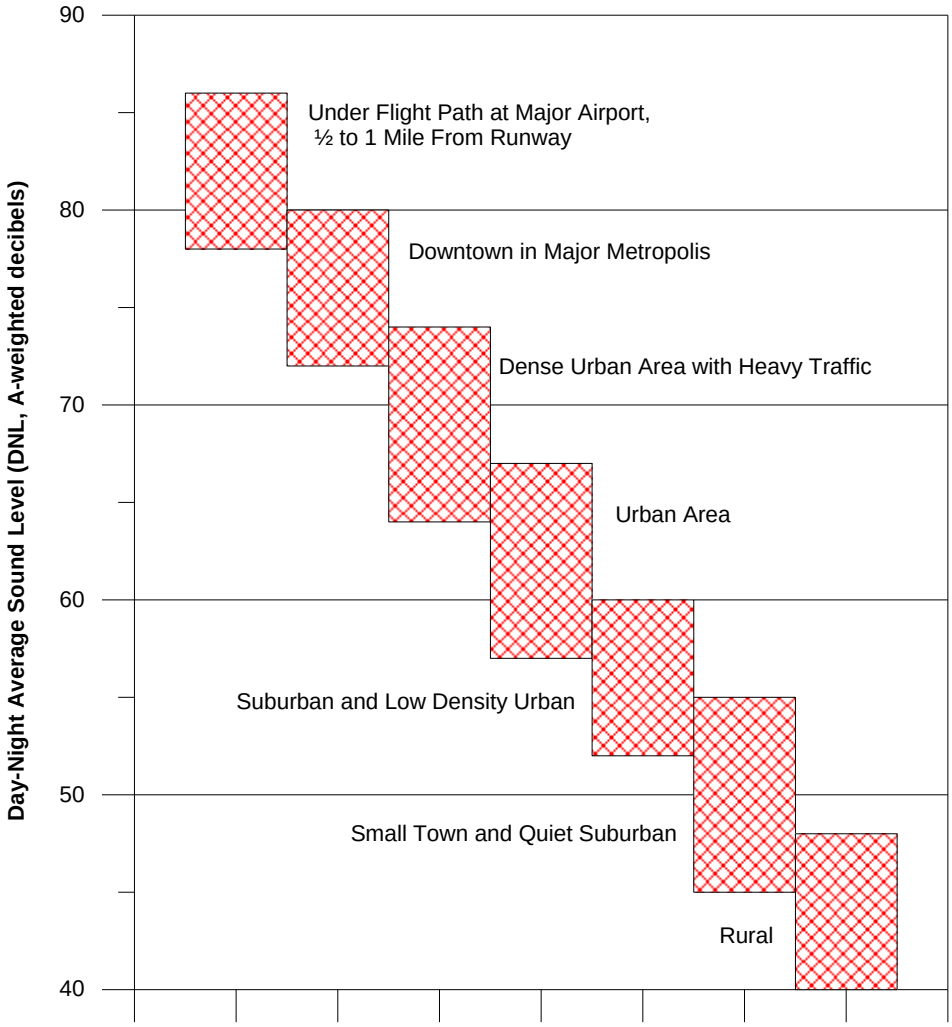
background noise level which studies have found takes place from daytime to nighttime in a typical community. The nighttime decrease in ambient sound levels—from both outdoor and indoor sources—is commonly considered to be the principal explanation for people's heightened sensitivity to noises during these periods. (Caltrans, 2002)

DNL is the primary noise descriptor of this study. It is a 24-hour time-weighted-average noise metric expressed in A-weighted decibels (dBA) which accounts for the noise levels (in terms of SEL) of all individual aircraft events, the number of times those events occur, and the time of day at which they occur. Values of DNL can be measured with standard monitoring equipment or predicted with computer models.

Typical DNL values for a variety of noise environments are shown in Figure E-3. DNL values can be approximately 85 dBA outdoors under a flight path within a mile of a major airport and 40 dBA or less outdoors in a rural residential area.

DNL has demonstrated good correlation with community response. Because of this correlation, DNL has been formally adopted by most Federal agencies for measuring and evaluating aircraft noise for land use planning and noise impact assessment. Federal committees such as the Federal Interagency Committee on Urban Noise (FICUN), Federal Interagency Committee on Aircraft Noise (FICAN) and the Federal Interagency Committee on Noise (FICON) which include the Environmental Protection Agency (EPA), Federal Aviation Administration (FAA), Department of Defense (DOD), Department of Housing and Urban Development (HUD), and Veterans Administration (VA), found DNL to be the best metric for land use planning. They also found no new cumulative sound descriptors or metrics of sufficient scientific standing to substitute for DNL. Other cumulative metrics could be used only to supplement, not replace DNL. Furthermore, FAA Order 1050.1E for environmental impact studies, requires DNL be used in describing cumulative noise exposure and in identifying aircraft noise/land use compatibility issues. (EPA, 1974; FICUN, 1980; FICON, 1992; 14 CFR part 150, 2007; FAA, 2006).

FIGURE E-3
TYPICAL RANGE OF OUTDOOR COMMUNITY DAY-NIGHT AVERAGE SOUND LEVELS



Source: DOD, 1978

Time-Above a Specified Level – The Time-Above a Specified Level (TA) metric describes the total number of minutes that instantaneous sound level (usually from aircraft) are above a given threshold. For example, if the natural ambient noise level is the specified threshold, the metric would be referred to as "$TA_{natural}$." The TA metric is typically associated with 24-hour annual average daily conditions but can be used to represent any time period. Any threshold may be chosen for the TA calculation.

Number of Events Above a Specified Level – Number-of-events Above (NA) is a noise metric that reflects the average number of times noise equals or exceeds a chosen threshold level during a specified time period. NA contours can be depicted at any noise threshold level (x) and any user defined number of events (z), using the notation "NAx(z)," meaning "z" events at or above noise level "x." These analysis parameters (x and z) may differ in each affected community, based on specific circumstances. No guidelines have yet been established for NA analyses, but individual jurisdictions may apply Federal

guidelines in such a way as to reflect unique conditions at each airport. Therefore, each jurisdiction has some latitude in establishing local noise standards. The NA metric provides for much flexibility and can be tailored to any noise environment, such as daytime, nighttime, or any user-defined number of hours.

2 EFFECTS OF AIRCRAFT NOISE ON PEOPLE

This section addresses three ways humans can be affected by aircraft noise: annoyance, speech interference and sleep disturbance.

Annoyance – The primary potential effect of aircraft noise on exposed communities is one of annoyance. Noise annoyance is defined by the Environmental Protection Agency as any negative subjective reaction on the part of an individual or group (EPA, 1974). Scientific studies and a large number of social/attitudinal surveys have been conducted to appraise people's annoyance to all types of environmental noise, especially aircraft events. These studies and surveys have found the DNL to be the best measure of this annoyance (EPA, 1974; FICUN, 1980; FICON, 1992; ANSI, 2007; ANSI, 2003; Schultz, 1978; Fidell, et. al., 1991).

The relationship between annoyance and DNL determined by the scientific community and endorsed by many Federal agencies, including the FAA, is shown in Figure E-4. For a DNL of 65 dBA, approximately 13% of the exposed population would be highly-annoyed. The figure also shows at very low values of DNL, such as 45 dB or less, 1% or less of the exposed population would be highly annoyed. At very high values of DNL, such as 90 dBA, more than 80% of the exposed population would be highly annoyed.

It is often suggested a lower DNL, such as 60 or 55 dB, be adopted as the threshold of community noise annoyance for FAA environmental analysis documents. While there is no technical reason why a lower level cannot be measured or calculated for comparison purposes, a DNL of 65 dB:

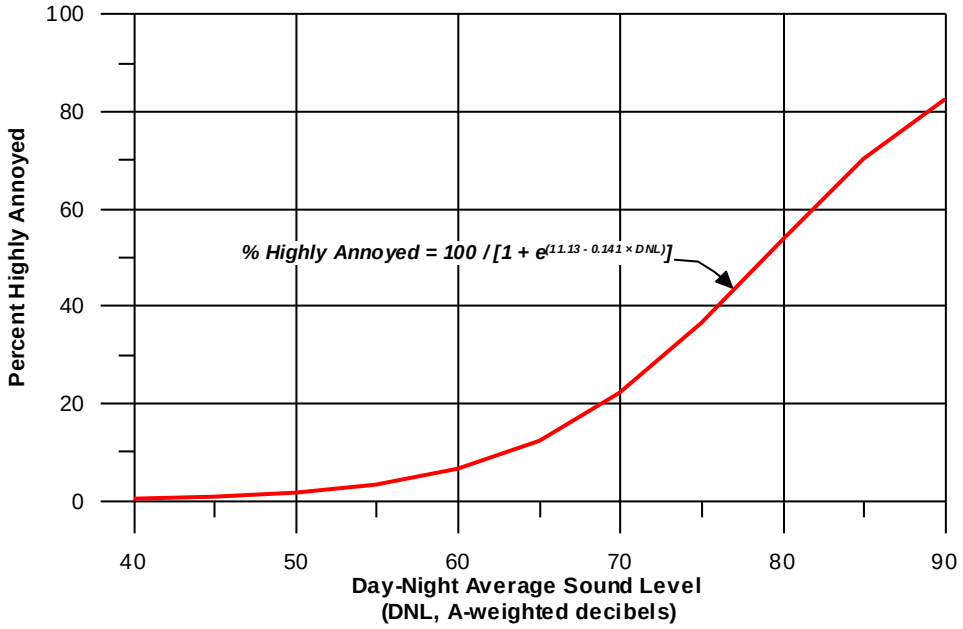
1) Provides a valid basis for comparing and assessing community noise effects.

2) Represents a noise exposure level normally dominated by aircraft noise and not other community or nearby highway noise sources.

3) Reflects the FAA's threshold for grant-in-aid funding of airport noise mitigation projects.

4) HUD also established a DNL standard of 65 dBA for eligibility for Federally-guaranteed home loans.

FIGURE E-4
RELATIONSHIP BETWEEN ANNOYANCE AND DAY-NIGHT AVERAGE SOUND LEVEL



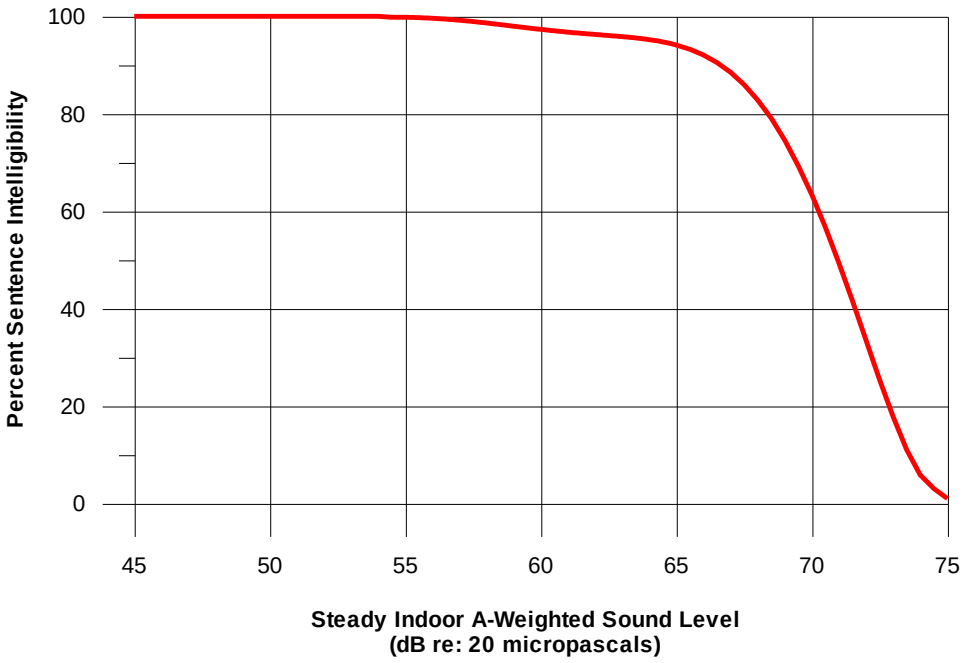
Source: FICON, 1992

Speech Interference – A primary effect of aircraft noise is its tendency to drown out or "mask" speech, making it difficult to carry on a normal conversation. As an aircraft approaches and its sound level increases, speech becomes harder to hear. As the ambient level increases, the talker must raise his/her voice, or the individuals must get closer together to continue talking.

For typical communication distances of 3 or 4 feet (1 to 1.5 meters), acceptable outdoor conversations can be carried on in a normal voice as long as the ambient noise outdoors is less than about 65 dBA (FICON, 1992). If the noise exceeds this level, intelligibility would be lost unless vocal effort was increased or communication distance was decreased.

Indoor speech interference can be expressed as a percentage of sentence intelligibility between two average adults with normal hearing speaking fluently in relaxed conversation approximately one meter apart in a typical living room or bedroom (EPA, 1974). As shown in Figure E-5, the percentage of sentence intelligibility is a non-linear function of the (steady) indoor ambient or background sound level (24-hour energy-average equivalent sound level ($L_{eq(24)}$). Steady ambient indoor sound levels of up to 45 dBA $L_{eq(24)}$ are expected to allow 100% intelligibility of sentences. The curve shows 99 percent sentence intelligibility for $L_{eq(24)}$ at or below 54 dBA and less than 10 percent intelligibility for $L_{eq(24)}$ greater than 73 dBA. In the same document from which Figure D-5 was taken, the EPA established an indoor criterion of 45 dBA DNL as requisite to protect against speech interference indoors (EPA, 1974).

FIGURE E-5
PERCENT SENTENCE INTELLIGIBILITY FOR INDOOR SPEECH



Source: EPA, 1974.

3 NOISE MODELLING METHODOLOGY

3.1 Introduction

The Integrated Noise Model (INM) has been FAA's standard tool since 1978 for determining the predicted noise impact in the vicinity of airports. The INM currently has over 1,000 licensed users and is used in over 30 countries. Within the U.S., statutory requirements for INM use are defined in FAA Order 1050.1E, Environmental Impacts: Policies and Procedures; Order 5050.4B, National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions; and Title 14 CFR Part 150, Airport Noise Compatibility Planning.

INM Version 7.0b, released September 30, 2009, is the most recent version of the INM and was used for this document. For additional information see:

(http://www.faa.gov/about/office_org/headquarters_offices/apl/research/models/inm_model/)

The INM uses the number of daily daytime, evening and nighttime flight operations, flight paths, and flight profiles of the aircraft along with its extensive internal database of aircraft noise and performance information, to calculate the noise levels in airport environs. From a grid of points, the INM contouring program calculates contours of equal noise levels that can be superimposed onto land use maps for analysis. For this document, DNL contours of 65, 70, and 75 dBA were developed. DNL contours present a graphical representation of how the noise from the airport's average annual daily aircraft operations is distributed over the surrounding area. The INM can calculate sound levels at any specified point so that noise exposure at representative locations around an airport can be obtained.

The INM aircraft profile and noise calculation algorithms are based on several guidance documents published by the Society of Automotive Engineers (SAE) Aviation Noise Committee (A-21). A-21 is an internationally represented committee that includes research institutions, engineering firms, government and regulatory agencies, and aircraft and engine manufacturers. The core computational modules of the INM are based on five internationally recognized standards documents as follows:

- SAE-AIR-1845 "Procedure for the Calculation of Airplane Noise in the Vicinity of Airports"
- SAE-AIR-5662 "Method for Predicting Lateral Attenuation of Airplane Noise"
- SAE-ARP-866A "Standard Values of Atmospheric Absorption as a Function of Temperature and Humidity"
- ECAC Doc 29 "Report on Standard Method of Computing Noise Contours Around Civil Airports"
- ICAO Circular 205 "Recommended Method for Computing Noise Contours Around Airports"

The INM is an average-value-model and is designed to estimate long-term average effects using average annual input conditions. Because of this, differences between predicated and measured values can occur

because certain local acoustical variables are not averaged, or because they may not be explicitly modeled in INM. Differences may also occur due to errors or improper procedures employed during the collection of the measured data.

Examples of detailed local acoustical variables include:

- Temperature profiles
- Wind gradients
- Humidity effects
- Ground absorption
- Individual aircraft directivity patterns
- Sound diffraction caused by water, buildings, barriers, etc.

The results of the INM analysis provide a relative measure of noise levels around airfield facilities. When detailed aircraft operational data is accurately analyzed and input into the model, the INM is the best tool available for comparing before and after noise effects resulting from forecast changes or alternative noise control actions. It allows noise levels to be predicted for such proposed projects without the actual implementation and noise monitoring of those actions.

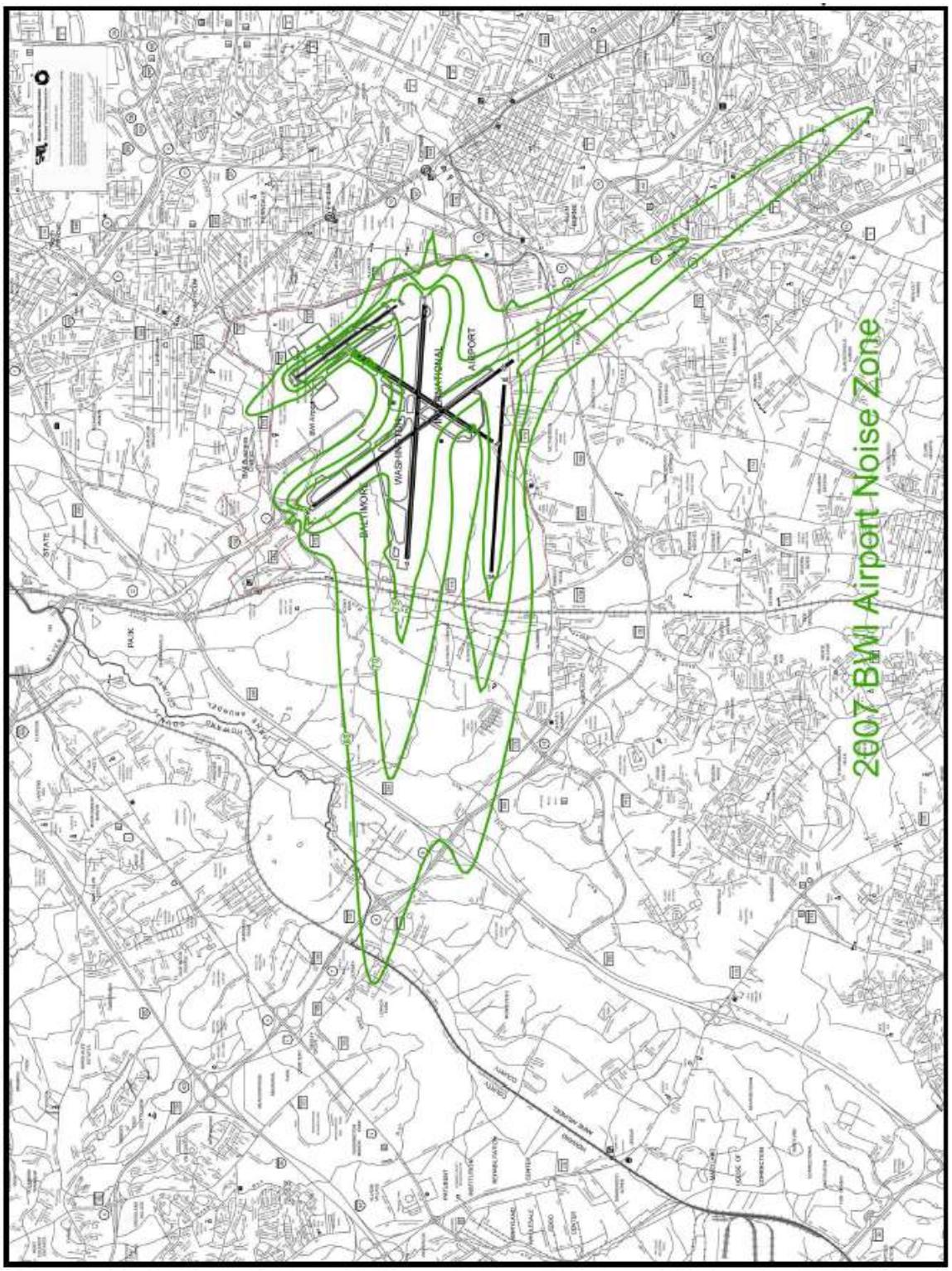
3.2 BWI Marshall Noise Abatement Programs

The Code of Maryland Regulations via the Maryland Environmental Noise Act of 1974 (the "Act") provides for the protection of citizens from the impact of transportation related noise. The Maryland Aviation Administration (MAA) has a long history of comprehensive noise management programs. These programs can be categorized as Compatible Land Use Programs, Aircraft Operational Noise Management Programs, or Community Outreach Programs.

Compatible Land Use Programs

The aviation portion of the Act requires the Maryland Aviation Administration (MAA) to create a certified Airport Noise Zone (ANZ) to control incompatible land development around BWI Marshall and a Noise Abatement Plan (NAP) to minimize the impact of aircraft noise on people living near the Airport. The MAA guidelines are similar to the FAA guidelines in that the ANZ is based on the DNL noise contour with 65 DNL delineating incompatible land uses. In 1976, the first ANZ and NAP were established. These programs are regularly reviewed and updated. The most recent update occurred November 6, 2007. The ANZ is shown in Figure E-6.

Figure E-6 BWI Marshall 2007 Airport Noise Zone



Source: Baltimore Washington International Airport

The ANZ is determined by a composite of three noise contours: a base year contour, a five-year forecast, and a ten-year forecast. The largest of the three contours in any area around the Airport determines the Noise Zone, thereby offering protection within the largest of the existing or future noise exposure contours. The MAA uses the ANZ to control incompatible land development around the Airport. Other mechanisms that assist with compatible land uses in the vicinity of the airport include the Board of Airport Zoning Appeals (BAZA) and the requirement for Noise Zone Notification in real estate transactions.

BWI Marshall provides noise assistance programs to assist qualifying individuals and organizations with a means of improving their noise environment. These programs include the Voluntary Land Acquisition Program, Homeowners Assistance Program, and the School Soundproofing Program.

Aircraft Operational Noise Management Program

The ANZ is designed to ensure that land uses in the vicinity of BWI Marshall are compatible with aviation activities. The counterpart to the ANZ is the Noise Abatement Plan. The goal of the Noise Abatement Plan is to ensure that aircraft are operated in a manner that recognizes the sensitive land uses in the vicinity of the Airport. The following elements are included in the BWI Marshall Noise Abatement Plan:

Noise Abatement Elements

Aircraft Noise Abatement Departure Procedures	• Noise abatement flight tracks which specify turn locations on all runways. • Limited use of Runway 4
Aircraft Noise Abatement Arrival Procedures	• VFR noise abatement arrival procedures
Preferential Runway Use System	• West operations are preferred for noise abatement. • Runway 10/28 is the preferred runway for noise abatement between the hours of 2300 and 0500 local time. • Limitation on the use of Runway 33R from 2300 to 0500 local time. • Practice landings and approaches by jet and turboprop aircraft are prohibited on all runways from 2300 to 0700 local time. • Noise Rule for runway 15L/33R
Continued Restricted Use of Runway 4/22	• In most cases, Runway 04/22 shall be closed to multi-engined aircraft from 2200 to 0700 local time.
Control of Ground Based Noise Sources	• Powerback Restrictions • Engine Maintenance Runup Restrictions • Tree Buffer Along East Airport Boundary
Airport Noise and Operations Monitoring System	• Continuously monitors noise levels in the airport area

Source: Baltimore Washington International Airport

Community Outreach Programs

BWI Marshall has an established citizen liaison program. The BWI Marshall Neighbor's Committee was founded by MAA in 1983 in response to citizen's concerns regarding aircraft noise and future airport growth and development. The BWI Marshall Neighbor's Committee currently consists of representatives from eleven communities surrounding the airport as well as airport users, pilots, and local, state, and federal officials.

BWI Marshall maintains a 24-hour noise hotline. Citizens can use this hotline to report loud noise events or other noise related concerns. Noise complaints can also be submitted online or via U.S. Mail. BWI Marshall publishes a Quarterly Noise Report. This report provides information regarding aircraft operations, long-term noise level trends, and the latest in Airport noise news.

3.2.1 Aircraft Operations

Individual daily INM input data for 2010 were calculated based on historical data and the FAA Terminal Area Forecast (TAF). These data are the most comprehensive data available regarding aircraft operational activity at BWI Marshall and are used as the basis of the noise analysis. These data are shown in Table D-1.

Table D-1
Baltimore/Washington International Airport 2010 Operations

Aircraft Category	Annual Operations		Average Daily Operations		Total Annual Operations	Total Daily Operations
	Day	Night	Day	Night		
Air Carrier (AC)	177,853	23,928	487	65	201,280	552
Air Taxi (AT)	38,899	5,080	107	14	45,593	125
General Aviation (GA)	19,163	3,818	52	10	21,866	60
Total Operations	235,915	32,827	646	90	268,742	736

Source: HMMH Integrated Noise Model Input Files provided by HMMH, FAA Terminal Area Forecast, URS Corp. Analysis.
Note: Calendar Year 2010. Numbers may not add due to rounding.

As shown in Table D-1, the majority of operations at BWI Marshall are conducted by Air Carrier aircraft. This category includes operations by large aircraft operated by major airlines and air cargo carriers. Annual Air Carrier 2010 operations totaled 201,280 operations and comprised seventy-five percent of total airport operations. Air Taxi operations are the second most numerous operations at the airport. These operations are conducted by smaller aircraft such as the turbo-prop commuter aircraft. Air Taxi operations totaled 45,953 operations and comprised seventeen percent of total operations. General Aviation operations are operations conducted by private aircraft such as business jets and other

personal aircraft. General Aviation operations totaled 21,866 operations and represented eight percent of total operations. In terms of noise contribution, the most significant category of aircraft operations is the air carrier category. This is due to the number of operations and the relative loudness of air carrier category aircraft.

3.2.2 Aircraft Fleet Mix

Aircraft noise levels can vary greatly based on the aircraft type. This is due to differences in the noise emissions of the various airframe/engine combinations. For this reason, it is very important to determine the precise mix of aircraft operating from the airport. These data are shown in Table D-2.

Table D-2
Baltimore/Washington International Airport 2010 Fleet Mix

INM Aircraft Type	Aircraft Category	Total Operations	% of Category	% of Total
717200	AC	18,216	9.0%	6.8%
737300	AC	54,599	27.1%	20.3%
737400	AC	3,037	1.5%	1.1%
737500	AC	1,267	0.6%	0.5%
737700	AC	45,226	22.5%	16.8%
737800	AC	6,974	3.5%	2.6%
747400	AC	14	0.0%	0.0%
757300	AC	498	0.2%	0.2%
767300	AC	2,168	1.1%	0.8%
777200	AC	308	0.2%	0.1%
727EM1	AC	460	0.2%	0.2%
727EM2	AC	2,450	1.2%	0.9%
727QF	AC	6	0.0%	0.0%
7373B2	AC	7,755	3.9%	2.9%
737N17	AC	237	0.1%	0.1%
737N9	AC	34	0.0%	0.0%
74710Q	AC	6	0.0%	0.0%
74720B	AC	253	0.1%	0.1%
757PW	AC	17,271	8.6%	6.4%
757RR	AC	9,759	4.8%	3.6%
767CF6	AC	180	0.1%	0.1%
767JT9	AC	93	0.0%	0.0%
A30062	AC	2,277	1.1%	0.8%
A310	AC	864	0.4%	0.3%
A319	AC	2,802	1.4%	1.0%
A320	AC	2,505	1.2%	0.9%
A32023	AC	6,229	3.1%	2.3%

INM Aircraft Type	Aircraft Category	Total Operations	% of Category	% of Total
A32123	AC	391	0.2%	0.1%
BAC111	AC	134	0.1%	0.0%
BEC58P	GA	4,470	20.4%	1.7%
CIT3	GA	333	1.5%	0.1%
CL600	AT	221	0.5%	0.1%
CL601	AT	3,758	8.2%	1.4%
CNA172	GA	1,897	8.7%	0.7%
CNA206	GA	527	2.4%	0.2%
CNA20T	GA	1,636	7.5%	0.6%
CNA441	GA	913	4.2%	0.3%
CNA500	GA	481	2.2%	0.2%
CNA750	GA	193	0.9%	0.1%
COMSEP	GA	1,405	6.4%	0.5%
DC1010	AC	8	0.0%	0.0%
DC1030	AC	457	0.2%	0.2%
DC3	AC	5	0.0%	0.0%
DC870	AC	435	0.2%	0.2%
DC93LW	AC	3,175	1.6%	1.2%
DC95HW	AC	1,096	0.5%	0.4%
DHC6	AT	7,299	16.0%	2.7%
DHC8	AT	14,183	31.1%	5.3%
EMB145	AT	5,288	11.6%	2.0%
EMB14L	AT	4,917	10.8%	1.8%
F10065	AT	81	0.2%	0.0%
FAL20	GA	849	3.9%	0.3%
GASEPF	GA	1,056	4.8%	0.4%
GASEPV	GA	1,971	9.0%	0.7%
GII	GA	146	0.7%	0.1%
GIIB	GA	159	0.7%	0.1%
GIV	GA	430	2.0%	0.2%
GV	GA	112	0.5%	0.0%
HS748A	AT	701	1.5%	0.3%
IA1125	GA	329	1.5%	0.1%
L1011	AC	455	0.2%	0.2%
L10115	AC	883	0.4%	0.3%
LEAR25	GA	184	0.8%	0.1%
LEAR35	GA	3,391	15.5%	1.3%
MD11PW	AC	281	0.1%	0.1%
MD81	AC	40	0.0%	0.0%
MD82	AC	5,922	2.9%	2.2%

INM Aircraft Type	Aircraft Category	Total Operations	% of Category	% of Total
MD83	AC	2,512	1.2%	0.9%
MU3001	GA	1,385	6.3%	0.5%
SD330	AT	212	0.5%	0.1%
SF340	AT	8,932	19.6%	3.3%

Source: HMMH Integrated Noise Model Input Files provided by HMMH, FAA Terminal Area Forecast, URS Corp. Analysis.

3.2.3 Runway Utilization

Runway utilization refers to the percentage of operations that a given runway is used. For safety reasons, aircraft generally takeoff and land into the wind. As a result, runway utilization is largely determined by prevailing wind conditions. Historical Airport Surveillance Radar (ASR) data via the ANOMS were used to determine the existing runway utilization at BWI Marshall. These data were compiled for each runway by time of day. A generalized summary of these data is presented in Table D-3. Table D-3 indicates the runway utilization by time period for arrival and departure operations. These data indicate that the majority of arrival operations occur on Runway 33L and the majority of takeoff operations occur on Runway 28.

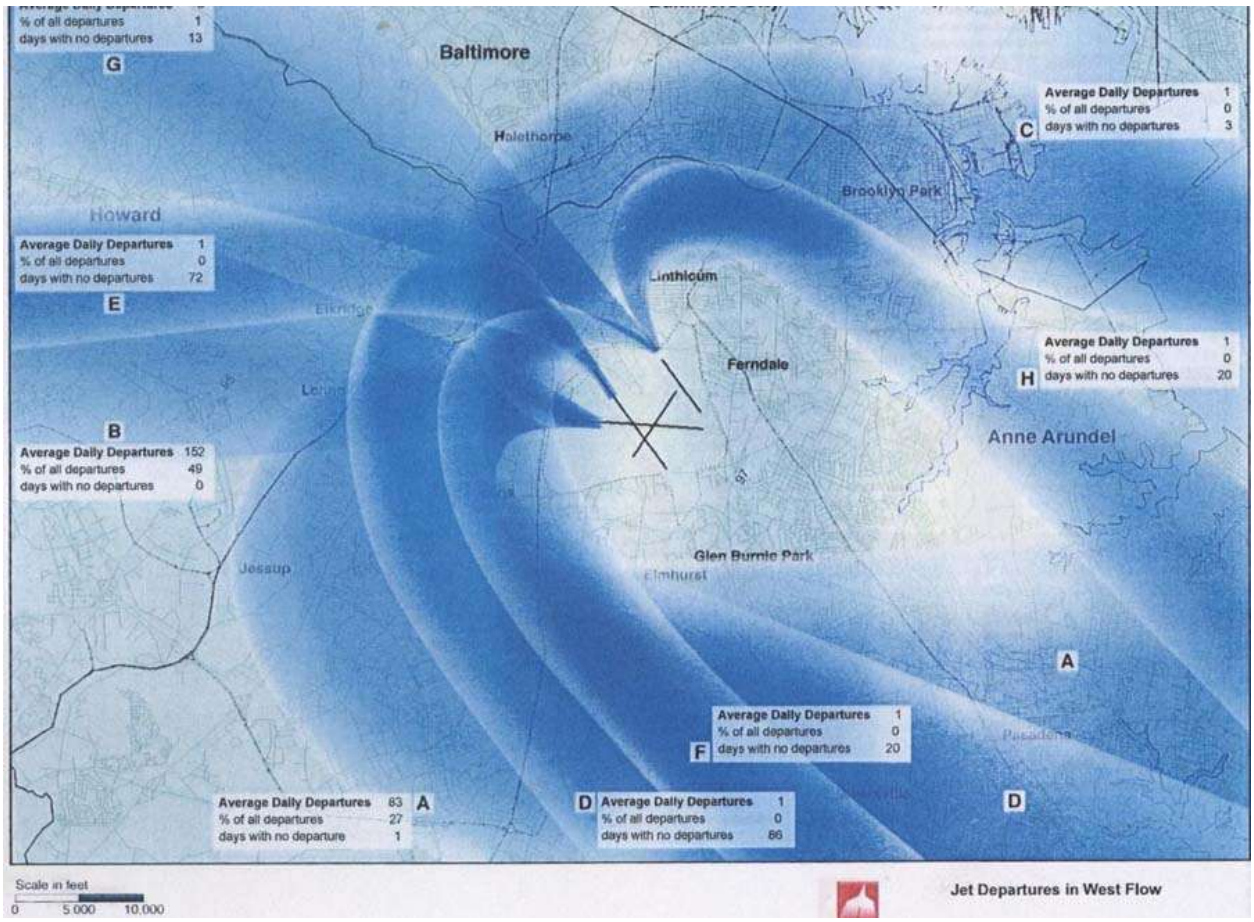
Table D-3
Baltimore/Washington International Airport
Runway Utilization (2010)

Runway	Arrivals		Departures	
	Day	Night	Day	Night
4	0.03%	0.24%	0.02%	0.01%
10	28.94%	35.97%	1.18%	1.18%
15L	3.94%	2.54%	4.40%	8.93%
15R	1.23%	4.29%	27.73%	20.36%
22	0.01%	0.03%	0.20%	0.33%
28	5.97%	10.29%	56.13%	57.76%
33L	50.98%	40.10%	1.40%	1.65%
33R	8.89%	6.55%	8.95%	9.77%

Source: HMMH Integrated Noise Model Input Files provided by HMMH, FAA Terminal Area Forecast, URS Corp. Analysis.

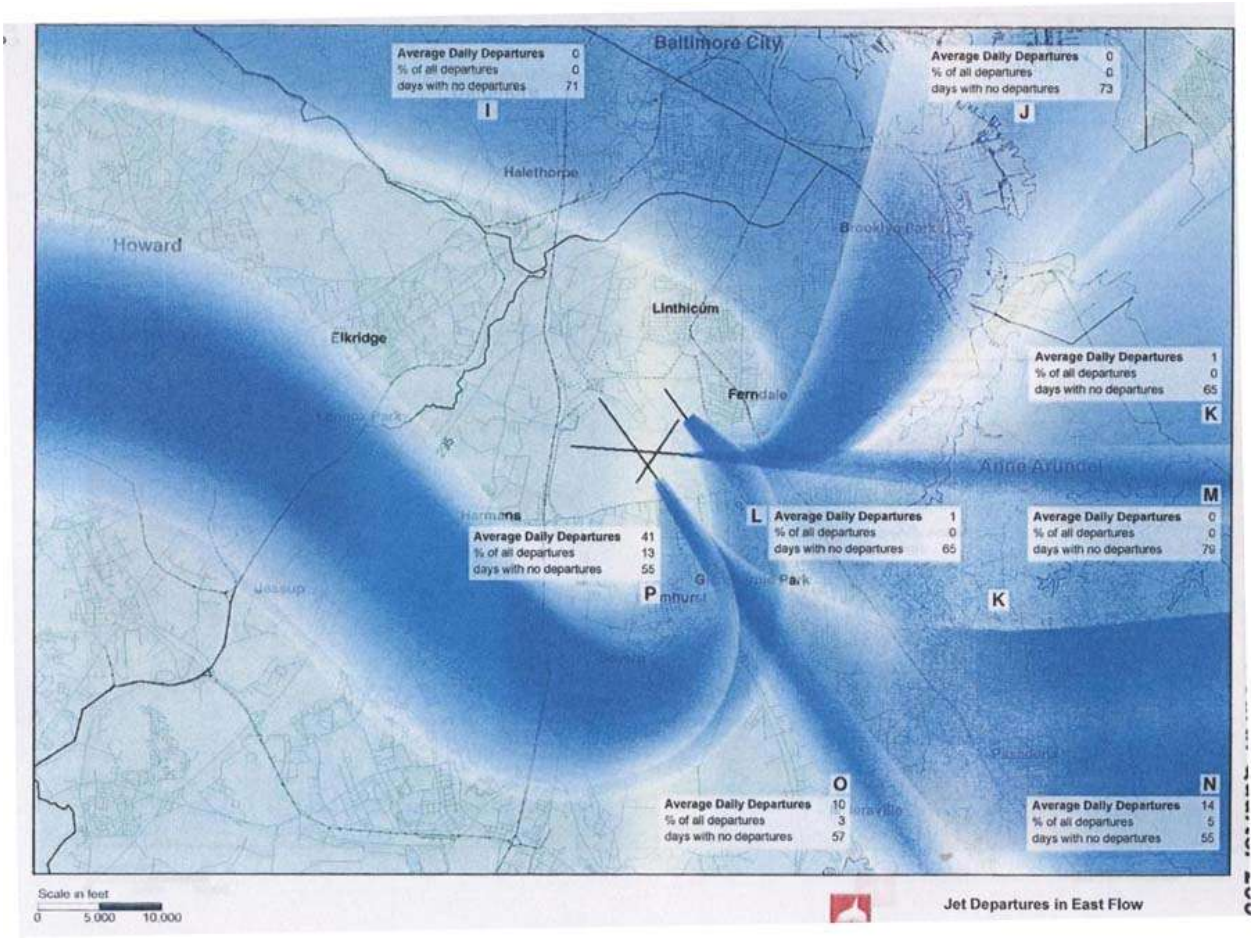
The location of flight tracks (flight path over the ground) is another key component for determining noise exposure. Generalized flight tracks by runway are shown in Figures E-7 through E-9. These figures depict the geographical spread of aircraft operations in terms of over flight density based on ASR data. For purposes of analyzing noise exposure, each flight track was individually modeled.

Figure E-7 BWI Marshall West Flow Departures



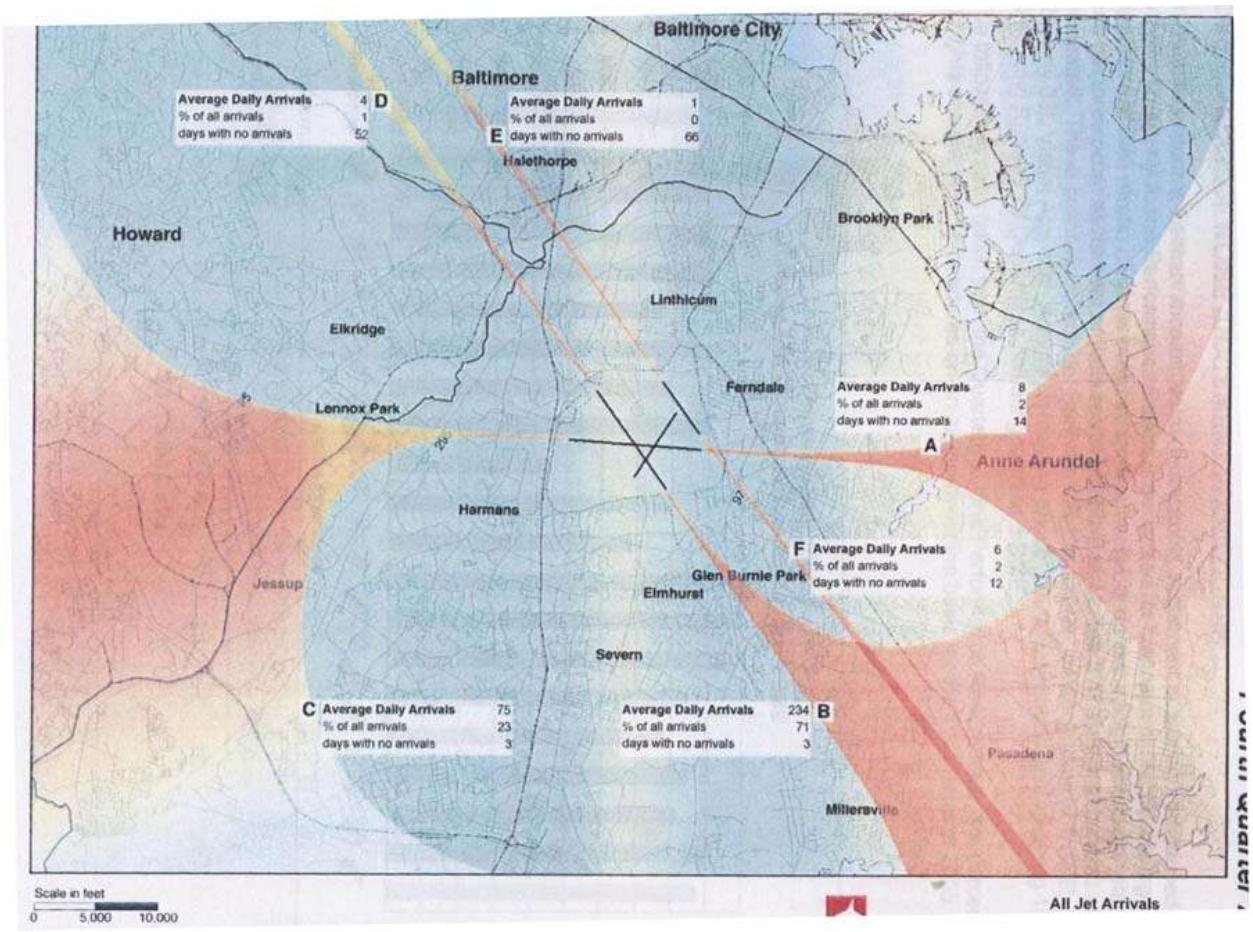
Source: Baltimore Washington International Airport. Accessed from: http://bwinoise.org/BWI_paths.html

Figure E-8 BWI Marshall East Flow Departures



Source: Baltimore Washington International Airport. Accessed from: http://bwinoise.org/BWI_paths.html

Figure E-9 BWI Marshall Arrivals



Source: Baltimore Washington International Airport. Accessed from: http://bwinoise.org/BWI_paths.html

3.2.4 Time of Day

The Time of Day aircraft operations occur is important for determining cumulative noise exposure. In the DNL metric, aircraft noise levels are weighted based on the time of day they occur. In determining DNL, each aircraft operation occurring during the nighttime, between the hours of 10:00 p.m. and 7:00 a.m., is treated as if it were ten daytime operations. Logarithmically, this is the equivalent of adding 10 dB to the noise level of each nighttime operation. This noise level penalty is intended to account for the drop in background noise level which studies have found takes place naturally from daytime to nighttime in a typical community. The nighttime decrease in ambient sound levels—from both outdoor and indoor sources—is commonly considered to be the principal explanation for people's heightened sensitivity to noises during the nighttime period. DNL is designed to account for this increased sensitivity. The percentage of daytime and nighttime operations by major aircraft category is shown in Table D-4.

Table D-4
Summary of Operations by Time of Day
Baltimore/Washington International Airport

Aircraft Category	Annual Operations	
	Day	Night
Air Carrier (AC)	88%	12%
Air Taxi (AT)	88%	12%
General Aviation (GA)	83%	17%

Source: Integrated Noise Model Input Files provided by HMMH, URS Corp. Analysis.

3.2.5 Future Years Noise Modeling Inputs

Noise modeling inputs for future years is based on the detailed data obtained during the analysis of 2010 aircraft operations. The Proposed Action Alternative would not change the operational conditions at the Airport. All assumptions remain the same as those defined for the 2010 existing conditions, except the location of the takeoff and landing points on Runway 11/29. Data regarding runway utilization, flight tracks, and time of day were carried forward for the analysis of future years.

3.2.6 Aircraft Operations

The FAA TAF was used to determine the number of aircraft operations for future year 2015. These data are shown in Table D-5. For purposes of comparison, operational data for 2010 is included in this table.

Table D-5
Baltimore/Washington International Airport
Existing and Forecast Aircraft Operations

Aircraft Category	Annual Operations	
	Existing 2010	TAF 2015
Air Carrier (AC)	201,280	236,718
Air Taxi (AT)	45,593	49,016
General Aviation (GA)	21,866	21,332
Total Operations	268,742	307,066

Source: HMMH Integrated Noise Model Input Files provided by HMMH, FAA Terminal Area Forecast, URS Corp. Analysis.

3.2.7 2015 Aircraft Operations

The aircraft fleet mix for 2010 was maintained for the 2015 analysis. Given the high capital cost of aircraft, Airframes are well maintained and typically serve in the fleet for many years. This practice maintains the initial investment by extending the useful aircraft life and serves to stabilize the fleet mix. In terms of analyzing noise exposure, this approach is somewhat conservative in that future aircraft will likely be quieter than existing aircraft. As older aircraft are retired, they will likely be replaced by quieter aircraft.

The runway utilization for 2015 is identical to the 2010 runway utilization. Runway 4-22 will be closed as part of the Proposed Action. These operations account for less than one percent of total operations. For the Proposed Action Alternative, these operations were proportionally allocated to the operations of the remaining runways.

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APPENDIX F

AIR QUALITY

This Appendix contains technical data and other materials used and developed in the preparation of the air quality impact assessments for the BWI Marshall Proposed Airport Improvements.

F.1 Construction Activities

For this assessment, construction-related emissions are primarily associated the exhaust from heavy equipment (i.e., backhoes, bulldozers, graders, etc.), delivery trucks (i.e., cement trucks, dump trucks, etc.) and construction worker vehicles getting to and from the site; dust from site preparation, land clearing, material handling, equipment movement on unpaved areas, and demolition activities; and, fugitive emissions from the storage/transfer of raw materials. These emissions are temporary in nature and generally confined to the construction site and the access/egress roadways.

Emissions from construction activities were estimated based on the projected construction activity schedule, the number of vehicles/pieces of equipment, the types of equipment/type of fuel used, vehicle/equipment utilization rates, and the year construction occurs. For this assessment, emissions of carbon monoxide (CO), volatile organic carbon (VOC), nitrogen oxides (NOx), sulfur dioxide (SO_2), and respirable/fine particulate matter (PM10/PM2.5) were evaluated. Because BWI is located in EPA-designated air quality non-attainment areas with respect to the National Ambient Air Quality Standards (NAAQS), emissions of VOC, NOx, SO_2 and PM2.5 were compared against the Clean Air Act (CAA) General Conformity de minimis thresholds for ozone (NOx and VOC) and fine particulates (NOx, SO_2, PM2.5) to ensure that the planned improvements at BWI conform to the area State Implementation Plans (SIPs) to attain the NAAQS.[1]

Data regarding the number of pieces and types of construction equipment to be used on the project, the deployment schedule of equipment (monthly and annually), and the approximate daily operating time (including power level or usage factor) were estimated for each individual construction project based on a schedule of construction activity. The estimates were provided by project phase and subcomponent.

Table F-1 details the individual elements of the proposed airport improvements as well as the scheduled duration of each element. **Tables F-2A through F-2F** provide a list of construction equipment, along with their assumed horsepower, fuel, emissions rates per construction year, and other pertinent parameters used to estimate project-related emissions.

[1] The NAAQS represent concentrations of pollutants in the ambient air over which detriment to human health and environmental welfare is likely to be incurred, based on available scientific evidence evaluated by EPA.

TABLE F-1
CONSTRUCTION SCHEDULE FOR THE PROPOSED PROJECTS

Construction Project	2012 Duration (days)	2013 Duration (days)	2014 Duration (days)	2015 Duration (days)
Runway 10-28	150	--	--	--
Runway 28 DPAD	110	--	--	--
Taxiway F	--	--	22	--
Taxiway Y	--	--	33	--
Taxiway U	--	--	--	155
Runway 15R-33L	--	--	236	--
Runway 15R DPAD	--	103	--	--
Taxiway D/Hold Pad	--	--	145	--
Runway 4-22 Conversion	--	--	--	85
Runway 15L-33R	--	96	--	--
Engineering Brief 75 Improvements	--	--	110	--
Other Landside Roadways (Elm Rd, etc)	--	--	--	16
Security Fence Improvements	--	--	--	91
Obstruction Removal	--	35	--	--
Terminal Exit Runway	--	--	--	33
ARFF Fillet Widening	--	--	72	--
35-foot shoulders on Runway 15R-33L	--	--	99	--
Central Utility Plant Expansion	--	--	--	134
Flight Kitchen Demolition	--	--	224	--

Source: URS Corporation, 2011.

TABLE F-2A
CONSTRUCTION EQUIPMENT PARAMETERS AND CARBON MONOXIDE (CO) EMISSIONS FACTORS

Off-road Equipment (fuel)	Horsepower	Load Factor	Usage Factor	CO (grams per horsepower-hour)			
				2012	2013	2014	2015
Cranes (D)	237.7	0.43	0.48	0.71	0.63	0.56	0.49
Hydroseeders (D)	442.6	0.59	0.29	2.13	1.93	1.74	1.56
Medium Dozers (D)	136.1	0.59	0.45	1.28	1.14	1.00	0.87
Milling Machines (D)	60.7	0.43	0.46	2.58	2.36	2.16	1.96
Pavers (Dl)	134.6	0.59	0.39	1.32	1.18	1.04	0.92
Pile Drivers(D)	442.6	0.59	0.29	2.13	1.93	1.74	1.56
Road Graders (D)	231.2	0.59	0.46	0.97	0.85	0.73	0.62
Rollers (D)	84.8	0.59	0.37	3.58	3.23	2.91	2.59
Trackhoe Excavators (D)	137.6	0.59	0.53	1.26	1.10	0.95	0.80
On-road Vehicles (fuel)				**CO (grams per mile @ 35 mph)**			
				2012	**2013**	**2014**	**2015**
Employee Vehicles (G)				11.85	11.59	11.33	11.17
Flatbed Trucks (D)				1.13	0.90	0.75	0.66
Large Dump Trucks (D)				1.13	0.90	0.75	0.66
Marking Trucks (G)				15.90	15.27	14.78	14.34
Pickups (G)				9.58	9.26	9.02	8.84
Triaxle Trucks (D)				1.13	0.90	0.75	0.66

D= Diesel, G= Gasoline

Source: EPA NONROAD2008a and MOBILE6.2 Emissions Models

TABLE F-2B
CONSTRUCTION EQUIPMENT PARAMETERS AND VOLATILE ORGANIC CARBON (VOC) EMISSIONS FACTORS

Off-road Equipment (fuel)	Horsepower	Load Factor	Usage Factor	VOC (grams per horsepower-hour)			
				2012	2013	2014	2015
Cranes (D)	237.7	0.43	0.48	0.25	0.23	0.22	0.20
Hydroseeders (D)	442.6	0.59	0.29	0.31	0.29	0.26	0.24
Medium Dozers (D)	136.1	0.59	0.45	0.26	0.24	0.22	0.20
Milling Machines (D)	60.7	0.43	0.46	0.39	0.35	0.32	0.29
Pavers (Dl)	134.6	0.59	0.39	0.28	0.26	0.23	0.21
Pile Drivers(D)	442.6	0.59	0.29	0.31	0.29	0.26	0.24
Road Graders (D)	231.2	0.59	0.46	0.23	0.21	0.19	0.18
Rollers (D)	84.8	0.59	0.37	0.38	0.34	0.30	0.27
Trackhoe Excavators (D)	137.6	0.59	0.53	0.25	0.22	0.20	0.19
On-road Vehicles (fuel)				**VOC (grams per mile @ 35 mph)**			
				2012	**2013**	**2014**	**2015**
Employee Vehicles (G)				0.40	0.37	0.34	0.32
Flatbed Trucks (D)				0.34	0.33	0.32	0.31
Large Dump Trucks (D)				0.34	0.33	0.32	0.31
Marking Trucks (G)				0.64	0.59	0.55	0.51
Pickups (G)				0.23	0.21	0.20	0.19
Triaxle Trucks (D)				0.34	0.33	0.32	0.31

D= Diesel, G= Gasoline

Source: EPA NONROAD2008a and MOBILE6.2 Emissions Models

TABLE F-2C
CONSTRUCTION EQUIPMENT PARAMETERS AND NITROGEN OXIDES (NOX) EMISSIONS FACTORS

Off-road Equipment (fuel)	Horsepower	Load Factor	Usage Factor	NOx (grams per horsepower-hour)			
				2012	2013	2014	2015
Cranes (D)	237.7	0.43	0.48	3.35	3.02	2.63	2.27
Hydroseeders (D)	442.6	0.59	0.29	4.57	4.27	3.92	3.58
Medium Dozers (D)	136.1	0.59	0.45	3.14	2.83	2.41	2.02
Milling Machines (D)	60.7	0.43	0.46	4.37	4.16	3.96	3.78
Pavers (Dl)	134.6	0.59	0.39	3.32	3.01	2.60	2.23
Pile Drivers(D)	442.6	0.59	0.29	4.57	4.27	3.92	3.58
Road Graders (D)	231.2	0.59	0.46	2.84	2.55	2.15	1.82
Rollers (D)	84.8	0.59	0.37	4.01	3.68	3.23	2.82
Trackhoe Excavators (D)	137.6	0.59	0.53	2.96	2.64	2.19	1.82
On-road Vehicles (fuel)				**NOx (grams per mile @ 35 mph)**			
				2012	**2013**	**2014**	**2015**
Employee Vehicles (G)				0.33	0.30	0.27	0.25
Flatbed Trucks (D)				4.34	3.67	3.09	2.58
Large Dump Trucks (D)				4.34	3.67	3.09	2.58
Marking Trucks (G)				1.02	0.96	0.90	0.85
Pickups (G)				0.23	0.21	0.19	0.17
Triaxle Trucks (D)				4.34	3.67	3.09	2.58

D= Diesel, G= Gasoline

Source: EPA NONROAD2008a and MOBILE6.2 Emissions Models

TABLE F-2D
CONSTRUCTION EQUIPMENT PARAMETERS AND SULFUR DIOXIDE (SO_2) EMISSIONS FACTORS

Off-road Equipment (fuel)	Horsepower	Load Factor	Usage Factor	SO_2 (grams per horsepower-hour)			
				2012	2013	2014	2015
Cranes (D)	237.7	0.43	0.48	0.70	0.68	0.66	0.65
Hydroseeders (D)	442.6	0.59	0.29	0.72	0.71	0.70	0.69
Medium Dozers (D)	136.1	0.59	0.45	0.72	0.70	0.68	0.65
Milling Machines (D)	60.7	0.43	0.46	0.82	0.80	0.78	0.76
Pavers (Dl)	134.6	0.59	0.39	0.73	0.70	0.68	0.66
Pile Drivers(D)	442.6	0.59	0.29	0.72	0.71	0.70	0.69
Road Graders (D)	231.2	0.59	0.46	0.70	0.67	0.65	0.63
Rollers (D)	84.8	0.59	0.37	0.81	0.79	0.76	0.74
Trackhoe Excavators (D)	137.6	0.59	0.53	0.72	0.69	0.67	0.64
				SO_2 (grams per mile @ 35 mph)			
On-road Vehicles (fuel)				**2012**	**2013**	**2014**	**2015**
Employee Vehicles (G)				0.01	0.01	0.01	0.01
Flatbed Trucks (D)				0.02	0.02	0.02	0.02
Large Dump Trucks (D)				0.02	0.02	0.02	0.02
Marking Trucks (G)				0.01	0.01	0.01	0.01
Pickups (G)				0.01	0.01	0.01	0.01
Triaxle Trucks (D)				0.02	0.02	0.02	0.02

D= Diesel, G= Gasoline

Source: EPA NONROAD2008a and MOBILE6.2 Emissions Models

TABLE F-2A
CONSTRUCTION EQUIPMENT PARAMETERS AND RESPIRABLE PARTICULATE MATTER (PM10) EMISSIONS FACTORS

Off-road Equipment (fuel)	Horsepower	Load Factor	Usage Factor	PM10 (grams per horsepower-hour)			
				2012	2013	2014	2015
Cranes (D)	237.7	0.43	0.48	0.35	0.39	0.44	0.49
Hydroseeders (D)	442.6	0.59	0.29	0.43	0.45	0.47	0.48
Medium Dozers (D)	136.1	0.59	0.45	0.44	0.50	0.56	0.61
Milling Machines (D)	60.7	0.43	0.46	0.42	0.46	0.50	0.53
Pavers (Dl)	134.6	0.59	0.39	0.43	0.48	0.53	0.58
Pile Drivers(D)	442.6	0.59	0.29	0.43	0.45	0.47	0.48
Road Graders (D)	231.2	0.59	0.46	0.42	0.49	0.55	0.60
Rollers (D)	84.8	0.59	0.37	0.63	0.66	0.69	0.72
Trackhoe Excavators (D)	137.6	0.59	0.53	0.45	0.52	0.58	0.63
				PM10 (grams per mile @ 35 mph)			
On-road Vehicles (fuel)				**2012**	**2013**	**2014**	**2015**
Employee Vehicles (G)				0.02	0.02	0.02	0.02
Flatbed Trucks (D)				0.15	0.14	0.12	0.10
Large Dump Trucks (D)				0.15	0.14	0.12	0.10
Marking Trucks (G)				0.02	0.02	0.02	0.02
Pickups (G)				0.02	0.02	0.02	0.02
Triaxle Trucks (D)				0.15	0.14	0.12	0.10

D= Diesel, G= Gasoline

Source: EPA NONROAD2008a and MOBILE6.2 Emissions Models

TABLE F-2F
CONSTRUCTION EQUIPMENT PARAMETERS AND FINE PARTICULATE MATTER (PM2.5) EMISSIONS FACTORS

Off-road Equipment (fuel)	Horsepower	Load Factor	Usage Factor	PM2.5 (grams per horsepower-hour)			
				2012	2013	2014	2015
Cranes (D)	237.7	0.43	0.48	0.33	0.38	0.43	0.48
Hydroseeders (D)	442.6	0.59	0.29	0.42	0.44	0.45	0.47
Medium Dozers (D)	136.1	0.59	0.45	0.43	0.48	0.54	0.59
Milling Machines (D)	60.7	0.43	0.46	0.41	0.45	0.48	0.52
Pavers (Dl)	134.6	0.59	0.39	0.42	0.47	0.52	0.56
Pile Drivers(D)	442.6	0.59	0.29	0.42	0.44	0.45	0.47
Road Graders (D)	231.2	0.59	0.46	0.41	0.47	0.53	0.58
Rollers (D)	84.8	0.59	0.37	0.61	0.64	0.67	0.70
Trackhoe Excavators (D)	137.6	0.59	0.53	0.44	0.51	0.57	0.62
				PM2.5 (grams per mile @ 35 mph)			
On-road Vehicles (fuel)				**2012**	**2013**	**2014**	**2015**
Employee Vehicles (G)				0.01	0.01	0.01	0.01
Flatbed Trucks (D)				0.11	0.10	0.08	0.07
Large Dump Trucks (D)				0.11	0.10	0.08	0.07
Marking Trucks (G)				0.01	0.01	0.01	0.01
Pickups (G)				0.01	0.01	0.01	0.01
Triaxle Trucks (D)				0.11	0.10	0.08	0.07

D= Diesel, G= Gasoline

Source: EPA NONROAD2008a and MOBILE6.2 Emissions Models

Emission factors for each equipment type were developed using the MOBILE6.2 and NONROAD2008a emissions models required by EPA, in accordance with model parameters utilized by the Maryland Department of the Environment (MDE) for SIP development. These factors were applied to the anticipated equipment work output (i.e. horsepower-hours of expected equipment use or vehicle miles of travel). Operating times for the equipment were based on a five-day workweek and an eight-hour workday during which the equipment may be operating.

A usage factor accounting for the percentage of daily operation and a load factor accounting for the average throttle setting relative to capacity were used. That is, a usage factor of 0.75 equates to six hours of operation and a load factor of 0.62 equates to 62 percent of capacity during operation. For the off-road equipment sulfur dioxide and particulate matter emission factors, a diesel sulfur content of 15 parts per million (ultra-low sulfur diesel fuel) was assumed, based on EPA mandated regulations effective June 2010.

For on-road vehicles, the anticipated vehicle miles traveled (VMT) were estimated to determine annual emissions. The following equations were used to obtain annual emission rates for off-road equipment and on-road vehicles:

*Emission Rate (tons/year) = Emission Factor (g/hp-hr) * size (hp) * 8 hours per day * Usage Factor * days/year * Load Factor * (453.59/2000 tons/g)*

*Emission Rate (tons/year) = Emission Factor (g/mile) * miles per day * days/year * (453.59/2000 tons/g)*

To estimate emissions associated with on-road motor vehicles including haul trucks, vehicles utilized for the purposes of security, escorting and project management, and personal employee vehicles, the following assumptions were applied. For haul trucks, VMT was calculated assuming five round trips per work day and forty miles per round trip. Security, escorting and project management vehicles were assumed to travel a grand total of 30 miles per work day. Employee VMT was calculated assuming 40 miles per work day (round trip), one employee vehicle for every piece of equipment listed in the construction schedule, and the scheduled calendar days for each project subtask as reported in the construction schedule. Where applicable, eight hours per day of work was applied to calculations (as above). Finally, MOBILE6.2 emissions factors employed in the analysis are relative to a vehicle speed of 35 miles per hour.

Additionally, the construction emissions inventories for fugitive dust sources were calculated using emission factors within EPA's AP-42 and other publications. Fugitive dust emissions can result from the following activities: grading, moving soil, and digging, loading/unloading of trucks, movement of trucks on unpaved surfaces, and wind erosion of stockpiles. A fugitive dust emission factor of 1.2 tons per acre disturbed per month during construction was used, consistent with AP-42, assuming that twenty-five percent of the construction project area would be disturbed per construction month. PM2.5 was assumed to be 10 percent of PM10 based on AP-42. Erosion control measures and water programs are typically taken to minimize these fugitive dust and particulate emissions. A dust control efficiency of 75 percent due to daily watering and other measures was estimated (AP-42).

Evaporative VOC emissions associated with the application of hot mix asphalt on areas requiring paving were estimated using raw materials quantities listed in the projected construction schedule, as well as an emission factor of 0.053 tons of VOC per acre of asphalt material laid, following methodology outlined by the National Association of Clean Air Agencies (NACAA, formerly STAPPA-ALAPCO).

A complete listing of the construction emissions associated with the proposed airport improvements for BWI Marshall is presented on **Table F-3,** arranged individual construction subtask. **Table F-4** details this same information by emissions category within each subtask (i.e. off-road equipment, asphalt placement). As shown, annual construction emissions remain below the applicable CAA General Conformity de minimis thresholds for NO_x and VOC (100 tons per year each), signifying the project conforms to the Ozone SIP to improve air quality in the Baltimore "moderate" ozone non-attainment area. Additionally, annual emissions remain below the applicable de minimis thresholds for direct PM2.5, NOx and SO2 (100 tons per year for each), signifying that the BWI improvements conform to the PM2.5 SIP to improve air quality in the Baltimore PM2.5 non-attainment area (under the EPA's 1997 PM2.5 standard).[2]

[2] In consultation with EPA, the MDE has determined that direct PM2.5, NOx and SO2 are applicable precursors to PM2.5 for conformity purposes in Maryland non-attainment areas (Baltimore Nonattainment Area PM2.5 State Implementation Plan and Base Year Inventory SIP Number: 08-0439531 [2008]).

TABLE F-3
CONSTRUCTION EMISSIONS INVENTORY (TONS PER YEAR) BY SUBTASK

Construction Subtask	CO				VOC				NOx				SO_2				PM10				PM2.5			
	2012	2013	2014	2015	2012	2013	2014	2015	2012	2013	2014	2015	2012	2013	2014	2015	2012	2013	2014	2015	2012	2013	2014	2015
Runway 10-28	23.3	--	--	--	1.6	--	--	--	5.6	--	--	--	0.3	--	--	--	15.7	--	--	--	1.8	--	--	--
Runway 28 DPAD	1.4	--	--	--	0.2	--	--	--	0.5	--	--	--	<0.1	--	--	--	11.3	--	--	--	1.1	--	--	--
Taxiway F	--	--	0.3	--	--	--	<0.1	--	--	--	0.1	--	--	--	<0.1	--	--	--	2.3	--	--	--	0.2	--
Taxiway Y	--	--	0.4	--	--	--	<0.1	--	--	--	0.1	--	--	--	<0.1	--	--	--	3.4	--	--	--	0.3	--
Taxiway U	--	--	--	11.3	--	--	--	1.2	--	--	--	2.9	--	--	--	0.4	--	--	--	16.3	--	--	--	2.0
Runway 15R-33L	--	--	59.9	--	--	--	3.8	--	--	--	23.0	--	--	--	2.3	--	--	--	26.7	--	--	--	4.7	--
Runway 15R DPAD	--	0.6	--	--	--	0.1	--	--	--	0.2	--	--	--	<0.1	--	--	--	10.5	--	--	--	1.1	--	--
Taxiway D/Hold Pad	--	--	13.5	--	--	--	1.2	--	--	--	5.3	--	--	--	0.6	--	--	--	15.4	--	--	--	2.0	--
Runway 4-22 Conversion	--	--	--	2.3	--	--	--	0.2	--	--	--	0.6	--	--	--	0.1	--	--	--	8.8	--	--	--	0.9
Runway 15L-33R	--	5.7	--	--	--	0.4	--	--	--	1.5	--	--	--	0.1	--	--	--	9.9	--	--	--	1.1	--	--
Engineering Brief 75 Improvements	--	--	6.4	--	--	--	0.9	--	--	--	4.7	--	--	--	1.0	--	--	--	12.1	--	--	--	1.9	--
Other Landside Roadways (Elm Rd, etc)	--	--	--	0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	1.6	--	--	--	0.2
Security Fence Improvements	--	--	--	0.5	--	--	--	<0.1	--	--	--	0.3	--	--	--	<0.1	--	--	--	9.4	--	--	--	1.0
Obstruction Removal	--	0.2	--	--	--	<0.1	--	--	--	0.1	--	--	--	<0.1	--	--	--	3.6	--	--	--	0.4	--	--
Terminal Exit Runway	--	--	--	0.4	--	--	--	0.1	--	--	--	0.1	--	--	--	<0.1	--	--	--	3.4	--	--	--	0.3
ARFF Fillet Widening	--	--	1.4	--	--	--	0.1	--	--	--	0.5	--	--	--	0.1	--	--	--	7.4	--	--	--	0.8	--
35-foot shoulders on Runway 15R-33L	--	--	3.5	--	--	--	0.4	--	--	--	2.1	--	--	--	0.2	--	--	--	10.4	--	--	--	1.2	--
Flight Kitchen Demolition	--	--	2.1	--	--	--	0.2	--	--	--	1.1	--	--	--	0.1	--	--	--	23.0	--	--	--	2.4	--
Central Utility Plant Expansion	--	--	--	1.4	--	--	--	0.1	--	--	--	0.9	--	--	--	0.1	--	--	--	13.8	--	--	--	1.4
Grand Total	**24.7**	**6.4**	**87.5**	**16.1**	**1.8**	**0.5**	**6.7**	**1.6**	**6.1**	**1.8**	**36.8**	**4.9**	**0.4**	**0.1**	**4.3**	**0.6**	**27.0**	**24.0**	**100.6**	**53.2**	**3.0**	**2.5**	**13.6**	**5.8**
De minimis - Ozone	**--**	**--**	**--**	**--**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**
Exceeds?	**--**	**--**	**--**	**--**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**
De minimis - PM2.5	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**--**	**--**	**--**	**--**	**100**	**100**	**100**	**100**
Exceeds?	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**--**	**--**	**--**	**--**	**No**	**No**	**No**	**No**

Source: KB Environmental Sciences, Inc., 2012.

TABLE F-4
DETAILED CONSTRUCTION EMISSIONS INVENTORY (TONS PER YEAR) BY SUBTASK

	CO				VOC				NOx				SO_x				PM10				PM2.5			
Construction Subtask	**2012**	**2013**	**2014**	**2015**	**2012**	**2013**	**2014**	**2015**	**2012**	**2013**	**2014**	**2015**	**2012**	**2013**	**2014**	**2015**	**2012**	**2013**	**2014**	**2015**	**2012**	**2013**	**2014**	**2015**
Runway 10-28	**23.3**	**--**	**--**	**--**	**1.6**	**--**	**--**	**--**	**5.6**	**--**	**--**	**--**	**0.3**	**--**	**--**	**--**	**15.7**	**--**	**--**	**--**	**1.8**	**--**	**--**	**--**
On-road Vehicles	1.4	--	--	--	0.3	--	--	--	3.5	--	--	--	<0.1	--	--	--	0.1	--	--	--	0.1	--	--	--
Off-Road Equipment	0.7	--	--	--	0.1	--	--	--	1.5	--	--	--	0.3	--	--	--	0.2	--	--	--	0.2	--	--	--
Asphalt Placement	--	--	--	--	0.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Employee Commutes	21.2	--	--	--	0.7	--	--	--	0.6	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--
Fugitive Dust	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	15.3	--	--	--	1.5	--	--	--
Runway 28 DPAD	**1.4**	**--**	**--**	**--**	**0.2**	**--**	**--**	**--**	**0.5**	**--**	**--**	**--**	**<0.1**	**--**	**--**	**--**	**11.3**	**--**	**--**	**--**	**1.1**	**--**	**--**	**--**
On-road Vehicles	0.3	--	--	--	<0.1	--	--	--	0.4	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--
Off-Road Equipment	<0.1	--	--	--	<0.1	--	--	--	0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--
Asphalt Placement	--	--	--	--	0.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Employee Commutes	1.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--
Fugitive Dust	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	11.2	--	--	--	1.1	--	--	--
Taxiway F	**--**	**--**	**0.3**	**--**	**--**	**--**	**<0.1**	**--**	**--**	**--**	**0.1**	**--**	**--**	**--**	**<0.1**	**--**	**--**	**--**	**2.3**	**--**	**--**	**--**	**0.2**	**--**
On-road Vehicles	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--
Off-Road Equipment	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--
Asphalt Placement	--	--	--	--	--	--	<0.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Employee Commutes	--	--	0.2	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--
Fugitive Dust	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2.2	--	--	--	0.2	--
Taxiway Y	**--**	**--**	**0.4**	**--**	**--**	**--**	**<0.1**	**--**	**--**	**--**	**0.1**	**--**	**--**	**--**	**<0.1**	**--**	**--**	**--**	**3.4**	**--**	**--**	**--**	**0.3**	**--**
On-road Vehicles	--	--	0.1	--	--	--	<0.1	--	--	--	0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--
Off-Road Equipment	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--
Asphalt Placement	--	--	--	--	--	--	<0.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Employee Commutes	--	--	0.3	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--
Fugitive Dust	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3.4	--	--	--	0.3	--
Taxiway U	**--**	**--**	**--**	**11.3**	**--**	**--**	**--**	**1.2**	**--**	**--**	**--**	**2.9**	**--**	**--**	**--**	**0.4**	**--**	**--**	**--**	**16.3**	**--**	**--**	**--**	**2.0**
On-road Vehicles	--	--	--	0.6	--	--	--	0.2	--	--	--	1.6	--	--	--	<0.1	--	--	--	0.1	--	--	--	<0.1
Off-Road Equipment	--	--	--	0.5	--	--	--	0.1	--	--	--	1.1	--	--	--	0.4	--	--	--	0.4	--	--	--	0.3
Asphalt Placement	--	--	--	--	--	--	--	0.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Employee Commutes	--	--	--	10.2	--	--	--	0.3	--	--	--	0.2	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1
Fugitive Dust	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	15.8	--	--	--	1.6
Runway 15R-33L	**--**	**--**	**59.9**	**--**	**--**	**--**	**3.8**	**--**	**--**	**--**	**23.0**	**--**	**--**	**--**	**2.3**	**--**	**--**	**--**	**26.7**	**--**	**--**	**--**	**4.7**	**--**
On-road Vehicles	--	--	4.0	--	--	--	1.4	--	--	--	13.9	--	--	--	0.1	--	--	--	0.5	--	--	--	0.3	--
Off-Road Equipment	--	--	3.4	--	--	--	0.7	--	--	--	7.8	--	--	--	2.2	--	--	--	1.9	--	--	--	1.8	--
Asphalt Placement	--	--	--	--	--	--	0.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Employee Commutes	--	--	52.5	--	--	--	1.6	--	--	--	1.3	--	--	--	<0.1	--	--	--	0.1	--	--	--	0.1	--
Fugitive Dust	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	24.1	--	--	--	2.4	--
Runway 15R DPAD	**--**	**0.6**	**--**	**--**	**--**	**0.1**	**--**	**--**	**--**	**0.2**	**--**	**--**	**--**	**<0.1**	**--**	**--**	**--**	**10.5**	**--**	**--**	**--**	**1.1**	**--**	**--**
On-road Vehicles	--	0.1	--	--	--	<0.1	--	--	--	0.2	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--
Off-Road Equipment	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--
Asphalt Placement	--	--	--	--	--	0.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Employee Commutes	--	0.4	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--
Fugitive Dust	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10.5	--	--	--	1.1	--	--
Taxiway D/Hold Pad	**--**	**--**	**13.5**	**--**	**--**	**--**	**1.2**	**--**	**--**	**--**	**5.3**	**--**	**--**	**--**	**0.6**	**--**	**--**	**--**	**15.4**	**--**	**--**	**--**	**2.0**	**--**

Construction Subtask	CO				VOC				NOx				SO_x				PM10				PM2.5			
	2012	2013	2014	2015	2012	2013	2014	2015	2012	2013	2014	2015	2012	2013	2014	2015	2012	2013	2014	2015	2012	2013	2014	2015
On-road Vehicles	--	--	1.0	--	--	--	0.3	--	--	--	3.1	--	--	--	<0.1	--	--	--	0.1	--	--	--	0.1	--
Off-Road Equipment	--	--	0.9	--	--	--	0.2	--	--	--	1.9	--	--	--	0.6	--	--	--	0.5	--	--	--	0.5	--
Asphalt Placement	--	--	--	--	--	--	0.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Employee Commutes	--	--	11.6	--	--	--	0.3	--	--	--	0.3	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--
Fugitive Dust	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	14.8	--	--	--	1.5	--
Runway 4-22 Conversion	**--**	**--**	**--**	**2.3**	**--**	**--**	**--**	**0.2**	**--**	**--**	**--**	**0.6**	**--**	**--**	**--**	**0.1**	**--**	**--**	**--**	**8.8**	**--**	**--**	**--**	**0.9**
On-road Vehicles	--	--	--	0.2	--	--	--	<0.1	--	--	--	0.3	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1
Off-Road Equipment	--	--	--	0.1	--	--	--	<0.1	--	--	--	0.2	--	--	--	0.1	--	--	--	0.1	--	--	--	0.1
Asphalt Placement	--	--	--	--	--	--	--	<0.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Employee Commutes	--	--	--	2.0	--	--	--	0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1
Fugitive Dust	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8.7	--	--	--	0.9
Runway 15L-33R	**--**	**5.7**	**--**	**--**	**--**	**0.4**	**--**	**--**	**--**	**1.5**	**--**	**--**	**--**	**0.1**	**--**	**--**	**--**	**9.9**	**--**	**--**	**--**	**1.1**	**--**	**--**
On-road Vehicles	--	0.5	--	--	--	0.1	--	--	--	1.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--
Off-Road Equipment	--	0.2	--	--	--	<0.1	--	--	--	0.3	--	--	--	0.1	--	--	--	0.1	--	--	--	<0.1	--	--
Asphalt Placement	--	--	--	--	--	0.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Employee Commutes	--	5.1	--	--	--	0.2	--	--	--	0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--
Fugitive Dust	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	9.8	--	--	--	1.0	--	--
Engineering Brief 75 Improvements	**--**	**--**	**6.4**	**--**	**--**	**--**	**0.9**	**--**	**--**	**--**	**4.7**	**--**	**--**	**--**	**1.0**	**--**	**--**	**--**	**12.1**	**--**	**--**	**--**	**1.9**	**--**
On-road Vehicles	--	--	0.4	--	--	--	0.1	--	--	--	1.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--
Off-Road Equipment	--	--	1.5	--	--	--	0.3	--	--	--	3.5	--	--	--	1.0	--	--	--	0.8	--	--	--	0.8	--
Asphalt Placement	--	--	--	--	--	--	0.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Employee Commutes	--	--	4.5	--	--	--	0.1	--	--	--	0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--
Fugitive Dust	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	11.2	--	--	--	1.1	--
Other Landside Roadways (Elm Rd, etc)	**--**	**--**	**--**	**0.1**	**--**	**--**	**--**	**<0.1**	**--**	**--**	**--**	**<0.1**	**--**	**--**	**--**	**<0.1**	**--**	**--**	**--**	**1.6**	**--**	**--**	**--**	**0.2**
On-road Vehicles	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1
Off-Road Equipment	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1
Asphalt Placement	--	--	--	--	--	--	--	<0.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Employee Commutes	--	--	--	0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1
Fugitive Dust	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.6	--	--	--	0.2
Security Fence Improvements	**--**	**--**	**--**	**0.5**	**--**	**--**	**--**	**<0.1**	**--**	**--**	**--**	**0.3**	**--**	**--**	**--**	**<0.1**	**--**	**--**	**--**	**9.4**	**--**	**--**	**--**	**1.0**
On-road Vehicles	--	--	--	0.1	--	--	--	<0.1	--	--	--	0.2	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1
Off-Road Equipment	--	--	--	0.1	--	--	--	<0.1	--	--	--	0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1
Asphalt Placement	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Employee Commutes	--	--	--	0.4	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1
Fugitive Dust	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	9.3	--	--	--	0.9
Obstruction Removal	**--**	**0.2**	**--**	**--**	**--**	**<0.1**	**--**	**--**	**--**	**0.1**	**--**	**--**	**--**	**<0.1**	**--**	**--**	**--**	**3.6**	**--**	**--**	**--**	**0.4**	**--**	**--**
On-road Vehicles	--	<0.1	--	--	--	<0.1	--	--	--	0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--
Off-Road Equipment	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Asphalt Placement	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Employee Commutes	--	0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--
Fugitive Dust	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3.6	--	--	--	0.4	--	--
Terminal Exit Runway	**--**	**--**	**--**	**0.4**	**--**	**--**	**--**	**0.1**	**--**	**--**	**--**	**0.1**	**--**	**--**	**--**	**<0.1**	**--**	**--**	**--**	**3.4**	**--**	**--**	**--**	**0.3**
On-road Vehicles	--	--	--	<0.1	--	--	--	<0.1	--	--	--	0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1
Off-Road Equipment	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1

Construction Subtask	CO				VOC				NOx				SO_x				PM10				PM2.5			
	2012	2013	2014	2015	2012	2013	2014	2015	2012	2013	2014	2015	2012	2013	2014	2015	2012	2013	2014	2015	2012	2013	2014	2015
Asphalt Placement	--	--	--	--	--	--	--	<0.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Employee Commutes	--	--	--	0.4	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1
Fugitive Dust	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3.4	--	--	--	0.3
ARFF Fillet Widening	**--**	**--**	**1.4**	**--**	**--**	**--**	**0.1**	**--**	**--**	**--**	**0.5**	**--**	**--**	**--**	**0.1**	**--**	**--**	**--**	**7.4**	**--**	**--**	**--**	**0.8**	**--**
On-road Vehicles	--	--	0.1	--	--	--	<0.1	--	--	--	0.2	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--
Off-Road Equipment	--	--	0.1	--	--	--	<0.1	--	--	--	0.2	--	--	--	0.1	--	--	--	0.1	--	--	--	0.1	--
Asphalt Placement	--	--	--	--	--	--	<0.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Employee Commutes	--	--	1.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--
Fugitive Dust	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	7.4	--	--	--	0.7	--
35-foot shoulders on Runway 15R-33L	**--**	**--**	**3.5**	**--**	**--**	**--**	**0.4**	**--**	**--**	**--**	**2.1**	**--**	**--**	**--**	**0.2**	**--**	**--**	**--**	**10.4**	**--**	**--**	**--**	**1.2**	**--**
On-road Vehicles	--	--	0.5	--	--	--	0.1	--	--	--	1.2	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--
Off-Road Equipment	--	--	0.3	--	--	--	0.1	--	--	--	0.7	--	--	--	0.2	--	--	--	0.2	--	--	--	0.2	--
Asphalt Placement	--	--	--	--	--	--	0.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Employee Commutes	--	--	2.8	--	--	--	0.1	--	--	--	0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--
Fugitive Dust	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10.1	--	--	--	1.0	--
Flight Kitchen Demolition	**--**	**--**	**2.1**	**--**	**--**	**--**	**0.2**	**--**	**--**	**--**	**1.1**	**--**	**--**	**--**	**0.1**	**--**	**--**	**--**	**23.0**	**--**	**--**	**--**	**2.4**	**--**
On-road Vehicles	--	--	0.4	--	--	--	0.1	--	--	--	0.8	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--
Off-Road Equipment	--	--	0.1	--	--	--	<0.1	--	--	--	0.3	--	--	--	0.1	--	--	--	0.1	--	--	--	0.1	--
Asphalt Placement	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Employee Commutes	--	--	1.7	--	--	--	0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--
Fugitive Dust	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	22.9	--	--	--	2.3	--
Central Utility Plant Expansion	**--**	**--**	**--**	**1.4**	**--**	**--**	**--**	**0.1**	**--**	**--**	**--**	**0.9**	**--**	**--**	**--**	**0.1**	**--**	**--**	**--**	**13.8**	**--**	**--**	**--**	**1.4**
On-road Vehicles	--	--	--	0.3	--	--	--	0.1	--	--	--	0.7	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1
Off-Road Equipment	--	--	--	0.1	--	--	--	<0.1	--	--	--	0.2	--	--	--	0.1	--	--	--	0.1	--	--	--	0.1
Asphalt Placement	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Employee Commutes	--	--	--	1.0	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1	--	--	--	<0.1
Fugitive Dust	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	13.7	--	--	--	1.4
General Conformity Applicability	**CO**				**VOC**				**NOx**				**SOx**				**PM10**				**PM2.5**			
	2012	**2013**	**2014**	**2015**	**2012**	**2013**	**2014**	**2015**	**2012**	**2013**	**2014**	**2015**	**2012**	**2013**	**2014**	**2015**	**2012**	**2013**	**2014**	**2015**	**2012**	**2013**	**2014**	**2015**
Grand Total	**24.7**	**6.4**	**87.5**	**16.1**	**1.8**	**0.5**	**6.7**	**1.6**	**6.1**	**1.8**	**36.8**	**4.9**	**0.4**	**0.1**	**4.3**	**0.6**	**27.0**	**24.0**	**100.6**	**53.2**	**3.0**	**2.5**	**13.6**	**5.8**
De minimis - Ozone	**--**	**--**	**--**	**--**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**
Exceeds?	**--**	**--**	**--**	**--**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**
De minimis - PM2.5	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**--**	**--**	**--**	**--**	**100**	**100**	**100**	**100**
Exceeds?	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**--**	**--**	**--**	**--**	**No**	**No**	**No**	**No**

Source: KB Environmental Sciences, Inc., 2011.

Maryland Aviation Administration

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

PHASE IB ARCHEOLOGICAL SURVEY REPORT

Planned Near-Term Improvement Projects (2008-2012) at Baltimore/Washington International Thurgood Marshall Airport

MAA-AE-05-003
Task 2B

October 2009

Prepared by:

A.D. Marble & Company
10989 Red Run Boulevard, Suite 209
Owings Mills, MD 21117

A.D. MARBLE & COMPANY

PHASE IB ARCHEOLOGICAL INVESTIGATIONS OF THE NEAR-TERM IMPROVEMENT PROJECTS (2008-2012) AT BALTIMORE/WASHINGTON INTERNATIONAL THURGOOD MARSHALL AIRPORT

Anne Arundel County, Maryland

Prepared for:
Maryland Aviation Administration
P.O. Box 8766
BWI Airport, MD 21240

Prepared By:

Brooke Blades
Richard White
A.D. Marble & Company
10989 Red Run Boulevard
Suite 209
Owings Mills, Maryland 21117

October 2009

ABSTRACT

A.D. Marble & Company of Owings Mills, Maryland, undertook a Phase IB Archeological Survey for the Maryland Aviation Administration (MAA) Near-Term Improvement Projects (2008-2012) at Baltimore/Washington International (BWI) Thurgood Marshall Airport in Anne Arundel County, Maryland. The primary goal of the Phase IB archeological survey was to determine the presence or absence of potentially significant belowground cultural resources within the archeological APE. Additional goals included the delineation of any identified resources, to the extent possible, and the development of recommendations regarding the need for further evaluation.

The methods used in this survey included documentary and map research, review of the pertinent historic and archeological literature, visual inspection of the Area of Potential Effect (APE), and systematic subsurface investigation of undisturbed locations. A total of 232 shovel test pits (STPs) were excavated at various intervals in 12 distinct test areas according to their potential for the presence of cultural resources. The overall APE covers approximately 126 hectares (311.35 acres), of which 26.36 hectares (65.13 acres) were subjected to subsurface investigation.

The results of the Phase IB Archeological Survey indicate that areas of archeological sensitivity exist within several portions of the APE. As a result of the Phase IB survey, two historic sites have been documented within and in direct proximity to the APE for the proposed Near-Term improvements. No prehistoric artifacts or sites were identified during the Phase IB survey.

The T.W. Cole Site (18AN1427) is a historic site where a dwelling stood as early as the middle of the nineteenth century. The recovered artifacts reflected occupation in the later half of the nineteenth and early twentieth centuries. The portion of the site investigated during this survey exhibited, in most cases, a heavily disturbed context; however, it remains possible that additional portions of the site may exist outside the project impact area.

The Jas. Phelps Site (18AN1428) is a historic site where a dwelling stood as early as the late nineteenth century. The recovered artifacts reflected occupation in the later part of the nineteenth and early twentieth centuries. The portion of the site investigated during this survey exhibited, in most cases, a heavily to moderately disturbed context; however, it remains possible that additional portions of the site may exist outside the project impact area.

No above or belowground structures or foundations were identified in association with either site within the confines of the APE for this project; therefore, the possibility that either of these individual sites may be eligible for the National Register of Historic Places cannot be determined on the basis of these Phase IB investigations. However, it appears that the portions of the sites within the project impact areas do not preserve intact deposits, and therefore no additional investigations are recommended.

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1.0 INTRODUCTION

This report evaluates the results of Phase IB Archeological Survey investigations in April and May 2009 at selected areas at the Baltimore/Washington International Thurgood Marshall Airport (BWI) in Anne Arundel County, Maryland (Figure 1). These areas are owned by the Maryland Aviation Administration (MAA) and are the locations of proposed airport improvements recommended in the Airport Layout Plan (ALP).

The specific proposed impact areas are indicated on Figure 2. This archeological study represents one of several environmental studies that will be undertaken in the preparation of the Environmental Assessment (EA). The Area of Potential Effects (APE) for the archeological survey consists of the various locations spread throughout the MAA-owned airport facility. These locations were evaluated during previous studies by Greiner, Inc. (Brown et al. 1995; Klein et al. 1995), as having high and moderate probabilities for archeological resources that would potentially be affected by the proposed actions. These probability areas are also shown on Figure 2.

This survey report was prepared for the MAA and URS Corporation by Brooke Blades and Richard White of A.D. Marble & Company, Conshohocken, Pennsylvania. Phase IB survey crew consisted of Richard White (field director), Bryan Butina, (field director), John Gorczyk (field technician), Justin Bracken (field technician), Jonathan Gutsche (field technician), and James Ashby (field technician). This Phase IB survey was prepared in compliance with federal and state regulations regarding cultural resources (the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470a[b][3][D],[E],[F], and [G]), and Article 83B, §§ 5-607 (b)(8),(10), and (12), 5-617 (f)(1), 5-618 (g), and 5-623 (b)(2), of the Annotated Code of Maryland. The archeological survey and report preparation will be prepared in accordance with the relevant guidelines from the Maryland Historical Trust (MHT) (Shaffer and Cole 1994).

BWI was constructed across rural fields that had supplied Baltimore and much of the eastern United States with market vegetables and fruits since the latter half of the nineteenth century. A few vestiges of the rural communities, such as cemeteries, remain above ground. Traces of occupations from the late eighteenth, nineteenth, and early twentieth centuries consist of ruined farm dwellings and tenant or migrant worker housing remains, which have been frequently encountered in archeological survey excavations in and around the project area. The extensive development of transportation infrastructure for automobiles, rail, and air traffic obscures what was once an attractive natural environment for Native American hunter/gatherers. Archeological evidence of Native American occupations near the project area extends back in time to the early Holocene, when the Chesapeake Bay did not exist as the dominant geographical feature of the region as it is today.

1.1 Project Location

The BWI property release area is essentially bounded by BWI to the east and either the Baltimore/Washington Parkway (BWP) or by the Baltimore & Ohio (B&O) Railroad to the west. The area falls within northern Anne Arundel County, although Baltimore County lies immediately to the north beyond the Patapsco River and Howard County lies to the west. The location is positioned on the innermost portion of the Coastal Plain, on Maryland Archeological

Research Unit 7 (Patapsco, Northern, and Southern drainages) as defined by the Council for Maryland Archeology and MHT (Shaffer and Cole 1994) (Figure 3).

1.2 Project Description and Area of Potential Effects

The project involves improvements such as extensions and lighting to airport runways and creation of an internal perimeter loop road. The APE for the archeological survey consists of the various locations spread throughout the MAA-owned airport facility. These locations were evaluated during previous studies by Greiner, Inc., as having high and moderate probabilities for archeological resources that would potentially be affected by the proposed actions. The APE and the project area locations are depicted on Figure 2. The total area of proposed activities measured approximately 126.0 hectares (311.35 acres), of which 26.36 hectares (65.13 acres) were subjected to subsurface investigation.

Figure 4 depicts the general APE and provides the location of proposed activities in correspondence with areas that were tested. The following activities are proposed as part of the Planned Long Term Improvement Projects. A total of 18 new development projects are being proposed, including the following tasks outlined in the Draft EA prepared by MAA to provide the Federal Aviation Administration (FAA) with sufficient information to support an environmental finding for the project.

Presented below is a list of the proposed projects stated in the EA for review and approval by the FAA.

- Runway Safety Area (RSA) Improvements (including a 0.3-meter Runway 15R-33L shift)
- Terminal Improvement Program
- Perimeter Service Roadway Alignment
- Security Fence Improvements
- New Tenant Hangar Facility
- Midfield Cargo Apron
- Deicing Pads and Snow Dump Sites
- Central Utility Plant Improvements
- ARFF Facility Expansion
- Firefighting Training Facility Expansion
- Obstruction Removal
- Maintenance Vehicle/Equipment Storage Expansion
- Spring Lane/Gate G Improvements
- Airfield Pavement Improvements
- Checkpoint J Vehicle Inspection Lane
- Interstate 195 Widening
- Concourse C/D Apron Rehabilitation
- Property Interest Acquisition

Table 1 presents a list of project activities proposed for the areas identified as having a moderate to high probability for archeological resources and subjected to testing.

Table 1. Areas Within the APE Subjected to Archeological Testing and Proposed Activities.

Area	Archeological Sensitivity	Proposed Activities
1	Moderate to Low Probability for Prehistoric Resources	Runway Extension
2	High Probability for Prehistoric and Buried Resources	Runway Safety Area Improvements and Runway 15R-33L Shift
3	High Probability for Prehistoric and Buried Resources	New Tenant Hanger Facility
4	High Probability for Historic Resources	New Tenant Hanger Facility
5	Moderate to Low Probability for Historic Resources	New Tenant Hanger Facility
6	High Probability for Historic Resources	New Tenant Hanger Facility
7	Moderate to Low Probability for Cultural Resources	New Tenant Hanger Facility
8	High Probability for Prehistoric and Buried Resources	Interstate 195 Widening
9	High Probability for Prehistoric and Buried Resources	Runway Safety Area Improvements and Runway 15R-33L Shift
9A	High Probability for Historic Resources	Runway Safety Area Improvements and Runway 15R-33L Shift
10	High Probability for Cultural Resources	Runway Safety Area Improvements and Runway 15R-33L Shift
11	Moderate to Low Probability for Cultural Resources	New Tenant Hanger Facility

The following description of proposed activities is taken directly from the Draft EA prepared by the MAA:

RUNWAY SAFETY AREA IMPROVEMENTS

The purpose of an RSA is to provide a measure of safety off the sides and ends of a runway that is available to an aircraft should that aircraft leave the runway.

A Runway Safety Area (RSA), as defined by the FAA (FAA Advisory Circular [AC] 150/5300-13, Change 14, *Airport Design* [November 2008]), shall be:

- "cleared and graded and have no potentially hazardous ruts, humps, depressions, or other surface variations;
- drained by grading or storm sewers to prevent water accumulation;
- capable, under dry conditions, of supporting snow removal equipment, aircraft rescue and firefighting equipment, and the occasional passage of aircraft without causing structural damage to the aircraft; and
- free of objects, except for objects that need to be located in the runway safety area because of their function. The RSA associated with a particular runway extends off of the ends and sides of the runway surface at a dimension designated by FAA guidelines according to the airport runway's Airport Reference Code (ARC) (FAA AC 150/5300-13). Runways 15R-33L and 10-28 at BWI Marshall have an ARC of D-V meaning Aircraft Approach Category D (speed 144 knots or more, but less than 166 knots) and Airplane Design Group V (wingspan between 52 and 65 meters). The required RSA dimensions for Runways 10-28 and 15R-33L are 152 meters wide by 305 meters long off the ends of the runway and the RSA extends along the entire length of the runway at 76 meters from the runway centerline to both sides of the runway.

Beginning in 1999, the FAA inventoried all commercial service runways at all airports certificated under 14 CFR Part 139 (which includes BWI Marshall) to:

- Document all objects and natural features in each standard RSA that could create a hazard for aircraft that leave the runway surface;
- Develop a preliminary plan for improving non-standard RSAs to the maximum extent practicable; and
- Identify incremental improvements that could reduce the potential hazard to aircraft when a full standard RSA was not practicable.

In 2000, the FAA began a nationwide initiative to accelerate RSA improvements at all Part 139 airports that did not meet RSA requirements. At BWI Marshall, which currently operates four commercial service runways with non-standard RSAs, a phased program for compliance has been developed and accepted by FAA which focuses initially on the two longest and most heavily utilized runways, Runway 10-28 and Runway 15R-33L. The RSA deficiencies for each of these runways are described below.

Runway 10-28 does not meet current RSA width standards because the width of the RSA to the north near the Runway 10 threshold between Taxiway F and G and to the south in the area near the existing Aircraft Rescue and Firefighting (ARFF) facility is 148 meters rather than 152 meters as required. The width is reduced due to non-standard grading within the RSA. RSA grading criteria limits the slope to between three and five percent for the first 3 meters from the runway edge and from between one and a half percent to five percent for the remaining width of the RSA. The RSA on the Runway 10 end also does not meet the RSA standards for length and only extends 245 meters beyond the end of the runway at full width rather than the 305-meter standard.

Runway 15R-33L does not meet RSA standards for both length and width. At the approach end of 15R, the RSA extends only 143 meters beyond the threshold due to the presence of the I-195 / MD 170 interchange; the RSA should extend 305 meters beyond the threshold. At the approach end of 33L, the RSA extends only 51.5 meters past the threshold due to the presence of Dorsey Road (MD 176); this RSA should also extend 305 meters past the threshold. In addition, there are areas along the runway where the RSA width is only 72 meters from the runway centerline instead of the required 76 meters.

All of these RSA improvements need to be accomplished in order for the two primary air carrier runways at BWI Marshall to be consistent with FAA design standards for RSAs. The United States Congress has established a 2015 deadline for bringing into compliance with FAA design standards all of the Nation's runway safety areas at commercial airports, such as BWI Marshall.

As part of the RSA improvements, the MAA proposes to shift Runway 15R-33L 0.3 meter to the west. In 2001, the then newly published end coordinates for Runway 15R-33L indicated that the resultant separation distance between Runway 15R-33L and parallel Taxiway P, from the 15R end to Taxiway R, was 122 meters, 0.3 meter less than the standard separation of 122 meters for Airplane Design Group V (Airport Reference Code D-V). The separation between the southern portion of the runway and parallel Taxiway D, from Runway 10-28 to the 33L end, was within criteria. This shift of the runway 0.3 meter to the west will achieve full compliance with the runway-taxiway separation criteria as shown on the ALP.

TERMINAL IMPROVEMENT PROGRAM

One of the key planned improvements at BWI Marshall in the 2008 – 2012 timeframe is the implementation of projects that begin to modernize older portions of the terminal building as described below.

The passenger terminal building is a dynamic environment. As the nature of air transportation changes due to the ebb and flow of airline service; passenger processing preferences; regulatory code changes; security process requirements; and customer service initiatives, etc., the terminal building needs to be improved to accommodate changing conditions. As airlines modify their aircraft fleets from time to time, the resulting change in utilization of key terminal functional areas can require terminal improvements. Maintaining or improving customer service levels as passenger processing trends change (on-line check-in, increased security processes, etc.) sometimes requires improving terminal building spaces. Expediting passengers from the terminal core building to the concourses by providing moving sidewalks can relieve potential congestion within the terminal.

Life safety (building and fire) codes have also changed over the years, requiring more space for passenger processes and emergency circulation and egress. Finally, post-September 11, 2001 security processes have changed, requiring modernization of key terminal areas to provide effective passenger and baggage screening. The changes in passenger and airline processing, and code-required and security-related space requirements have led the MAA to evaluate ways to modernize areas of the terminal.

Concourses A and B were modernized in 2005 with the addition of 12 gates on Concourse A and the renovation of Concourse B (16 gates) – these portions of the passenger terminal building complex were brought up to current life safety code and Transportation Security Administration (TSA) standards. Terminal/Concourse E (the International Terminal – 6 gates) was completed prior to current TSA standards (1999), and portions of the terminal will require passenger and baggage screening modernization. The oldest portions of the terminal building complex (the building core and concourse areas between Concourse B and E) consisting of Concourse C and D require the most modernization to meet current TSA and life safety standards, as well as airline operational needs.

Specific proposed terminal improvements consist of interior building modifications and additions to accommodate:

- Relocation of passenger security screening checkpoints to maintain life safety code compliance;
- Relocation of some airline gates and holdrooms to maximize compliance with life safety codes and to enhance emergency egress options;
- “Bump-outs” of the terminal building towards the airside to increase the available area for baggage security screening, baggage claim functions, and providing secure connections between concourses; and
- Adding moving walkways within portions of the terminal and concourses, and modifying locations for concessions to improve customer levels of service.

Most of MAA's planned terminal projects have received prior environmental findings and FAA approvals. Extensions of Concourse A (five gates) and Concourse F (four gates) was approved by FAA in December 2000 (*Environmental Assessment for Proposed Improvements 2000 – 2005*), and an FAA Categorical Exclusion (December 2005) was granted for the remainder of the planned concourse and terminal widening projects that comprise the Terminal Improvement Program. Collectively, all of these projects are being evaluated again within this EA in order to reassess their cumulative impact with the other planned (2008 – 2012) improvements.

NEW TENANT HANGAR FACILITY

There is a large aviation-related manufacturing research facility adjacent to the northwest of the BWI Marshall campus. Corporate officials have recently requested MAA to enter into a long-term lease agreement for a portion of Airport property adjacent to theirs in order to construct a hangar facility and paved apron area needed to support their ongoing operations. The requested footprint of this facility is clear of all existing runway/taxiway areas, OFAs, and other restricted space and does not conflict with any current long-range plan for BWI Marshall facility development. As a result, the MAA has agreed in principal to such a leasing agreement, with the condition that the proposal must be consistent with FAA design and environmental criteria as well as State of Maryland stormwater and environmental regulations.

I-195 WIDENING

According to the *Feasibility Study for Arrivals Level Exit Road Improvements at BWI* (January 2007), the arrivals level exit ramp to I-195 currently experiences minor traffic congestion during peak traffic periods. The traffic volumes are expected to worsen as traffic volumes continue to grow from 20.3 million annual passengers to 30 million. In addition to the volume congestion, the traffic pattern requires motorists to merge and weave into their desired lane in a short distance (approximately 137 meters) creating further congestion. The congestion is further compounded by several factors:

- absence of an acceleration lane for commercial vehicles entering the arrivals level general traffic roadway;
- arrivals level commercial vehicles needing to weave through traffic to reach westbound I-195;
- arrivals level exit ramp to westbound I-195 is also part of the acceleration ramp from the hourly garage exit;
- arrivals level exit ramp to I-195 geometry is a non-standard left hand exit which does not meet typical driver expectations;
- existing roadway geometry makes Elm Road appear to be the major traffic movement and the arrivals level roadway exit ramp to I-195 is visually blocked by the abutment of the departure levels exit bridge; and
- there is minimal signing for traffic control and wayfinding because of the short distances between the entrances and exits.

To alleviate these concerns, additional capacity would be provided by widening the existing arrivals level exit ramp to I-195 from one to two lanes, the addition of a "choice lane" on westbound I-195 at the terminal return road exit ramp to reduce weaving, and the addition of a new arrivals level hourly garage exit ramp to provide direct access to westbound I-195.

The improved sections of roadways and ramps would improve passenger safety by minimizing weaving and providing signage for better driver decision-making.

1.3 Report Organization

The Phase IB report presenting the findings of the archeological survey in association with the proposed activities at the BWI is organized in the following manner: Chapter 1 introduces the reader to the proposed activities involved with the undertaking. It also includes the project location, a description of the project, and the APE.

Chapter 2 defines the research goals and design including the methods used for background research, field investigations, and laboratory provisions for dealing with recovered artifacts. Also included in this section are the dates during which time each of the above-mentioned activities have taken place.

A section on the environment in which the project took place is included in Chapter 3. Chapter 3 also includes the topography and geology of the project area, a list and description of the predominant soil types, and a description of existing conditions and the current land use of the area in which the activities will occur.

Chapters 4 and 5 present the Prehistoric and Historic context for the project area. The Prehistoric period in the Middle Atlantic Region covers approximately 12,000 years of history, beginning with the Paleoindian period and ending with the Contact period. The historical context of Chapter 5 presents the history of the region surrounding the present-day BWI.

A list of archeological surveys conducted within the near vicinity of the airport is presented in Chapter 6, and Chapter 7 presents a discussion of the previously recorded archeological sites within and near the current project area.

Chapter 8 provides the results of the Phase I archeological field study, and Chapter 9 presents a discussion of those results as well as a discussion of two identified historic sites.

A summary of the Phase I archeological activities and recommendations for future study are presented in Chapter 10. No further evaluation of either of the two historic sites is currently recommended.

2.0 RESEARCH GOALS AND DESIGN

2.1 Research Goals

The purpose of this archeological survey is to evaluate known archeological resources and the potential for additional archeological sites in the impact areas on BWI property. Therefore, this survey represents an initial stage in the identification of sites that may require evaluation for eligibility for listing in the National Register of Historic Places.

2.2 Research and Field Methodology

Background information on previous archeological surveys and recorded archeological sites was reviewed at MHT's library in Crownsville in 2006 and again in 2009. A considerable number of surveys have occurred in the general vicinity of BWI, resulting in numerous recorded archeological sites. As a consequence, the area of existing data review was restricted to approximately 1 mile around BWI Airport. Nevertheless, nearly 200 archeological sites and roughly 56 previous archeological surveys of varying size and scope fall within the review area. Information on historical developments in northern Anne Arundel County was recorded at the Maryland State Library in Annapolis.

Numerous previous studies have been undertaken on BWI and neighboring properties. The most relevant studies for the current project and the ones that served to direct much of the current work were prepared by Greiner, Inc. (Brown et al. 1995; Klein et al. 1995). The former report (Brown et al. 1995) constituted Part 1 of the Historic Preservation Plan for BWI and presented an overview of prehistoric and historic occupation and an inventory of sites known at the time. Part 2 of the Historic Preservation Plan (Klein et al. 1995) provided a planning manual and action plan for historic and archeological preservation at BWI Airport.

An element of the Part 1 overview and inventory was a predictive model for prehistoric deposits based on geomorphological research undertaken by Frank Vento. Vento defined areas of high probability for prehistoric occupation based on the likelihood of surviving buried deposits. These areas were defined using elevational data. Locations on the T1 and T2 terraces between 75 and 34 meters above mean sea level were considered to possess high probability for prehistoric sites. Those locations, indicated on maps or other sources as having historic occupations and that apparently had experienced minimal disturbance from airport construction, were considered to have a high probability for historic occupation. All other areas, except those destroyed by modern development, were evaluated as having moderate to low probability for prehistoric and/or historic sites (Brown et al. 1995:4.7). STP intervals varied from 20 meters (high) to 40 meters (medium).

Phase IB shovel testing occurred within project impact areas designated as high probability for either prehistoric or historic resources, unless those areas proved to be substantially disturbed. Testing also occurred in project impact locations designated as medium probability; no testing occurred at low probability or disturbed locations. A total of 232 STPs were excavated within 12 distinct areas at various intervals based on archeological probability as previously mentioned.

All STPs were excavated a minimum of 10 centimeters into culturally sterile sediments. Split spoon soil probes were extended deeper in random STPs to ensure that buried deposits were not

present beneath upper soils. Each soil stratum was excavated and screened separately. Artifacts were collected and recorded by stratigraphic layer. In some cases, artifacts less than 50 years of age were noted and discarded. All retained artifacts were bagged and removed to the A.D. Marble & Company laboratory in Conshohocken, Pennsylvania, for cataloging and analysis. Soil profile information, including measurements and soil texture and color, was recorded on standardized forms. All STPs were located on scaled base maps and backfilled upon completion of each test. Additionally, the locations of all STPs were recorded with the use of a high precision, hand-held Geographic Positioning System (GPS) instrument. Digital photographs were taken of the various project areas to illustrate the current project setting and document visible disturbances and cultural features, if present.

2.3 Laboratory Methods

All artifacts recovered during the course of the Phase I investigation were cataloged using classification terminology and typologies that are standard for historical material culture studies in the Mid-Atlantic Region. The catalog contains a complete description of every artifact and its known cultural affiliation (Appendix C). Historic artifacts were classified by functional class and material type. Glass color, vessel type, vessel portion, and decorative treatment were also noted when possible.

Artifact analyses performed in the laboratory consisted of statistical manipulation of the data in order to determine both horizontal and vertical artifact frequencies. Analysis of the field findings included the use of numerical techniques and qualitative assessment of the artifacts to evaluate the nature of the artifact deposits identified during testing and their depositional contexts. The goal of the analysis was to determine the integrity of the deposits and their potential to provide new and significant information on the history or prehistory of the locale and region. Any recommendation for further archeological investigations within the study area will be based on the results of these analyses.

The artifacts recovered during the study will be retained at the A.D. Marble & Company laboratory facilities in Conshohocken, Pennsylvania, until the final status of this project has been determined or until otherwise notified. To date, a deed-of-gift agreement has not been secured from the current property owners. If such agreement is obtained, the artifacts will be curated at the appropriate state and local facilities.

3.0 ENVIRONMENT

3.1 Topography and Geology

Northern Anne Arundel County is bordered by the Patapsco River at the interface of its estuary with the Chesapeake Bay south of Baltimore. The project area lies in the Western Shore Uplands Region of the Coastal Plain Physiographic Province to the east of the transitional zone with the Piedmont Physiographic Province (Maryland Geological Survey [MGS] 1981). Numerous tributary creeks and streams flow northward through the area into the Patapsco River. Stony Run, Piny Run, and Deep Run are the principal tributaries. Topographical landforms vary from floodplains and lower terraces along the Patapsco River and its tributaries to slopes and level locations on higher elevations at greater distances from the creeks and streams.

Northern Anne Arundel County is covered by Cretaceous Coastal Plain sediments of the Potomac Group that include quartz and quartzite gravels, sand, silts, and clay sediments (MGS 2000). These gravels have been found on stream terraces and slope exposures. The quartz and quartzite cobbles provided important sources of lithic raw materials for prehistoric occupants.

3.2 Soils

Soils within and near the project APE fall within two broad associations:

- Evesboro-Rumford-Sassafras sandy and loamy soils near BWI and Stony Run; and
- Loamy and clayey land-Muirkirk-Evesboro sandy soils around the BWP.

Evesboro sands and Rumford loamy sands are described as deep and underlain by either a clayey layer (Evesboro) or a sandy loam subsoil (Rumford). Sassafras soils are composed of fine sandy loam over sandy clay loam subsoil. Muirkirk soils consist of thick loamy sand over red clay subsoil (Kirby and Matthews 1973:6, 7).

3.3 Existing Conditions and Land Use

Roads and railroads passed through the area in the nineteenth century, but the construction of BWI hastened the development of a major transportation corridor between Baltimore, Washington, and Annapolis. Interstate 95 (I-95) and the BWP lie to the west, Interstate 97 (I-97) is to the east of BWI and connects Baltimore and Annapolis, and Maryland Route 100 (MD 100) is south of Dorsey Road and connects these transportation corridors. This extensive and expanding transportation network has encouraged the construction of industrial, commercial, and residential developments. Many of the data reviewed in this study were acquired during surveys prompted by proposed transportation corridor studies, commercial or housing construction, and airport improvements.

4.0 PREHISTORIC CULTURAL CONTEXT

4.1 Late Pleistocene Occupation: The Paleoindian Period

Paleoindian occupation of the southeastern United States is generally recognized to have commenced by ca. 12,000 B.P. (years before present), and thus may predate the earliest known sites in the northeastern United States (Haynes et al. 1984; Dincauze 1993; Dent 1995:102). Dates as old as ca. 16,000 B.P., however, have been radiometrically determined for archeological deposits at the Cactus Hill site in southeastern Virginia (McAvoy and McAvoy 1997), and even earlier dates have been projected for the Topper site in South Carolina (Goodyear 1999). Both sites are controversial due to concerns relating to geochronology and contextual integrity but constitute, in the opinion of many, two of the strongest indications of "pre-Clovis" occupation in eastern North America.

More traditional scenarios suggest that Paleoindian groups associated with fluted projectile point technology occupied the northeastern United States between 12,000 and 11,000 years ago. Pollen analyses indicate that a mixed conifer-hardwood environment had emerged in the Northeast by 12,000 B.P. and continued during the Allerod warm period about 11,750 to 11,400 B.P., when conditions were warmer and wetter than today (McWeeney and Kellogg 2001). A mosaic or mixed environment emerged with the more open conditions during the Youngest Dryas cold stadial between 10,800 and 10,300 years ago, although Carr and Adovasio (2002) argue that deciduous forests would have been sustained at least in sheltered river valleys. (The dates provided throughout Chapter 4 are derived from uncalibrated radiometric determinations.)

As temperatures generally warmed during the fluctuating conditions between 10,000 and 9,000 years ago, boreal evergreen forests with some deciduous elements emerged in the north as deciduous *Quercus* sp. (oak) increased in the south (Dent 1995:131; McWeeney and Kellogg 2001). However, local variations in microenvironments due to topography, solar exposure, and surface water (ponds, lakes, and rivers) exerted a considerable influence on prehistoric subsistence and adaptations.

Paleoindian occupants would have co-inhabited the region with a rich variety of fauna. The mammoth, oriented to more open habitats, disappeared from the region prior to the arrival of humans. A few forest mastodons may have been contemporaries of the earliest Paleoindians (Meltzer 1993). The image of early humans as hunters of megafauna requires substantial revision throughout the eastern United States (Meltzer 1993; Custer 1994:332-333). Deer and probably caribou would have been common inhabitants of the early Holocene forests in addition to a range of smaller fauna. The proximity of stream and riverine habitats would have supported aquatic faunal and floral resources.

Most models developed to explain Paleoindian settlement patterns (Goodyear 1979; Custer et al. 1983; Meltzer 1989) have emphasized movement, due to a presumed emphasis on the hunting of larger gregarious herd animals such as caribou and, in more closed settings, deer. Gardner (1974, 1977) argued that Paleoindian groups were often tethered to sources of high-quality raw materials, with elements of the settlement system conditioned by the availability of such materials. Group movements and catchment areas would therefore be centered on specific raw material sources. The issue is complicated by the general absence of faunal and floral data from

most eastern Paleoindian sites and by the fact that many, but not all, southeastern Paleoindian sites are located at or very near raw material sources and thus contain materials predominantly from those sources.

Models presuming movement within the Coastal Plain and particularly between the coast and the Piedmont are relevant to the project area. It must be remembered that the region lay west of the ancestral Susquehanna River, not the Chesapeake Bay, which only formed as sea level rose during the Holocene. Custer et al. (1983) expanded on the Gardner cyclical model to argue for "serial" movement on the Coastal Plain between raw material sources when such sources were relatively abundant.

Dent (1995:133-139) postulated seasonal movement between summer locations on the outer Coastal Plain and winter occupations to exploit resources within the ecotone between the inner Coastal Plain and Piedmont. Many of the outer Coastal Plain sites are now inundated by sea level rise, but the Paw Paw Cove site in Talbot County (Lowrey 1989) may be an example of a camp near the ancestral Susquehanna River. The Higgins site on Stony Creek in the project area (Ebright 1992a), a multi-component site with occupations ranging from Paleoindian to later Woodland, reflects the ecotone portion of the Dent model. The lack of seasonality data is another disappointing result of the virtual absence of botanical remains.

4.2 The Archaic: An Adaptational Continuum

The Early Archaic (ca. 10,000 to 9500 B.P.) has been combined by Gardner (1989) and others (Custer 1994, 1996) with the Paleoindian period into a broad late Pleistocene-early Holocene adaptational continuum. Changes in projectile point form and an increasing focus on locally available raw materials are also indicated early in the Archaic. Dent (1995:188-190) argues for a post-Pleistocene adaptational break that extended until ca. 4200 B.P. The latter half of the Late Archaic/Transitional Archaic (4200 to 3000 B.P.) represents for Dent an "intensification" of resource extraction efforts. Intensification is frequently linked with the later Archaic. Dent's synthesis is relevant as it relates to occupation of the Coastal Plain and Piedmont in the general vicinity of the Chesapeake Bay.

Smooth and even temporal transitions emphasize the summary nature inherent in most early-middle-late subdivisions. Carr (1998) defines the emergence of the Early Archaic with the appearance of Palmer and Kirk side-notched projectile points; he states that later bifurcate projectile points indicate the Middle Archaic (ca. 9500-6000 to 5000 B.P.). However, Anderson (2001) follows Gardner (1974), who suggested that the earliest side-notched points should still be considered manifestations of late Paleoindian occupations. Dent (1995) argues that bifurcate points should also be considered Early Archaic manifestations.

Carr and Adovasio (2002:41-42) noted that later Paleoindian and Early Archaic projectile points are encountered less frequently than are the later bifurcate points. They suggested that the expanding boreal forest in northern Pennsylvania may have resulted in reduced carrying capacity, possibly encouraging human groups to migrate southward to more favorable deciduous forest settings. Increasing numbers of Middle Archaic bifurcate points are interpreted by Carr and Adovasio as a reflection of expanding population following the emergence of a deciduous forest environment after 9000 B.P. By associating the Middle Archaic with emerging deciduous

forest, Carr (1998:87) made the interesting argument that bifurcate points were the initial Middle Archaic manifestations in the Middle Atlantic, but the later emergence of deciduous forest in New England meant that the Neville point was the initial Middle Archaic form to the north.

Stewart and Cavallo (1991:31) argue that the stratified Area D at the Abbott Farm complex on the New Jersey Coastal Plain near the Delaware River consisted of non-contemporaneous small clusters of lithics around hearths, perhaps created by individual families. Carr (1998:81) noted that Stewart and Cavallo defined a Middle Archaic base camp based on tool variation and feature presence but not necessarily large size, and that such base camps differ from those proposed by Gardner (1989) for either Paleoindian/Early Archaic or Late Archaic occupations.

The transition into the Late Archaic is a vague one, with dates ranging from 6000 B.P. to 5000 B.P. to Dent's adaptational transition ca. 4200 B.P. These differences have an impact on point form attribution to specific cultural phases. Otter Creek and initial Laurentian point forms are correlated with the later portion of the Middle Archaic. If one chooses to place the Middle-Late boundary ca. 6000 B.P., then the Brewerton side-notched projectile point forms are Late Archaic. A boundary drawn ca. 5000 B.P. would assign the earliest Brewerton forms to the later Middle Archaic. Late Archaic point forms recorded on sites near the project area include Vosburg and Bare Island.

Custer (1994:337; 1996:213) and Stewart (1990) have argued that an environmental shift from oak and *Tsuga* sp. (hemlock) to oak and *Carya* sp. (hickory) forests ca. 5000 B.P. may be correlated with their interpretation of the Subboreal as a dry climatic phase and the cultural changes perceived as the Late Archaic. Other paleoenvironmental interpretations (Joyce 1988; McWeeney and Kellogg 2001) suggest that existing oak-hickory forests expanded during a wetter, not drier, Subboreal climatic phase at the end of the dry Hypsithermal. Custer (1996:213) considered the Late Archaic to be a period of adjustment to environmental change and apparent population increase, with associated sites becoming larger and more numerous.

An intensification of resource utilization is reflected in various manners during the Late and Terminal Archaic (Dent 1995:188, 200-208). The technological component reflects an expanded use of ground stone tools, the appearance of steatite (soapstone) vessels, and, in riverine and coastal areas, fishing implements in the form of notched cobble netsinkers. The presence of storage features is noted, although not on the scale seen later in the Woodland.

A continuation of inferred "family group" occupations seen earlier in the Archaic is noted, but larger riverine sites with lithic reduction areas and platform "hearths" suggest multiple family gatherings or groups oriented to tool production or fish exploitation. A regionalization of lithic raw material use and projectile point shapes may reflect population growth and possibly reduced mobility. Evidence of regional interaction and exchange is found in the movement of raw materials such as steatite and perhaps of finished artifacts (Custer 1996:213-216).

4.3 The Woodland: Subsistence Continuity and Change

The Woodland period has traditionally been divided chronologically into Early, Middle, and Late phases. Custer (1989a) challenged this division for the Delmarva Peninsula, arguing instead for a division of Woodland I (traditional Late Archaic through Middle Woodland) and Woodland II

(traditional Late Woodland). The division between these two Woodland periods would fall ca. 1000 B.P.

The traditional division between the Archaic and Woodland periods is generally drawn at the point when ceramics appear in the archeological record. Marcey Creek ceramics are found throughout the Middle Atlantic; these vessels were flat bottomed with steatite fragments as body temper, reflecting the earlier carved steatite stone bowls. A wide range of ceramic types is present during the Woodland period, with varying forms of temper such as shell and quartz and increasingly elaborate decorative motifs later in the Woodland (Stewart 1992; Dent 1995:226, 238, 239, 244). The following ceramic types have been identified on sites around the project's APE: Accokeek Creek, Marcey Creek, Mayaone (possible), Mockley, Potomac Creek, Rappahannock, and various less clearly attributable sherds. Evidence of more southern contact during the later Woodland is probably reflected in the presence of Potomac Creek and Rappahannock sherds and Piscataway-type projectile points.

Subsistence practices represent an expansion and intensification of those that may have originated during the last part of the Archaic period. Intensive exploitation of marine shellfish resources is indicated by Woodland shell middens throughout the Chesapeake region. Shells mounds, at least in southern portions of the Chesapeake, have origins in the later Archaic (Potter 1982, Waselkov 1982). Hunting patterns of exploited species resembled those encountered earlier during the later Archaic period. Agricultural cultivation was undertaken to varying extents in the Chesapeake Bay region. Piedmont areas have yielded datable evidence of maize cultivation at various locations (Curry and Kavanagh 1991). Evidence of Coastal Plain maize production is more limited, with virtually no evidence from the Eastern Shore (Dent 1995). However, consumption of native plants is indicated throughout the region during the Woodland period.

Regional conceptions of settlement patterns during the Woodland period are summarized by Dent (1995) and mostly represent variations on a theme of seasonal aggregation and dispersal. Most of these conceptions include larger aggregation sites, often on the Coastal Plain or in major river valleys, and smaller dispersal sites for hunting and other forms of resource procurement. Late prehistoric and historic period contact with Native American groups to the north in the Susquehanna Valley exerted an influence in the northern portion of the Chesapeake Bay region.

Material manifestations of Adena-related cultural complexity have been encountered on the Eastern Shore of Maryland and Delaware, but these manifestations are considered to have been layered onto existing social organizations (Custer 1989a; Dent 1995; Stewart 2003). Whatever social complexity was reflected in these material manifestations appears to have disappeared with the advent of the Late Woodland or Woodland II period.

5.0 HISTORICAL CULTURAL CONTEXT

The earliest European colonists to occupy lands in Anne Arundel County were associated with the settlers of the Calvert family colony of Maryland via the Chesapeake Bay. The numerous tidal estuaries along the western side of the bay provided access to the northern portion of the county, but initial settlement focused on southern Anne Arundel County near the Severn River. The settlement of Providence was created in the mid-seventeenth century. By the 1690s, the colonial capital was relocated from St. Mary's City to Annapolis.

The proximity to the Patapsco River provided ready access as far as the falls, and eighteenth-century occupation is indicated on historical maps and from a few archeological sites in the vicinity. The Griffith Map of 1794 indicates two mills in the project vicinity: Shelby (or Selby) mill on the Patapsco and Plummers mill on Stony Creek (Griffith 1794). Shelby mill was operated as a grist mill from ca. 1816 by George Andrews, a transplanted English miller (Cunningham 2003:6). The mill site near the Patapsco River has been recorded as 18AN494. The Plummer family cemetery (18AN1164) in the project area has burial markers dating from the third quarter of the eighteenth century. Site 18AN1209 on Stony Run may relate to the Plummer mill.

By the early nineteenth century (Figure 5), the homes of millers and farmers were spread across the northern portion of Anne Arundel County. As in much of the rest of southern and eastern Maryland, enslaved African-Americans provided most of the labor on farms of varying sizes. Estimates of the slave population in Anne Arundel County suggest an increase from about 2,000 in the early eighteenth century to more than 9,000 by the end of the Revolutionary War (Calderhead 1977:11). The tobacco farm of Joseph Benson had ten slaves in 1860, while the market garden and fruit orchard on the Joseph Cole farm depended on the labor of six slaves (Cunningham 2003:13).

Some tobacco was grown in the northern part of the county, but the sandy soils were more suitable for a broad-based agricultural production. By 1850, most farms grew cereal grains: corn, some wheat, limited amounts of rye, and oats. The production of market garden crops and orchard fruits was undertaken by Joseph and Aaron Hawkins in 1850 and by Joseph Cole in 1860. These productions were the first indications of an agricultural shift that would change the nature of economic activity in northern Anne Arundel County for the next half century (Shipley 1977; Cunningham 2003:7) (Figure 6).

Strawberries, peas, and beans emerged as increasingly important garden crops during the third quarter of the nineteenth century. The Benson farm was credited in the 1880 Census with the following crops and produce: 1000 bushels of corn, 600 bushels of sweet potatoes, 250 bushels of apples, and market garden crops valued at $4,000. By the 1890s, Baltimore was evidently the largest distribution center for fruits and vegetables in the United States, with many of those crops being raised south of the Patapsco River in northern Anne Arundel County. Farms in the county were the leading producers in Maryland of strawberries and sweet potatoes in 1909 and 1910 (Cunningham 2003:23, 27).

Transport of this produce to Baltimore was facilitated by a rail network through the county. A rail line, the Annapolis and Elkridge Railroad, extended from Annapolis to Annapolis Junction southwest of the project area in 1840. The line connected with the early B&O Railroad between Baltimore and Washington at Annapolis Junction (Fredland 1977:36). The Taylor Viaduct that carries the B&O rail line across the Patapsco River survives as one of the oldest railroad bridges in America. The present Amtrak mainline was in place as the Baltimore and Potomac Railroad by the 1870s with the Harman Station very close to the project area. By the first decade of the twentieth century, the former route of the Annapolis and Elkridge Railroad was electrified by the Washington, Baltimore, and Annapolis Electric Railway (Cunningham 2003:23, 27).

Much of the labor on these market garden farms and orchards was supplied by Eastern European immigrants from Baltimore by the 1870s (Cunningham 2003:23). Some of these laborers and later migrant farm workers resided in migrant worker houses, the archeological remains of which have been recorded near the project APE. Farm tenant houses were also present for those who leased lands or who "shared" the harvest with land owners.

African-American farmers were also likely participants in the market garden economy. The African-American population in the county by 1900 totaled 12,600 in 1,800 households, with most as residents in rural areas. More than two-thirds served as laborers on farms owned by white residents. Two hundred individuals were craftsmen, servants, sailors, fishermen, or storekeepers. However, the African-American community also had independent farmers, either as owners, renters, or sharecroppers, as follows:

- Sharecroppers: 40 with farms averaging 25 acres
- Renters: 50 with farms averaging 15 acres
- Owners: 170 with farms ranging from 5 acres to 150 acres

By contrast, the largest white-owned farm in the county contained 250 acres. Economic disparity was more pronounced in the other farm categories. Although the African-American and white populations were nearly equal in size, twice as many whites rented farms and three times as many served as sharecroppers (Calderhead 1977:21).

Northern Anne Arundel County remained a rural landscape until the creation of Friendship Airport between 1947 and 1950. Many of the local farms, orchards, migrant workers houses, and nineteenth-century residences were removed during the construction of the facility that has been renamed Baltimore/Washington International Thurgood Marshall Airport. The area is increasingly being redefined as a transportation corridor and locus, with associated commercial and residential developments.

6.0 PREVIOUS ARCHEOLOGICAL SURVEYS

The earliest site identifications were undertaken by T.D. Jones in the early twentieth century and by Richard Sterns in the 1940s, who recorded sites along the Patapsco River. Sites such as 18AN20, 24, and 261; and 18HO4, 5, 31, 32, 33, and 34 were observed and noted by Sterns, and some collections were deposited at the Smithsonian Institution.

The earliest cultural resource management surveys were undertaken for proposed highway or utility line corridors (Table 2). Various surveys focused on the MD 100 corridor that extends between MD 3 and the BWP south of BWI. Most of these surveys were undertaken by Hettie Ballweber, Geoffrey Conrad, Dennis Curry, and Lori Frye of MGS in the 1970s and 1980s, although others were conducted by Mary Barse of the Maryland State Highway Administration (SHA) and private consultants such as GAI, Inc., and Garrow and Associates in the 1980s and 1990s. Other roadway corridor surveys included those conducted by Fred Kinsey, MGS, and SHA for I-195, MD 70, MD 32, and the BWP. The Dorsey Run power transmission corridor was studied by Russell Handsman in the 1970s; Garrow and Associates examined a pipeline corridor that passed through the northern portion of the project APE in 1980.

Table 2. Previous Archeological Surveys, BWI Vicinity (Maryland Historical Trust files).

Location	FR #[1]	MHT #[2]	Reference
MD 100 (Beehive and Schultz Farms)		HO 53	M. Barse 1993
MD 100 (Buckingham Nursery, Deep Run)		AN 198	Schmidt 1992
MD 100 from MD 3 to US Route 1	193S	AN 125	Ballweber 1989
MD 100 from MD 3 to MD 170	26	AN 39	Conrad 1975
MD 100 from MD 3 to I-95	96	HO 12	Curry 1977b
MD 100 from MD 3 to I-95	193	AN 218	Frye 1986
MD 100		AN 84 app.	Wheaton and Garrow 1988
I-195 from I-95 to south of MD 170		AN 37	Kinsey 1978
MD 170, MD 100 to Hammonds Ferry Rd	66	AN 32A	Curry 1977a
BWP from Washington to Baltimore	113	AN 46	Curry 1978a
I-97 between Baltimore and Annapolis	60 sup.	AN 44 2nd	Epperson 1980
MD 32	167 sup.	AN 42 add.	Curry 1985
Elkridge site, Patapsco River	226	AN 112	Ebright 1988
I-195 bridge over Patapsco River		BA 102	Ebright 1993b
BWI and noise corridors	31	AN 39	Conrad 1976
I-195 and BWI rail station, etc.	136	AN 36	Curry 1978b
Higgins site investigations		AN 202	Ebright 1992a
Higgins site eastern portion, BWI		AN 233	Ebright 1993a
Pipeline right-of-way (through APE)		AN 56	Garrow et al. 1980
Stoney Run Industrial Park (APE)		AN 406	Hopkins and Harris 1997
MAA in vicinity of Hanover (APE)		AN 399	Harris et al. 2000
Airport 100 Property, Dorsey Rd (near APE)		AN 402	Hill and Pfanstiehl 2000
Stoney Run Rd Development (APE)		AN 429	Emory 2001
Stoney Ridge Property (APE)		AN 420	Sparenberg et al. 2001
B. Smith Site (18AN1151) (APE)		AN 440	Harris and Hopkins 2002
BWI Runway 15L-33R extension		AN 80	Flanagan et al. 1988
BWI Plaza		AN 102	Comer et al. 1989
BWI Runway 10R-28L		AN 182	Haynes and Bienenfeld 1991

[1] Refers to MGS File Report number.
[2] Refers to MHT Library File Report number.

Location	FR #[1]	MHT #[2]	Reference
BWI Runway 10/28 Areas A, B, E, F		AN 183, 184	Petraglia et al. 1992
Sites 18AN366 and 778		AN 231	Greiner, Inc. 1993
BWI Trail Section 2		AN 263	Wall 1994
BWI Rescue and Firefighting Station		AN 292	Tull et al. 1995
Site 18AN964, BWI Trail Section 3		AN 294	Sterling et al. 1995
BWI Cole/Disney Cemetery evaluation		AN 306	Brown 1995
BWI historic preservation plan		AN 268	Brown et al. 1995
BWI unmarked burials		AN 305	Grey 1996
BWI Midfield Cargo Complex		AN 334	Barse et al. 1997
Airport A and B sites		AN 54	Conrad 1976
BWI Runway 33R proposed MALSR facility		AN 311	Friedman et al. 1996
Cromwell Business Park I and II sites		AN 254	Gaber 1993
MD Route 162 Poplar Grove Ave to Route 176		AN 91	Shaffer 1988
MD Routes 162 and 762 hiker-biker trails		AN 214	Ebright 1992b
MD Route 162 and I-97 stream crossing		AN 293	Ebright 1995
MD Route 162 at I-97		AN 295	Ballweber 1995
Hallameyer Property		AN 151	Neumann 1989
Race Rd Water & Sewer (N of BWI)		AN 365	Zielinski 1999
Dorchester Development south of Dorsey Rd		AN 114	Custer 1989b
Ridge Commons Project		AN 145	Goodwin et al. 1990
Graham Property		AN 245	Ballweber 1992
Arundel Mills Development		AN 347	Sheehan et al. 1999
Sites 18AN1119 and 1120		AN 350	Davis et al. 1999
Site 18AN1095, Dorchester Subdivision		AN 362	Simons et al. 1999
Cedar Winds Farm Subdivision		AN 370	Ballweber 1999a
Deer View Subdivision		AN 371	Ballweber 1999b
Arundel Preserve Development		AN 463	Maymon and Godwin 2004
Dorsey Run Transmission Line		AN 30	Handsman 1976
Maryland penitentiary property		MD 6	Myers and Coerper 1981
Site 18AN816, National Business Park		AN 210	Gaber and Erlandson 1992
National Business Park Phase IV		AN 408	Harris and Hopkins 2000
Site 18AN1180, National Junior Republic		AN 406	Hopkins Assoc. 2001
Fort Meade cultural resources plan		AN 260	McAloon et al. 1994
Fort Meade archeological survey		AN 260 app.	Hornum et al. 1995
Fort Meade supplementary survey		AN 345	Hunter and Ferenbach 1998

The development of the Amtrak rail station for BWI and the State Railroad Administration building and parking resulted in extensive excavations at the Higgins site (18AN489, formerly 18AN23B) by Carol Ebright of the SHA (Ebright 1992a, 1993a). The stratified site has temporal components extending from the Paleoindian to the Late Woodland periods. The site is located in the general vicinity of the project area.

The area west of the project area was surveyed for commercial developments starting in the late 1990s through 2002. These surveys, conducted by Greenhorne and O'Mara, Philip Hill, Hopkins and Associates, and A.D. Marble & Company, resulted in the identification and registration of numerous prehistoric sites, nineteenth- and early-twentieth-century farmstead sites, and several mid-twentieth-century residences. The latter were purchased by the MAA as a result of noise remediation policies.

Friendship Airport was developed prior to the passage of federal historic preservation legislation, but subsequent improvements have been subject to Section 106 evaluation for the presence of archeological resources. These studies were conducted by Douglas Comer, Engineering Science, Goodwin and Associates, Greiner, Inc., and WAPORA during the late 1980s and 1990s and yielded similar archeological components to those encountered in the project area.

Increased commercial and residential demand was reflected in several surveys south of Dorsey Road and east of the project area. Archeological surveys were conducted in the late 1980s, 1990s, and early 2000s by ACS Consultants, Jay Custer, and Goodwin and Associates.

A survey of Maryland penitentiary property was undertaken by MHT in 1981, which included an investigation of a property southwest of the project area (Myers and Coerper 1981). The National Business Park in the same general area was surveyed by John Harns and Associates (Gaber and Erlandson 1992) and Hopkins and Associates (Harris and Hopkins 2000). The United States Army installation at Fort George G. Meade, south of the project area, was the focus of cultural resources planning activities and archeological surveys by Goodwin and Associates and Hunter Research.

7.0 RECORDED ARCHEOLOGICAL SITES

Archeological investigations during the first half of the twentieth century and cultural resource management surveys after 1970 have resulted in the identification of nearly 200 prehistoric and historic site loci in and around the project's APE. These sites collectively constitute an extensive database that informs on the temporal extent and functional associations of human occupation from the early Holocene until the middle of the twentieth century. A comprehensive listing of these sites is provided in Appendix A at the end of this report. The recorded archeological sites and boundaries of previous surveys are shown in Figures 7A through 7E, which run in a north to south direction through the project region.

7.1 Prehistoric Sites in and near the Project Area

The Higgins site (18AN489) is clearly the preeminent locus in the study area. Every prehistoric time period including Paleoindian is represented at the site. The location was actually closer in elevation to Stony Run during the early Holocene; the run continued to cut a deeper channel until sea level rise and the creation of the Chesapeake Bay slowed and eventually halted the geologic downcutting process.

Limited additional evidence of Early Archaic occupation has been found. Two loci on Stony Run have been identified: 18AN965 near BWI and 18AN621, which yielded a MacCorkle point near the Higgins site. Middle Archaic evidence is somewhat more abundant in the broader area around the project area.

Late Archaic occupation evidence increases considerably, including extensive occupation evidence along the Patapsco River at the Big Holly Branch site (18AN20). These data suggest a general population increase or more frequent reoccupations of favorable locations that would coincide generally with Dent's (1995) period of "intensification" after about 4200 B.P.

Evidence of transitional occupations between later Archaic and earliest Woodland periods is limited but present. Early and Middle Woodland occupations are also limited, although Woodland "village" loci at the Harmans A site (18AN29A) on Stony Run and the Elkridge site (18AN30) on the Patapsco River were occupied from the Late Archaic through the Late Woodland periods. As was the case with the Late Archaic, the Late Woodland occupations increase considerably compared with those earlier in the Woodland period.

Most of the prehistoric sites reflect evidence of exploitation of locally available quartz and quartzite, with the frequent presence of rhyolite that is traditionally considered to derive from deposits in western Maryland. Larger, more complex sites with more varied lithic raw materials such as chert, jasper, argillite, and more rarely greenstone, steatite, silicified sandstone, and ironstone are present. Some of these loci, such as the multi-component Higgins site, have been noted. Site 18AN164 is an Archaic period locus that yielded approximately 100 projectile points. The combination of these sites suggests an overall settlement pattern composed of smaller procurement loci on inland and upland locations and larger, more frequently occupied loci, as base camps generally close to water but not necessarily along the Patapsco River. The focus of occupations along Stony Run probably reflects a stability of favorable environmental settings along the run, at least on a seasonal basis, throughout the Holocene. The large Woodland sites

along the Patapsco River have origins in the later Archaic, which may reflect intensification of resource exploitation and the emerging stability of this riverine setting later in the Holocene.

7.2 Historic Sites in and near the Project Area

The preferred locations for historic sites differ somewhat from those for the prehistoric sites, although some loci were occupied during both the prehistoric and historic periods. Historic sites were often located at greater distances from water courses, usually on more level upland, interior flats, or on hillslopes. Evidence of occupation dating to the second half of the eighteenth century is indicated in recorded archeological sites in and near the project area.

Various historic maps indicate that by the third quarter of the nineteenth century a road network and numerous farms and residences existed within the area that was eventually encompassed within BWI Airport. Two of these residences, the T.W. Cole House and the Jas. Phelps House, are particularly relevant to the current project and are discussed further in the next section.

8.0 FIELD RESULTS

Thirteen survey areas were examined during the Phase IB survey. The areas were numbered from 1 to 11 (including 2A and 9A) and were evaluated individually for their potential to contain prehistoric and historic resources. Areas 1, 2, 2A, 3, 8, 9, and the southern end of Area 10 were considered to have a high potential for prehistoric resources; and Areas 4, 6, and 9A were considered to have a high potential for historic resources. Areas 1 and 9 were excluded from subsurface testing due to modern disturbance as a result of highway construction and airport-related improvements. The survey area locations are shown on Figure 4 and are also plotted on referenced figures in the corresponding text below. Portions of two historic sites were identified during the survey. A catalogue of all recovered artifacts is present as Appendix C.

Area 1

Area 1 (Figure 8A) is a linear area located at the northwestern edge of the airport and lies outside the fenced property southwest of the off ramp of I-195 that measures approximately 1.02 hectares (2.52 acres). The APE extends parallel to the off ramp through mildly undulating topography that slopes sharply toward a wood line along its western edge (Photograph 1). There is a considerable amount of visible disturbance across the landscape within the APE due to utilities related to the airport and construction of the I-195 off ramp. A row of runway lights and their associated power supply lines run down the center of the APE. Disturbance as a result of the off ramp construction includes storm water drains, a prepared wetland, and terra forming of the surrounding landscape (Photograph 2). As a result of the significant amount of disturbance, no subsurface archeological testing was conducted within Area 1 of the APE.

Area 2/Area 2A

Areas 2 and 2A (Figure 8B) are located east of Area 3 and separated by a wooded tree line where Kitten Branch flows northerly to Stony Run. This portion of the APE is a linear section sitting between the creek and the berm for Runway 15R-33L measuring approximately 1.63 hectares (4.04 acres). Area 2A is located at the northern end of Area 2 separated by a gravel access road (Photograph 3) and a rip-rap drainage feature (Photograph 4) and measures approximately 0.31 hectare (0.79 acre). Area 2 runs parallel to Kitten Branch and an active sewer/storm water drainage line runs along the edge of a gravel/asphalt service road at the base of a steep runway berm (Photograph 5). The bulk of the STPs were excavated in an open grassy area on either side of the access road and stormwater line. Areas that were excluded from testing as a result of previous disturbance included features associated with active drainage as a result of terra forming to build the airport runways (Photograph 6).

Area 2 was considered to have a high potential for the presence of prehistoric resources and was therefore subjected to 20.0-meter interval testing. A total of two STPs were excavated in Area 2A and 27 STPs were excavated in Area 2. Soil profiles in Area 2A consisted of a 10YR 4/2 dark grayish brown sandy loam fill over a 10YR 5/6 yellowish brown A-horizon over a very compact 10YR 5/8 yellowish brown sandy loam. Attempts to auger the subsoil were impeded by the compact nature of the soil. No artifacts were recovered from either STP in Area 2A.

Soil profiles in Area 2 were similar across the landscape and on both sides of the gravel and asphalt road. Soil profiles from Area 2 are represented on Figure 9 and consist of 10YR 3/3 dark

brown A-horizon overlying a 10YR 5/4 yellowish brown medium coarse sand subsoil. An exception to the standard soil profile in Area 2 was STP 25, which consisted of a 10YR 4/3 brown sandy clay loam modern A/O horizon over two fill horizons (10YR 6/2 light yellowish brown with pockets of 10YR 2/1 black loamy sand, 10YR 6/2 light yellowish brown sandy loam) over 10YR 5/4 yellowish brown sandy loam subsoil.

Three historic artifacts were recovered from two STPs within Area 2. Stratum I of STP 24 produced a single fragment of undecorated yellowware and a small fragment of undecorated whiteware. A single piece of blue transfer printed whiteware was recovered from a fill horizon within STP 25.

Area 3

Area 3 (Figure 8B) is a rectangular parcel between the Northrop Grumman access runway and Kitten Branch and measures approximately 1.26 hectares (3.13 acres). This area is currently in an open grassy field with a small portion running into the woods; Kitten Branch flows northerly to Stony Run (Photograph 7). A total of 14 STPs were excavated within this area: 12 in the open field and two within the woods. Area 3, considered to have high potential for containing prehistoric artifacts, was found to be extensively disturbed, most likely as a result of modifications related to construction of the access taxiway. The grassy area sits level along the edge of the taxiway and drops off considerably to the northeast at the edge of the woods. STPs excavated within the open grassy area presented very consistent profiles throughout. Figure 10 is representative of the soil profiles found in STPs 1 to 12 in Area 3 that consist of 10YR 4/3 brown very wet silty loam over 10YR 5/2 grayish brown clay loam over 2.5YR 4/6 red mottled with 6/8 light red clay loam over 7/5YR 6/6 reddish yellow fill (Photograph 8). No subsoil was encountered within the grassy section of Area 3. The two STPs excavated within the woods exhibited stacked modern alluvial soil profiles of 10YR 4/3 brown silty loam over 5YR 4/4 reddish brown sandy clay loam over 10YR 5/4 yellowish brown clay loam over 10YR 2/1 black silt loam with small pebbles. Auger boring placed at 1 meter below the ground surface showed the water table at approximately 1 meter. No artifacts were recovered during the excavations within Area 3.

Area 4

A total of seven STPs were excavated within Area 4. Area 4 (Figure 8C) is located just southeast of Area 6 in a densely wooded section of the airport property near an asphalt service road (Photograph 9) and measures approximately 0.29 hectare (0.72 acre). STPs were excavated at 20-meter standard intervals in a single line in the south and separating into two transects as the area opens up to the north due to its proximity to a previously reported historic site. Soil profiles are represented on Figure 11 and consist of 10YR 3/2 very dark grayish brown silty clay loam O-horizon over a 10YR 5/4 yellowish brown, very gravelly sandy loam A-horizon over 10YR 7/4 very pale brown gravelly sandy loam subsoil. Artifacts were recovered from STP 6 and consisted of one fragment of light olive bottle glass, one fragment of aqua glass, and five pieces of flat window glass.

Area 5

Area 5 (Figure 8B) is located southwest of the Northrop Grumman facilities and northwest of Taxiway W and Area 3. It measures approximately 4.58 hectares (11.34 acres) and connects to

Area 6 to the south. This area is mostly wooded with a small section of grass along the edge of the taxiway (Photograph 10). A total of 25 STPs were excavated at 40-meter intervals throughout the woods and along the grassy section. Soil profiles were relatively similar and consisted of 10YR 2/2 very dark brown sandy loam O-horizon over a 10YR 4/4 dark yellowish brown sandy loam A-horizon over 10YR 5/6 yellowish brown sandy clay loam subsoil (Figure 12). The final artifact count from Area 5 totaled six. Artifacts were recovered from STPs 5, 15, 18, 23, and 25. All artifacts were recovered from the A-horizon and consisted of two shell fragments and a single piece of colorless bottle fragment from STP 5, one undecorated whiteware fragment from STP 15, one aqua bottle glass fragment from STP 18, a brick fragment from STP 23, and a single fragment of black transfer printed pearlware from STP 25.

Area 6

Area 6 (Figure 8C) is a rectangular portion of the APE that measures approximately 1.25 hectares (3.09 acres) and is located west of Runway 15R-33L between Area 5 to the west, Area 7 to the east, and Area 4 to the south. This area sits totally within a heavily wooded section of the airport property (Photograph 11) and was investigated at 20-meter intervals due to the high probability for the presence of historic resources associated with a previously reported site (T.W. Cole House). Prior to the onset of subsurface investigation, a thorough pedestrian reconnaissance of the entirety of Area 6, as well as the immediate surrounding area, was conducted in an attempt to identify the location of building remains associated with the reported historical site. No such features were identified during the reconnaissance or the subsurface investigation. However, a number of aboveground or surface features were identified within the APE as well as outside the APE. Table 3 provides a list of the identified features and photograph designations.

Table 3. List of Surface Features Identified in Area 6.

Feature #	Feature Type	Description	Photograph #
1	Tire Dump	A pile of 20th-century rubber tires.	12
2	Concrete Roller	A cylindrical concrete roller without attachments.	13
3	Concrete Pipes	A pair of very large hollow concrete pipes.	14
4	Abandoned Road	A gravel road that has been abandoned and is currently being overtaken with trees and underbrush.	15
5	Granite Pillars	A pair of granite pillars on either side of the abandoned roadway. One of the pillars has been knocked over and broken. The remains of what appears to be cast iron gate remnants are still attached to the standing pillar.	16
6	Property Boundary Marker	A concrete block that tapers to a point with a cruciform symbol located on each side.	17
7	Stone and Concrete Culvert	A stone and concrete culvert that runs below a portion of the abandoned road.	18
8	Concrete and Brick Block	A conglomerate of brick and concrete located outside the APE.	No Photo
9	Concrete and Brick Shaft	A concrete and brick shaft feature, may be displaced. Outside the APE.	19

A total of 30 STPs were excavated at intervals of 20 meters within Area 6, 12 of which contained various quantities of historic and modern material. A total of 151 artifacts were recovered from this area; 94 were recovered from a single STP (3). Artifacts recovered from Area 6 are listed in Table 4.

Table 4. List of Artifacts Recovered from Area 6.

STP	Stratum	Depth BGS	Artifacts
3	II	9-32	1 piece of slag, 1 opal glass fragment, 3 cut nail fragments, 1 metal snap, 7 window glass fragments, 1 glass vessel fragment, 5 aqua bottle glass fragments, 7 canning jar fragments, 1 aqua bottle lip, 1 vinyl record fragment, 4 metal can fragments, 11 colorless bottle fragments, 2 brick fragments, 2 metal ring fragments, and 1 amber bottle fragment
	III	32-62	14 colorless bottle fragments, 23 light green bottle glass fragments, 4 dark aqua bottle fragments, 1 metal strap with cut mounting nails, 3 metal nail fragments, 2 window glass fragments, 2 cut nail fragments, 1 aqua bottle lip, 1 amber glass bottle fragment, 1 undecorated ironstone rim, 1 undecorated porcelain fragment, 1 porcelain button, 1 wheat-backed Lincoln Penny (no readable date), 1 bone fragment, 5 pieces of sheet metal and 5 wire nail fragments
4	II	5-24	2 olive bottle glass fragments
5	II	10-28	2 colorless bottle fragments, 1 window glass fragment
9	II	6-31	1 machine-made bottle glass base
15	II	6-55	1 window glass fragment, 1 aqua bottle (complete), 1 undecorated whiteware fragment, and 1 colorless bottle fragment
16	II	11-45	1 undecorated ironstone fragment and 1 blue painted porcelain rim
17	II	9-35	13 window glass fragments
18	II	5-23	3 window glass fragments
19	II	7-48	2 window glass fragments and 1 cinder
22	II	22-32	1 window glass fragment, 1 wire nail, and 1 cut nail
23	II	10-25	1 colorless bottle fragment and 1 window glass fragment
28	II	10-27	1 cut nail and 1 wire nail

Soil profiles from Area 6 were similar throughout the area with one obvious exception: STP 3. The bulk of the soil profiles consisted of either 10YR 4/2 dark grayish brown sandy silt loam plowzone over 10YR 6/6 brownish yellow sandy loam subsoil or 10YR 3/2 very dark grayish brown sandy silt loam A/O-horizon over 10YR 5/4 yellowish brown sandy loam plowzone over 10YR 7/4 very pale brown sandy loam subsoil (Figure 13).

The obvious exception to the normal soil profile throughout Area 6 was STP 3. It consisted of 10YR 3/2 very dark grayish brown silt loam O/A-horizon over two fill soils. They consisted of 10YR 5/3 brown silty clay loam fill over 10YR 5/4 yellowish brown mottled with 10YR 6/4 light yellowish brown clayey sand loam fill .These deposits covered subsoil consisting of 10YR 6/4 light yellowish brown sandy loam. The two overlying fill horizons contained a high quantity of temporally mixed historic artifacts as well as cinders, coal ash, and ash with some bits of mortar.

Area 7

Area 7 (Figure 8C) is a linear section of the APE located east of Area 6 and measures approximately 2.09 hectares (5.13 acres). The largest portion of Area 7 is wooded with a small section of grassy field that tapers as it approaches the eastern edge of Runway 10-28. The woods are very thick with dense patches of greenbriar (Photograph 20). Fifteen STPs were placed at 40-meter intervals across Area 7; a total of six artifacts recovered from a single STP included one vessel glass fragment, two window glass fragments, and three pieces of colorless glass. Soil profiles (Figure 14) were similar to those present throughout most of the wooded sections of the APE and consisted of 10YR 3/2 very dark brown silt loam O-horizon over 10YR 4/2 dark

grayish brown clay sandy loam plowzone over 10YR 7/4 very pale brown loamy sand with gravels subsoil.

Area 8

Area 8 (Figure 8D) of the overall APE measures approximately 4.51 hectares (11.15 acres) and is located both inside and outside the airport boundary fence. Due to its proximity to a previously recorded prehistoric site, this area was investigated at high probability intervals of 20 meters in sections where ground disturbance was not obvious. Area 8 is located at the west end of Runway 10-28 and runs parallel to the road. The portion of Area 8 that lies inside the airport boundary fence is in high grass that begins at the edge of the woods to the south and extends north toward and past the end of the runway (Photograph 21). The topography changes rapidly as the APE approaches the runway becoming very steep and obviously terra formed. North of the runway, the APE dips down into a landscaped drainage basin fed by drainage ditches (Photograph 22). Excavation inside the boundary fence occurred only in the grassy section between the terra-formed runway berm and the woods. Profiles (Figure 15) consisted of 10YR 5/4 very dark brown silt loam fill over 10YR 7/4 very pale brown mottled with 10YR 5/4 yellowish brown loamy sand fill/disturbed plowzone over 10YR 8/2 very pale brown mottled with 10YR 7/6 yellow clay sandy loam subsoil. No artifacts were recovered from the STPs excavated within the boundary fence in Area 8.

The Area 8 portion of the APE that is located outside the airport boundary fence was a fairly narrow linear section that lies within two stands of woods (Photograph 23), separated by an open field and access road (Photograph 24). Considerable disturbance was identified where the runway light towers stand. The landscape has been terra formed for drainage and the presence of subsurface utilities have destroyed potentially artifact bearing soil (Photograph 25). A total of 25 STPs were excavated within the woods and the open grassy area outside the boundary fence in the Area 8 APE. Eight historic artifacts were recovered from four STPs and included colorless bottle glass fragments, window glass, a clam shell, and a single piece of transitional pearlware. Soil profiles were similar across the entire APE with more wetland type soils located in the southern woods near a small perennial stream. Representative profiles are presented as Figure 15 and consisted of 10YR 5/3 brown sandy loam over 7.5YR 6/4 light brown sandy loam subsoil.

Areas 9 and 9A

Area 9 (Figure 8F) is located at the southern end of Runway 15R-33L outside the airport boundary fence and measures 1.63 hectares (4.04 acres). This area, similar to Area 1 in topography, is a linear configuration with runway light towers located at the center of the APE. No excavation was conducted within this area due to the presence of onsite construction crews excavating the soils through which archeological investigation would have occurred (Photograph 26). The southeastern end of Area 9 does not appear on Figure 8F. Since no subsurface work was conducted in this area and to maintain a comprehensive preview of Area 10, the remainder of Area 9 was left off the figure.

Area 9A, located within the airport boundary adjacent to runway 15R-33L, was identified as having a high potential for historic resources (Jas. Phelps Site). Therefore, the area was tested at 20-meter intervals in portions that were not obviously disturbed. Area 9A (Figure 8E) is a grassy, terra-formed knoll surrounded by deep drainage features is bordered by a gravel access road

(Photograph 27) and measures approximately 0.55 hectares (1.38 acres). Soil profiles confirmed the disturbed nature typical of the rest of the areas that have been modified during the construction and landscaping of the airport property (Photograph 28). Figure 16 represents the typical soil profiles encountered within this area. Temporally mixed artifacts were recovered throughout the area from deposits that often exceeded 0.7 meter below the ground surface. Artifacts recovered from Area 9A are listed in Table 5.

Table 5. List of Artifacts Recovered from Area 9A.

STP	Stratum	Depth BGS	Artifacts
4	III	17-34	1 colorless bottle glass fragment, 1 brick fragment, 1 cut nail, 1 wire nail
5	II	31-80	1 whiteware with decal, 1 brick fragment, 1 aqua bottle glass fragment
	III	80-90	1 piece of lumber, 1 wire nail fragment, 2 brick fragments, 1 piece of unidentified rigid plastic, 1 colorless bottle fragment, and 2 pieces of window glass
6	III	61-96	1 colorless bottle fragment and 1 fragment of undecorated whiteware
7	I	0-25	1 textured colorless bottle glass fragment
10	I	0-17	4 brick fragments, 1 unidentified nail fragment, and 1 fragment of aqua bottle glass
13	I	0-60	1 piece of window glass, 1 wire nail, 1 white-bodied earthenware fragment, 5 shell fragments, 1 plastic trash bag fragment
	II	60-87	1 green bottle fragment, 5 pieces of colorless glass, 2 brick fragments, 1 piece of large gauge wire, 4 pieces of green plastic bag, and 1 piece of plaster

Area 10

Area 10 (Figure 8F) is the largest area, measuring approximately 6.87 hectares (16.99 acres), within the current APE for this project. It is located in a wooded and grassy section southeast of Runway 15R-33L (Photograph 29). The southern part of Area 10 was considered to have a high potential for the presence of prehistoric resources and was therefore investigated with STPs at intervals of 20 meters. The northern end of the area held only a moderate potential and was investigated with STPs at 40-meter intervals. There is a drainage that runs along the edge of the runway berm that empties into a wetland where the airport boundary fence runs parallel to the highway. The portion of Area 10 within the wetland, as well as to the east where slope and disturbance are evident (Photograph 30), was not subjected to subsurface investigation.

A total of 61 STPs were excavated within Area 10 and 124 historic artifacts were recovered from 31 individual STPs. Recovered artifacts area listed in Table 5. Each STP exhibited very similar soil profiles of 10YR 6/3 pale brown sandy loam plowzone over 10YR 8/2 very pale brown sandy loam subsoil that contained ferric staining in the grassy area near the wetlands and 10YR 4/3 brown sandy loam plowzone over 10YR 3/2 very dark grayish brown sandy loam lense over 10YR 5/4 yellowish brown sandy loam subsoil (Figure 17).

Table 6. List of Artifacts Recovered from Area 10.

STP	Stratum	Depths BGS	Artifacts
2	I	0-53	1 undecorated whiteware fragment
3	I	0-13	1 colorless bottle glass fragment and 2 shell fragments
	II	13-34	1 undecorated whiteware fragment, 2 shell fragments, 2 colorless bottle fragments, and 1 window glass fragment
4	I	0-19	2 whiteware fragments
5	I	0-16	1 ceramic insulator, 1 aqua bottle glass, and 2 milk glass jar lid liner fragments
8	I	0-21	2 window glass fragments
9	I	0-21	1 amber bottle glass fragment, 1 colorless bottle fragment, and 2 embossed colorless bottle fragments
10	I	0-14	1 colorless bottle glass fragment
11	II	10-30	1 unidentified metal, 1 amber bottle glass fragment, 2 colorless bottle fragment, 5 whiteware fragments, 1 hatched tumbler rim, 2 porcelain fragments, and 1 ironstone fragment
13	I	0-20	1 floral decal decorated whiteware fragment
15	I	0-23	1 undecorated porcelain fragment
16	I	0-24	1 whiteware ceramic fragment, 1 window glass fragment, 1 undecorated ironstone rim, and 4 colorless bottle glass fragments
18	I	0-18	1 colorless bottle fragment and 1 stippled amber bottle glass fragment
19	I	0-14	1 colorless bottle fragment, 1 undecorated porcelain rim fragment, 3 shell fragments, 1 brick fragment, and 1 undecorated whiteware fragment
20	I	0-30	1 colorless bottle glass fragment, 2 porcelain fragments, and 1 window glass fragment
22	I	0-14	1 undecorated whiteware fragment
26	I	0-38	1 brick fragment, 1 colorless bottle glass fragment, 1 window glass fragment, and 1 undecorated ironstone fragment
29	I	0-31	1 window glass fragment
31	I	0-12	1 cobalt vessel glass fragment, 1 underglaze blue decorated porcelain fragment, and 1 colorless bottle glass fragment
	II	12-24	2 coke bottle fragments, 1 coal fragment, 1 colorless bottle fragment, 1 brick fragment, and 2 thick-walled glass fragments
32	II	11-29	1 window glass fragment, 1 solarized colorless bottle glass fragment, and 1 whiteware fragment
33	II	12-40	1 cut nail
34	II	10-63	1 undecorated whiteware fragment
35	II	12-40	2 colorless bottle glass fragments, 1 institutional porcelain fragment, and 1 window glass fragment
43	I	0-17	1 undecorated porcelain fragment
44	I	0-23	1 ironstone base with a partial makers mark
46	I	0-28	1 colorless bottle glass fragment
47	I	0-17	1 undecorated whiteware fragment, 1 institutional porcelain base fragment, 1 tumbler rim, 1 window glass fragment and 1 porcelain fragment
48	I	0-24	1 whiteware fragment, 1 blue underglaze porcelain rim fragment, 1 brick fragment and 1 floral designed polychrome whiteware fragment
49	II	14-49	1 cobalt blue glass bottle fragment, 2 cut nail fragments, 1 unidentifiable metal fragment, 3 colorless vessel glass fragments, 1 window glass fragment, and 1 colorless bottle glass fragment
50	I	0-10	3 glass window fragments
51	I	0-13	1 colorless bottle glass
52	I	0-9	1 bone fragment, 1 shell fragment, and 1 undecorated porcelain fragment
	II	9-32	1 glass ointment pot with a screw top, and 1 green vessel glass fragment

STP	Stratum	Depths BGS	Artifacts
53	II	7-29	1 whiteware fragment, 2 window glass fragments, and 1 cobalt vessel glass fragment
54	II	13-30	1 pink floral decal porcelain fragment
55	I	0-18	1 undecorated porcelain fragment, 1 undecorated whiteware fragment, and 2 colorless bottle fragments
56	II	17-28	1 undecorated whiteware fragment, 2 colorless bottle glass fragments, and 1 colorless vessel glass fragment
57	II	14-22	2 undecorated whiteware fragments and 1 cut nail fragment
58	I	0-24	1 undecorated whiteware fragment and 1 institutional porcelain fragment
59	II	13-22	2 colorless bottle glass fragments

Area 11

Area 11 (Figure 8C) measures approximately 0.32 hectare (0.80 acre) and is located along the Northrop Grumman southwestern boundary fence northwest of Area 5 and north of Area 6. This location sits on top of a steep bank overlooking the Northrop Grumman complex. The entirely wooded area is linear in shape and is considered to have a low to moderate potential for the presence of archeological resources. A total of four STPs were excavated within this area from which no artifacts were recovered. Excavations exhibited soil profiles very similar to those identified and described throughout the entire airport property. Representative profiles are present on Figure 18.

9.0 RESULTS DISCUSSION AND SITE EVALUATION

Thirteen survey areas were examined during the Phase IB survey. These areas represented locations of high to moderate prehistoric probability or high historic probability and also locations where project impacts were indicated as occurring. Phase IB archeological investigations were conducted on MAA-owned property in April 2009. No prehistoric artifacts were recovered during the survey. Historic artifacts encountered in three survey areas within the APE are currently interpreted as relating to two historically documented domestic sites: 18AN1427, the T. W. Cole Site (Survey Area 6); and 18AN1428, the Jas. Phelps Site (Survey Areas 9A and 10). Both sites are shown on the 1878 Hopkins Atlas of the Fifth District of Anne Arundel County (Figure 6). The artifacts recovered from both sites consist of collections of temporally mixed objects dating from the late nineteenth and twentieth centuries. The artifact locations were unevenly distributed and the deposits were substantially disturbed within the APEs.

9.1 T.W. Cole Site (18AN1427)

Thirty STPs were excavated within the APE at the approximate location of the former T.W. Cole House property. Recovered artifacts consisted of temporally mixed deposits of domestic and architectural items. Figure 19 represents the approximate site boundaries, based on positive STPs, located within the APE for this project. Unofficial site boundary outside the APE is based solely on the location of surface features identified outside the current project area.

Artifact Discussion

In all cases, with a single exception, all the artifacts that make up the total artifact assemblage at the T.W. Cole Site (18AN1427) were recovered from a plowzone context. The single exception was STP 3, where two layers of fill yielded 75.5 percent of the total artifact assemblage from the site positioned within the APE. These artifacts consisted of glass and metal fragments and likely have no relevance to the historic period occupation on this property.

Table 7 presents a list of artifacts recovered from nine STPs within the approximate boundaries of the site within the APE. The table includes the artifacts recovered in STP 3, which may not be associated with the historic occupation of the Cole property. Domestic artifacts constitute the bulk of the assemblage and include ceramics, container glass, shell, bone, and small finds. Architectural artifacts constitute the second largest number of collected artifacts, followed by metal.

Table 7. Domestic and Architectural Artifacts from 18AN1427 (Area 6).

Description	Number	Percentage of Total Assemblage
Architectural	51	32.9%
Domestic	92	59.4%
Metal	10	6.5%
Other	2	1.3%
	n=155	100.1%

Architectural artifacts included brick fragments, cut and wire nails, and window glass, which made up 32.9 percent of the total site assemblage (Table 7).

As previously mentioned, the domestic artifacts included ceramic fragments, container glass, shell, bone, and vinyl record. Of the domestic artifacts recovered from the site, 71.6 percent of the assemblage is comprised of glass, 34 percent (n=38) of which came from two vessels recovered from STP 3.

Diagnostic artifacts from the twentieth century in STP 3 stratum II consist of a complete stainless steel snap, a number of tin can fragments, a vinyl record fragment, and a single sherd of machine-made, banded finish, aqua bottle glass. There were no items that were clearly nineteenth-century diagnostic artifacts recovered from this stratum, but there were a number of non-diagnostic artifacts that could be attributed to that time period. Non-diagnostic artifacts included several fragments of glass from a panel bottle, a number of cut nail fragments, and "Ball" canning jar fragments. Photographs 31 and 32 depict a representative sample of artifacts recovered from STP 3.

Extracting temporal affiliation from the remaining eight STPs is difficult due to the low number of recovered ceramics. As shown in Table 4, the whiteware and ironstone artifacts indicate that their deposition could have occurred any time from the mid-nineteenth century up to today.

Surface Feature Discussion

Nine surface features were identified within the approximate site boundaries in and outside the APE. Feature 1 was a sizable pile of what appears to be various sizes of steel belted radial tires (Photograph 12). The tire pile appears to have been deposited some time ago, as many of the tires on the perimeter of the pile are partially buried. A fair estimate of the total number of tires present is more than 50 tires. Feature 1 is located along the southwestern edge of the approximate site boundary.

Feature 2 is located along the southern edge of the approximate site boundary and consisted of a large (1.2 meters by 0.7 meter) cylindrical concrete roller with rusted metal straps located on either end. The function of this item is relatively clear. However, it has not been used for a long period of time.

Feature 3 consists of a pair of very large concrete pipes (Photograph 14) similar to those used to run wastewater below streets. The pipes, measuring approximately 1.2 meters to 1.4 meters in diameter, are located in proximity to Feature 2 near the approximate southern site boundary at the edge of the APE.

Feature 4 is an abandoned roadway that runs north and south through the woods and may have been the original access to the T.W. Cole House. The road is gravel and travels directly through two stone pillars with what look like cast iron gate collars or hinges (Feature 5). The road has fallen into serious disrepair and is covered with fairly sizeable trees (Photograph 15). Following the demolition of the T.W. Cole House, this road would have provided easy access to a fairly remote area, where it appears clandestine dumping has occurred. The road crosses a stone and concrete culvert (Feature 7), extends an additional 30 to 45 meters north, and eventually ceases outside the current APE.

Feature 5 consists of a pair of stone, most likely granite, gate pillars. Each is approximately 1.8 meters tall, rectangular with planned edges, and sitting on a square footer with a square capstone on top. The western pillar is still standing *in situ* along the western side of Feature 4, and the eastern pillar has since fallen or been pushed over (Photograph 16). It appears as if the eastern pillar was more likely pushed over due to the presence of broken and bent iron rebar extending from the base and the bottom of the central portion of the pillar.

Feature 6 consists of a concrete boundary marker located just south of Feature 5 and west of Feature 4 (Photograph 17). The marker currently sits approximately 0.5 meter above the ground surface and extends belowground to an unknown depth. It is rectangular, rough cut, and comes to a point at the top. There is a cruciform symbol located on each of its four sides.

Feature 7 is a stone and concrete culvert (Photograph 18) that carries water underneath Feature 4. A small drainage runs beneath the road and eventually disappears as it travels into Area 5. It appears that a number of repairs have been enacted on this culvert and it has since again fallen into disrepair. Feature 7 is located at the southern edge of the APE where Area 6 meets Area 5.

Feature 8 is a 1.2-meter by 0.9-meter rectangular stone and concrete block. The mortar is clearly concrete and heavily decayed. The block does not appear to have been architectural in a domestic sense but more likely appears to have functioned as a footer for some type of large industrial object or structure. The position in which the block was sitting suggests the object was dumped rather than purposefully placed. Feature 8 is located at the spot outside the APE where Feature 4 appears to cease, further suggesting the block was dumped off.

Feature 9 is what remains of a concrete and brick shaft feature sitting outside the APE in proximity to the end of Feature 4 and Feature 8 (Photograph 19). The shaft is circular and currently filled with leaves and debris. The feature is currently sitting askew south of Feature 4 outside the APE, and could very well be displaced and/or dumped at its current location. No further evaluation or investigation of the feature was conducted during this survey as it sits well outside the APE.

The T.W. Cole House was most likely demolished at the time of, or before the creation of, the Friendship Airport in the late 1940s. The presence of artifacts that were not manufactured until ten or more years later, along with the presence of obvious dumping of post occupation trash (Features 1 to 3) in proximity to STP 3, suggests that the deposit may represent a later dumping episode. Also, presence of mid-twentieth century artifacts in Stratum III of STP 3 suggests that the deposition could not have occurred until after the 1950s, as evidenced by the crown top bottle fragment located within that deposit.

The bulk of the artifact assemblage was recovered from what appears to be a mid- to late-twentieth-century dumping episode (STP 3) and is unlikely associated with the T.W. Cole Site. The rest of the assemblage represents a low density scatter related to agricultural activity. Considering there is nothing unusual about the overall assemblage and it does not indicate any valued information regarding the historical occupation of the site, it is A.D. Marble & Company's opinion that further investigation within the APE would not provide additional significant information beyond what has already been learned.

The presence of architectural features most likely associated with the T.W. Cole House property exist outside the physical APE for this project, and intact resources may exist outside the current project area as well. This survey was confined to the physical APE and only takes into account the area in which a New Tenant Hanger Facility is proposed. Further investigation would be required if the project plans change and the APE is extended outside the current project area.

9.2 Jas. Phelps Site (18AN1428)

Two areas within the proposed APE, Area 9A (Figure 20) and Area 10 (Figure 21), were archaeologically investigated. They were separated by previously disturbed areas due to airport construction. The recovered artifacts were determined to be associated with the Jas. Phelps Site (18AN1428), a nineteenth-century property identified on historic maps during the background research phase of this study. Artifact assemblages from both areas are similar in type, form, and age. Area 9A artifacts were recovered from heavily disturbed and mixed fill horizons, and Area 10 artifacts were recovered strictly from a plowzone context.

Artifact Discussion

Area 9A deposits consisted of deeply buried fill and surface fill and represent mixed layers of primarily architectural debris. Table 5 provides a list of the temporally mixed assemblage that included modern plastic in deposits mixed with possibly late-nineteenth- to early-twentieth-century diagnostic ceramics. Photograph 33 presents a representative view of typical artifacts recovered from the fill horizons in Area 9A. The artifacts were distributed throughout thick and unconsolidated fill horizons. The artifacts may have been associated with the Jas. Phelps Site but have likely been redeposited. The generally large number of architectural artifacts recovered from the fill horizons (Table 5) suggest that a building may have stood in proximity to Area 9A, but the lack of evidence of a foundation or similar architectural feature makes this determination impossible.

The entire artifact assemblage from Area 10 was recovered from a plowzone horizon across a broad field and represents a typical field scatter of domestic and architectural debris. Architectural artifacts include: window glass, brick, and nail. Domestic artifacts consist of ceramics, glass, shell, and bone. Metal and coal were also recovered and made up the remainder of the assemblage.

Domestic artifacts make up the bulk of the assemblage at 79.7 percent, of which 55.2 percent is container glass. Forty-four diagnostic ceramics were recovered from the plowzone in Area 10. Diagnostic ceramics included whiteware, ironstone, and porcelain, with the highest percentage of recovered ceramics being whiteware at 52.3 percent.

Low artifact counts were recovered from each STP in Area 10. They were all generally small in size, suggesting trampling and plowing. Photographs 34 to 36 show the small size of the artifacts recovered from this area. No significant concentrations of artifacts were discovered within Area 10. The artifact assemblage in Area 10 represents a typical nineteenth- and twentieth-century field scatter of domestic and architectural debris commonly found throughout the Middle Atlantic Region. Most often these types of scatters can be attributed to early manuring practices carried out during those time periods. It is unlikely that these scatters can be attributed to individual occupations. Therefore, based on the limited available information provided by the

Area 10 assemblage and the lack of integrity of the contexts from which artifacts were recovered in Area 9A, it is A.D. Marble & Company's recommendation that no further work is required within these portions of the APE.

10.0 RECOMMENDATIONS

Phase IB archeological survey investigations of 13 survey areas were conducted within the BWI property. Evidence of historic occupation encountered in three areas is attributed to two domestic sites. No significant features were identified in association with the artifact assemblages at either location. The spatial patterning of positive STPs (i.e., those that yielded artifacts) did not reveal concentrations of artifacts at either site location. The individual STPs containing artifacts lack the integrity of context necessary to recommend further evaluation at the Phase II level. However, archeological features associated with both sites may be present outside the limited areas investigated during this Phase IB survey.

The possibility that either of these individual site areas may be eligible for inclusion in the National Register of Historic Places cannot be determined on the basis of these Phase IB investigations within the physical APE. However, it is apparent that the portions of the sites within the project impact areas do not preserve intact deposits that can confidently be attributed to deposition activity related to those nineteenth-century occupations at either site; therefore, no additional investigations are recommended.

Considering the preliminary nature of the current undertaking, it is difficult to determine what the exact effects from each of the individual planned actions may be, but it is likely that land-altering activities will take place. However, due to the lack of integrity of deposits investigated within the current APE at the T.W. Cole Site (18AN1427) and the Jas. Phelps Site (18AN1428), no significant resources will be impacted by future undertakings. In the future, if project plans extend outside the current APE, additional Phase I archaeological efforts may become necessary as part of the Section 106 process.

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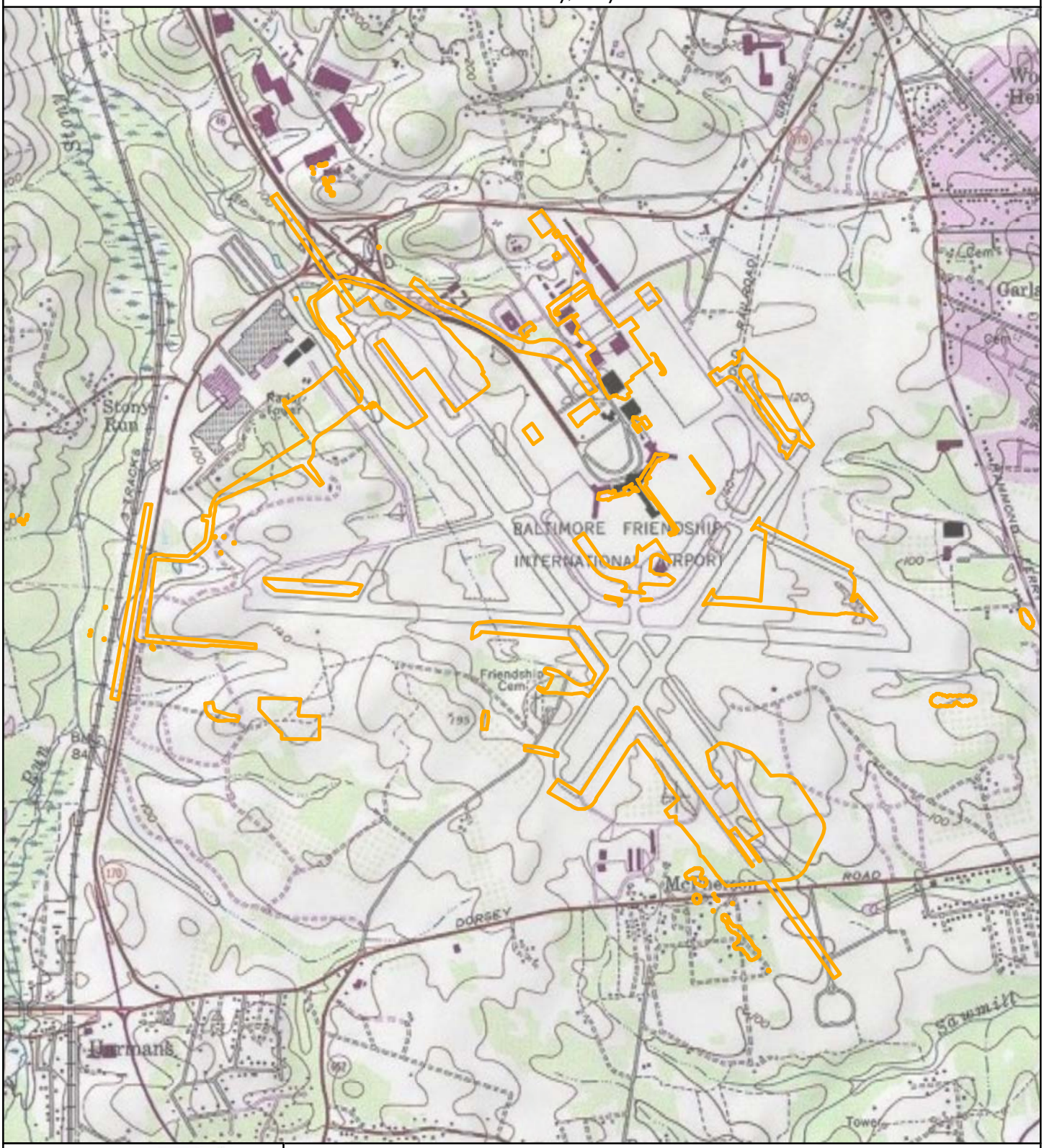
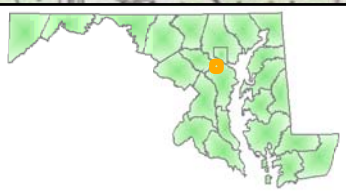
Figures

Figure 1: Project Location Map
USGS Relay 7.5 Minute Quadrangle
Baltimore/Washington International Thurgood Marshall Airport
Planned Near-Term Improvement Projects (2008-2012)
Phase IB Archeological Survey
Anne Arundel County, Maryland





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Study Area

Map source: © 2009 National Geographic Society

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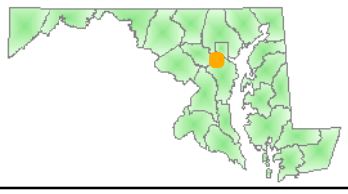
Figure 2: Proposed Impact Area Locations and Archeological Sensitivity
BWI Survey Plan

Baltimore/Washington International Thurgood Marshall Airport
Planned Near-Term Improvement Projects (2008-2012)
Phase IB Archeological Survey
Anne Arundel County, Maryland



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Project Area
Test Area
Previously Evaluated - No Additional Archeological Study Required
High Probability for Historic Sites
High Probability for Preistoric Sites (Buried Deposits)
Moderate to Low Probability for Prehistoric and Historic Sites
National Register Eligible Site
New Site
EBRIGHT

Map source: © 2009 i-cubed

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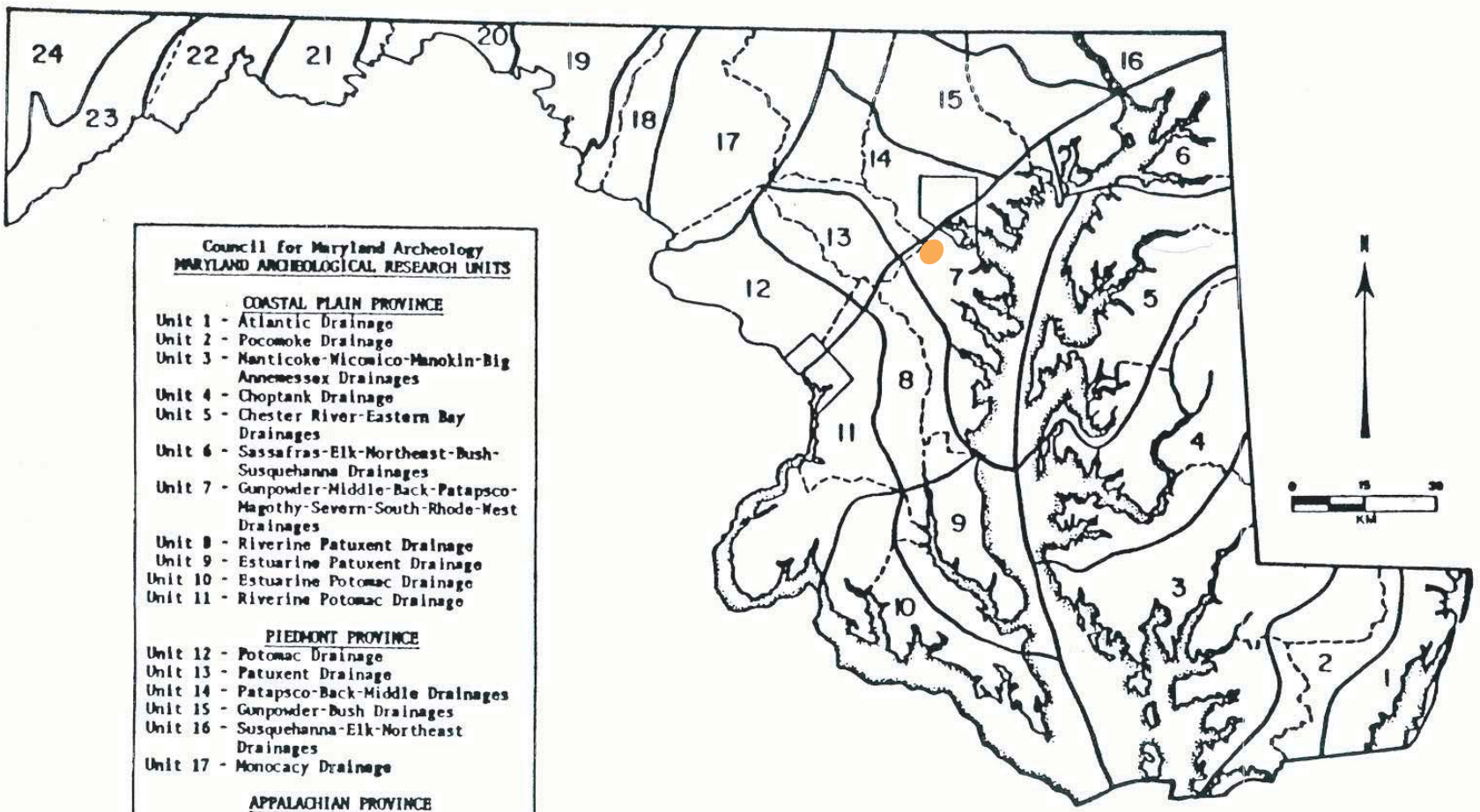

Maryland Aviation Administration Property Releases - Environmental Assessment Anne Arundel County, Maryland

Study Area

Source:
Council for Maryland Archaeology

Figure 3
Archeological Research Units

June 2009

Map Document X:\Graphics\Projects\P-820\Mapping\Archeology\Figure 3.ai

1	Maintenance Vehicle/Equipment Storage Expansion
2	ARFF Facility Expansion
3	Runway Safety Area Improvements and Runway 15R-33L Shift
4	Firefighting Training Facility Expansion
5	New Tenant Hangar Facility
6	Terminal Improvement Program
7	Concourse C/D Apron Rehabilitation
8	Checkpoint J Vehicle Inspection Lane
9	Interstate 195 Widening
10	Snow Dump Sites
11	Midfield Cargo Apron
12	Spring Land/Gate G Improvements
13	Central Utility Plant Expansion

Area 1
Area 2
Area 2A
Area 3
Area 4
Area 5
Area 6
Area 7
Area 8
Area 9
Area 9A
Area 10
Area 11

Legend

- Project Identification
- Test Area
- Proposed Near-Term Projects
- Obstruction Clearing

AERIAL: MAA 2005

BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

FIGURE 4
Proposed Near-Term Projects (2008-2012) with APE, Project Area & Survey Limits

N

COUNTY ANNE ARUNDEL

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Baltimore/Washington International Thurgood Marshall Airport ALP Project
Planned Near-Term Improvement Projects (2008-2012)

Source: Henry Tanner "Maryland" ca. 1817 (MD State Archives MSA SC 1427-1-94).

Maryland Aviation Administration
Property Release -
Environmental Assessment
Anne Arundel County, Maryland

Study Area

Figure 5
Circa-1817 Tanner Map with General Location of Project Area

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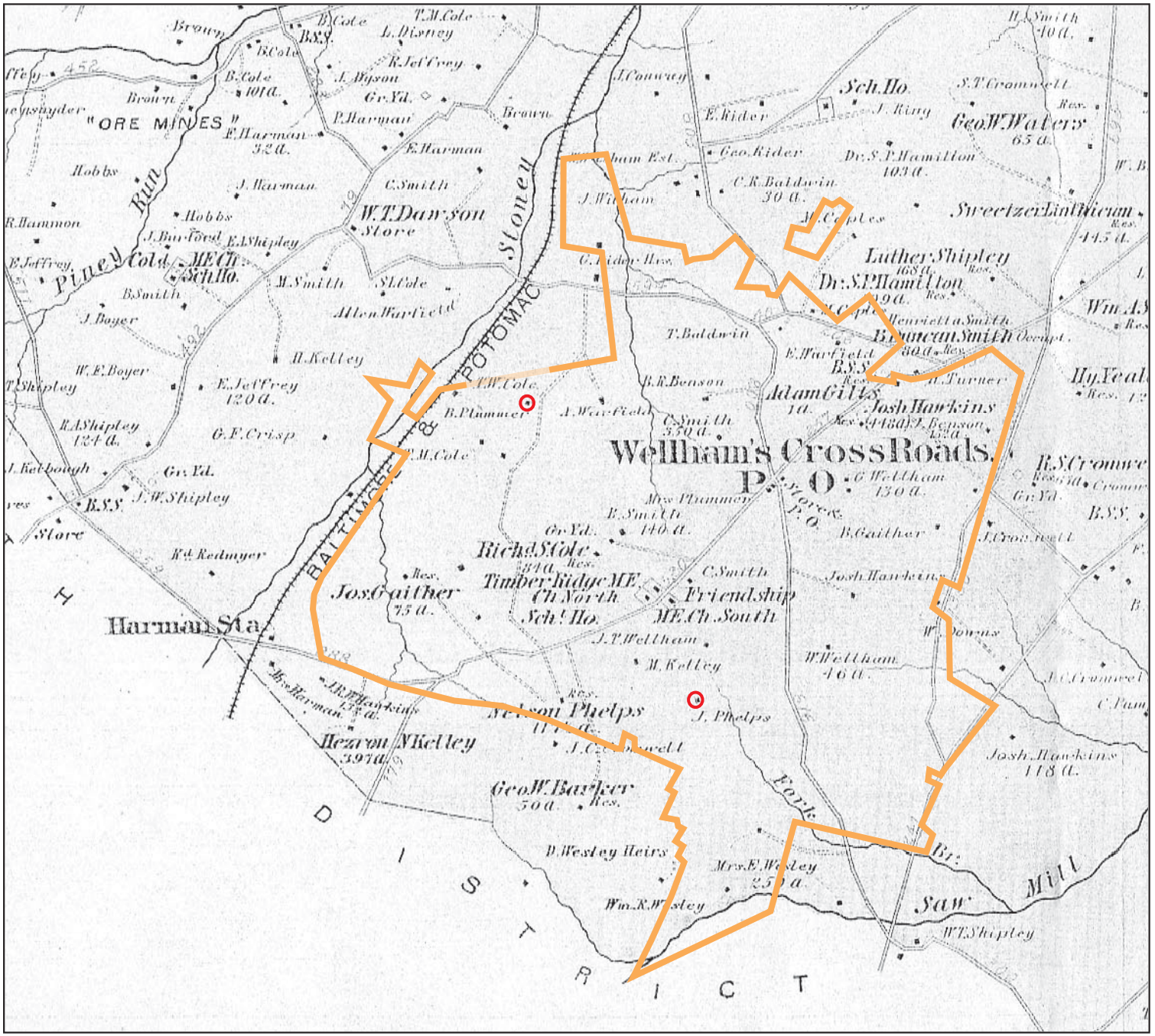
Miles

June 2009



Maryland Aviation Administration
Property Releases -
Environmental Assessment
Anne Arundel County, Maryland

Figure 6
1878 Hopkins Atlas

June 2009

Source: 1878 G.M. Hopkins Atlas of Anne Arundel County.

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Archeological Sites
Archeological Surveys
Study Area
Map Grid

Source:
USGS 7.5' DRGs:
Baltimore East, MD; Baltimore West, MD;
Curtis Bay, MD; Laurel, MD;
Odenton, MD; Relay, MD.

SCALE
1 inch = 2,000 feet

DRAWN BY
ADS

CHECKED BY
DJB

A.D. Marble & Company
375 E. Elm St.
Conshohocken, PA 19428
484.533.2500

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Oct 2009

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TITLE
Figure 7A
Recorded Sites and Previous Surveys
Baltimore/Washington International Thurgood Marshall Airport
Planned Near-Term Improvement Projects (2008-2012)
Phase IB Archeological Survey
Anne Arundel County, Maryland

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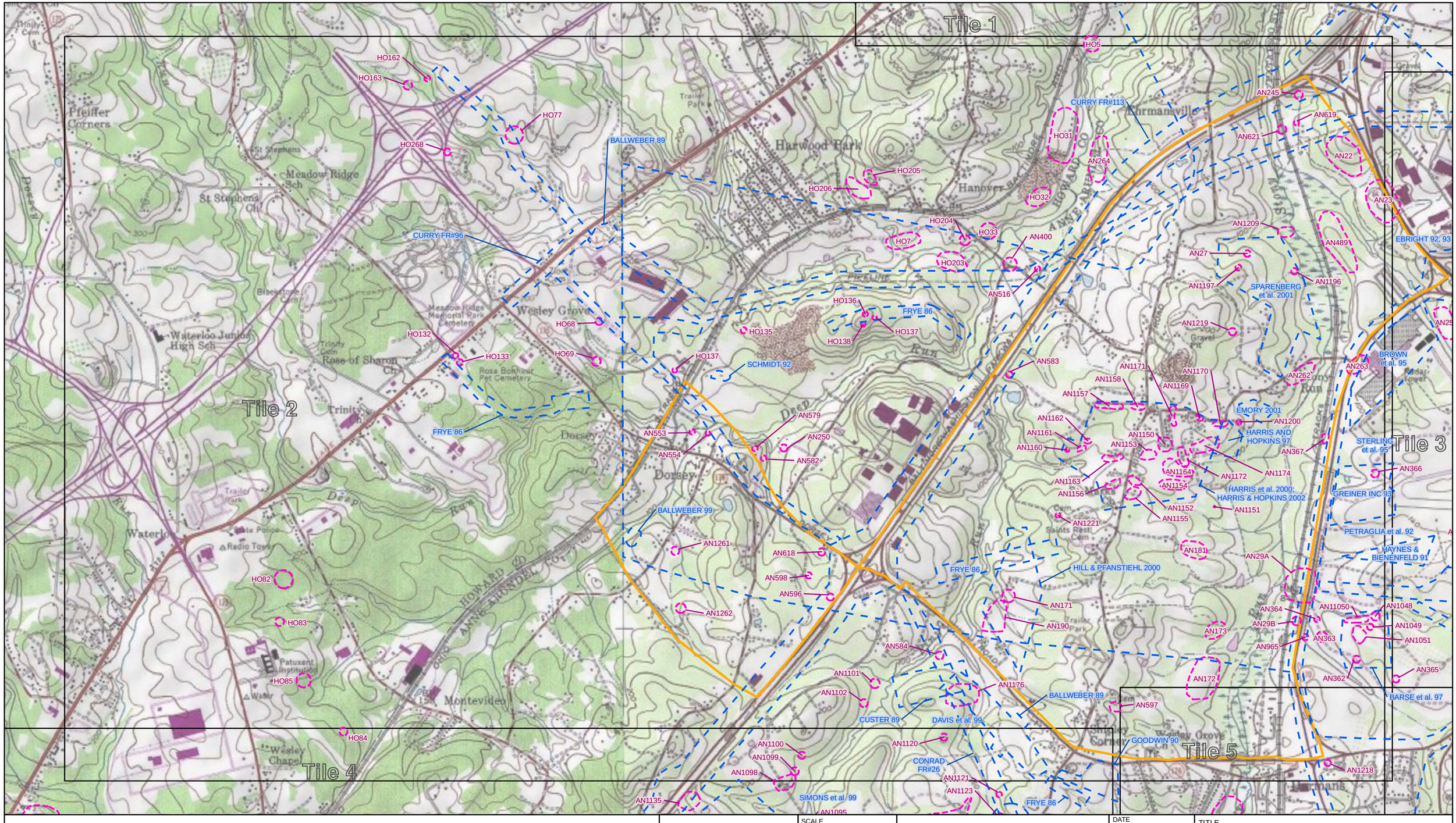

Source:
USGS 7.5' DRGs:
Baltimore East, MD; Baltimore West, MD;
Curtis Bay, MD; Laurel, MD;
Odenton, MD; Relay, MD.

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Figure 7B
Recorded Sites and Previous Surveys
Baltimore/Washington International Thurgood Marshall Airport
Planned Near-Term Improvement Projects (2008-2012)
Phase IB Archeological Survey
Anne Arundel County, Maryland

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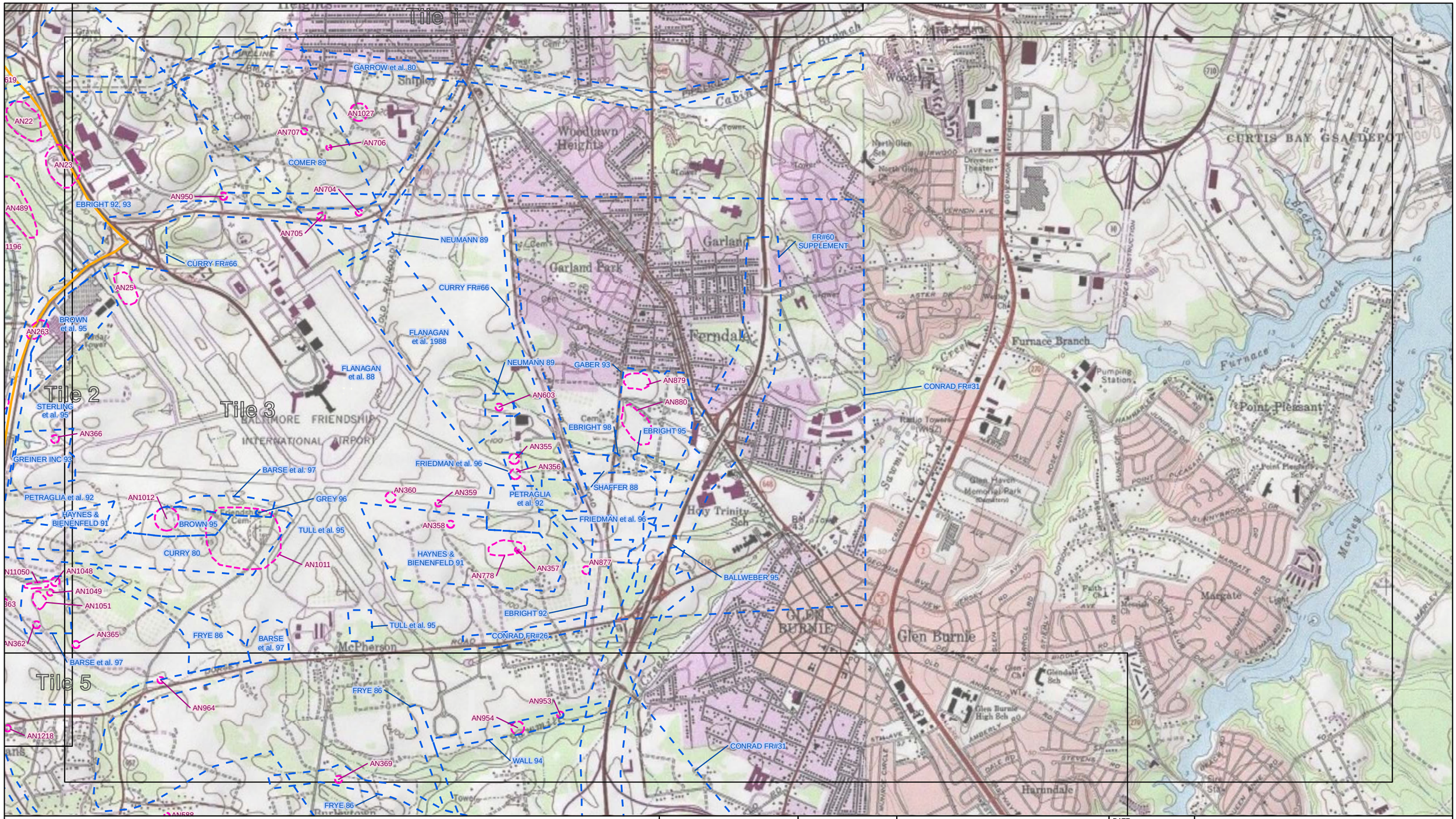

Archeological Sites
Archeological Surveys
Study Area
Map Grid

Source:
USGS 7.5' DRGs:
Baltimore East, MD; Baltimore West, MD;
Curtis Bay, MD; Laurel, MD;
Odenton, MD; Relay, MD.

SCALE
1 inch = 2,000 feet

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Figure 7C
Recorded Sites and Previous Surveys
Baltimore/Washington International Thurgood Marshall Airport
Planned Near-Term Improvement Projects (2008-2012)
Phase IB Archeological Survey
Anne Arundel County, Maryland

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Archeological Sites
Archeological Surveys
Study Area
Map Grid

Source:
USGS 7.5' DRGs:
Baltimore East, MD; Baltimore West, MD;
Curtis Bay, MD; Laurel, MD;
Odenton, MD; Relay, MD.

SCALE
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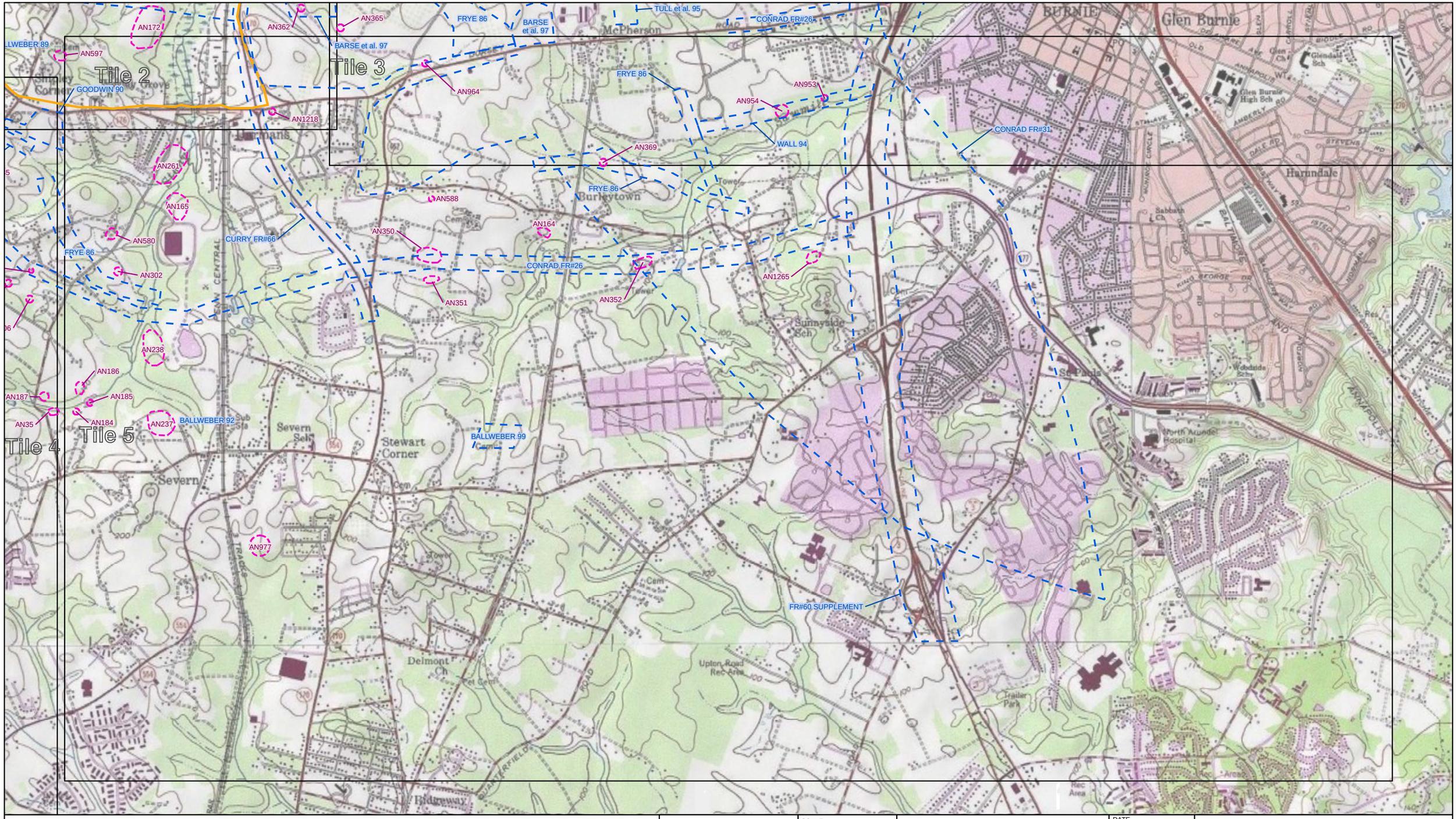
Figure 7D
Recorded Sites and Previous Surveys

Baltimore/Washington International Thurgood Marshall Airport
Planned Near-Term Improvement Projects (2008-2012)
Phase IB Archeological Survey
Anne Arundel County, Maryland



SCALE
1 inch = 2,000 feet

DRAWN BY
ADS

CHECKED BY
DJB

A.D. Marble & Company
375 E. Elm St.
Conshohocken, PA 19428
484.533.2500

DATE
Oct 2009

JOB NO.
P-820I

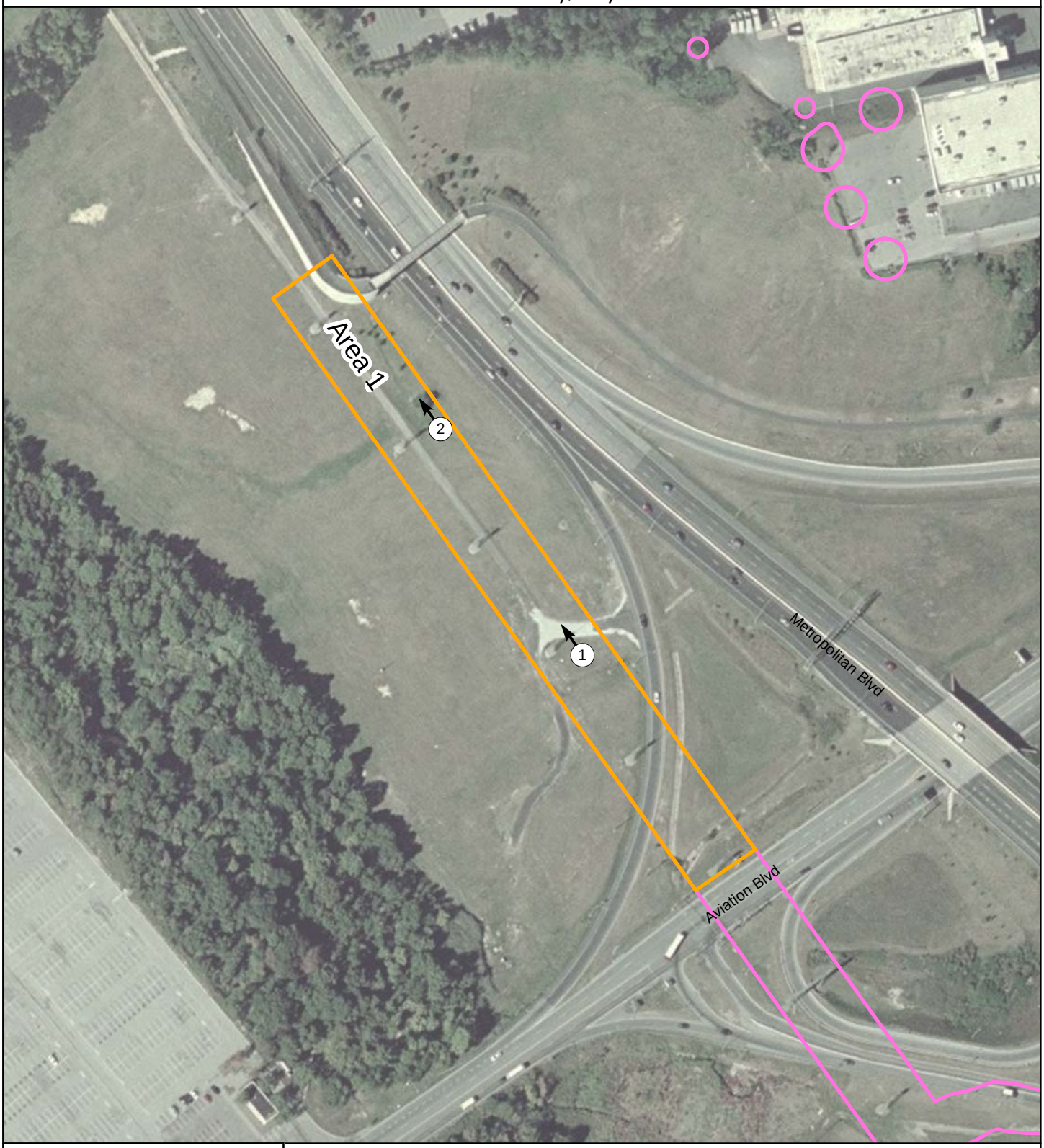
TITLE

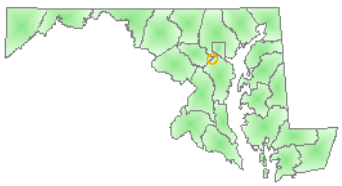
Figure 7E
Recorded Sites and Previous Surveys

Baltimore/Washington International Thurgood Marshall Airport
Planned Near-Term Improvement Projects (2008-2012)
Phase IB Archeological Survey
Anne Arundel County, Maryland

Map Document: (X:\Projects\P820D\Mapping\Fig7RecordedSites.mxd)
10/1/2009 -- 2:09:19 PM

Figure 8A: Area 1
BWI Survey Plan with STP and Photograph Location
Baltimore/Washington International Thurgood Marshall Airport
Planned Near-Term Improvement Projects (2008-2012)
Phase IB Archeological Survey
Anne Arundel County, Maryland





N

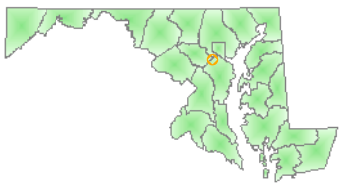
200 0 200
Feet

Photograph Location
Project Area
Test Area

Map source: © 2009 i-cubed

Map Document: (O:\Projects\P-8201 BWI ALP EA\GIS\Mapping\Phase1A\Fig8A_Area1.mxd)
9/30/2009 -- 12:53:37 PM

Figure 8B: Area 2-5
BWI Survey Plan with STP and Photograph Location
Baltimore/Washington International Thurgood Marshall Airport
Planned Near-Term Improvement Projects (2008-2012)
Phase IB Archeological Survey
Anne Arundel County, Maryland



N

300 0 300
Feet

Photograph Location
STP
Positive STP

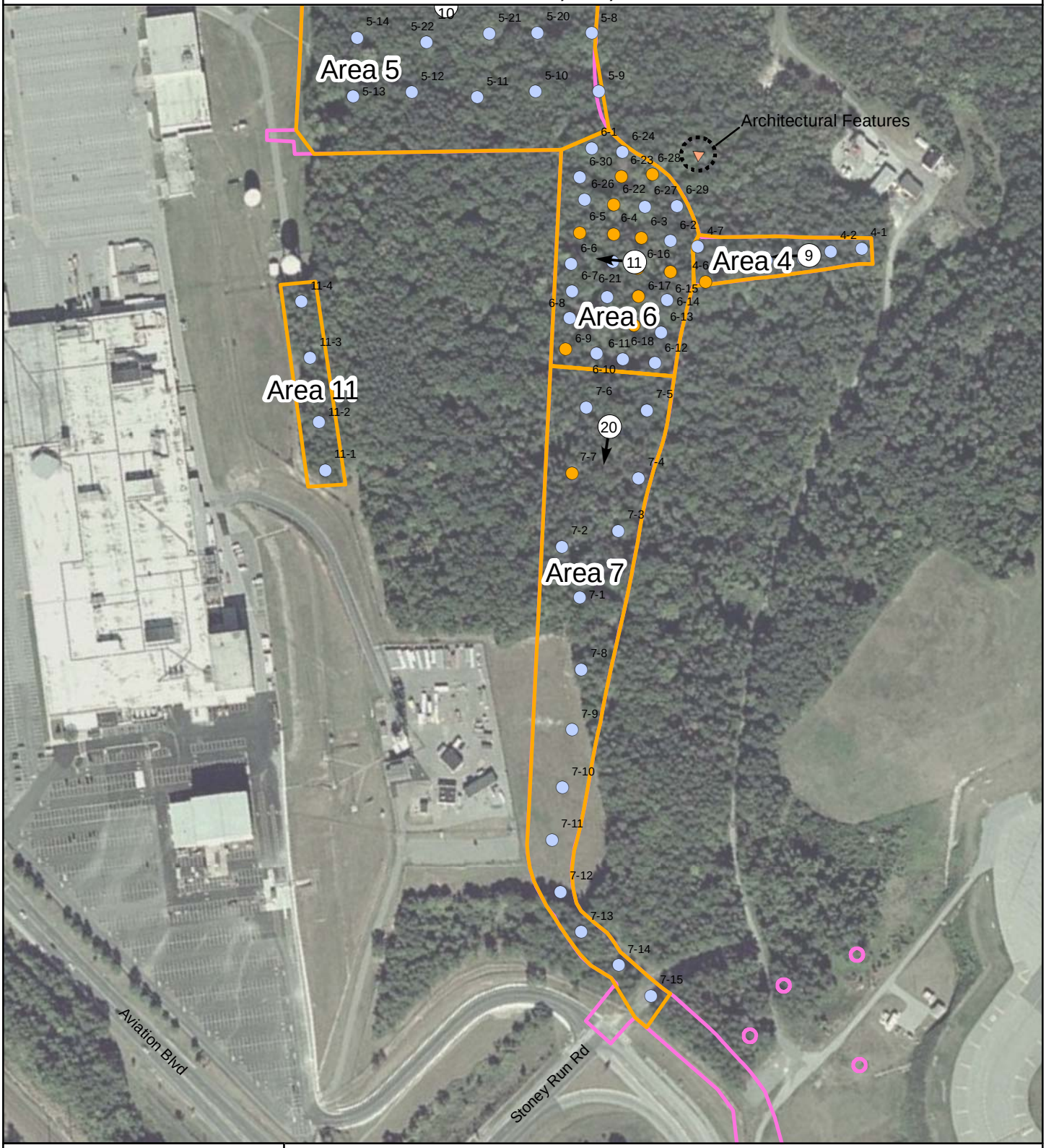
Project Area
Test Area
Disturbed
Active wetland
Water catch basin

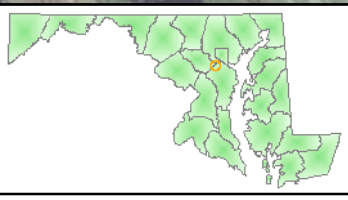
Map source: © 2009 i-cubed

Map Document: (O:\Projects\P-8201 BWI ALP EA\GIS\Mapping\Phase I A\Fig8B_Area2_5.mxd)
9/30/2009 -- 1:40:51 PM

Figure 8C: Area 4, Area 6, Area 7, and Area 11
BWI Survey Plan with STP and Photograph Location

Baltimore/Washington International Thurgood Marshall Airport
Planned Near-Term Improvement Projects (2008-2012)
Phase IB Archeological Survey
Anne Arundel County, Maryland





N

300 0 300 Feet

Photograph Location
STP
Positive STP
Architechtural Features
Project Area
Test Area

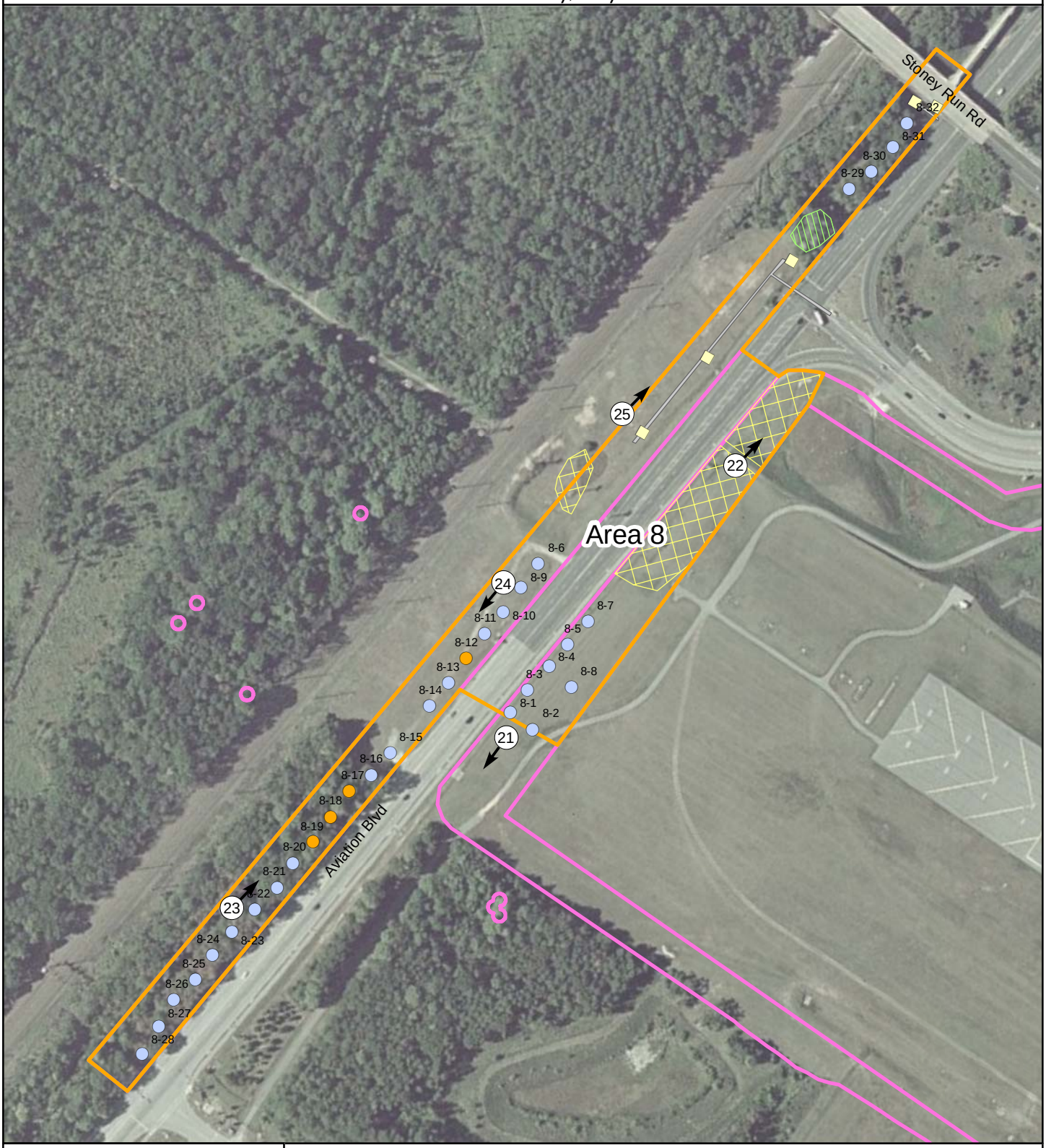
Photos 12-19 not shown.

Map source: © 2009 i-cubed

Map Document: (O:\Projects\P-8201 BWI ALP EA\GIS\Mapping\Phase I A\Fig7C_Area4_7.mxd)
7/23/2009 -- 12:23:48 PM

Figure 8D: Area 8
BWI Survey Plan with STP and Photograph Location

Baltimore/Washington International Thurgood Marshall Airport
Planned Near-Term Improvement Projects (2008-2012)
Phase IB Archeological Survey
Anne Arundel County, Maryland



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9/30/2009 - 3:00:34 PM

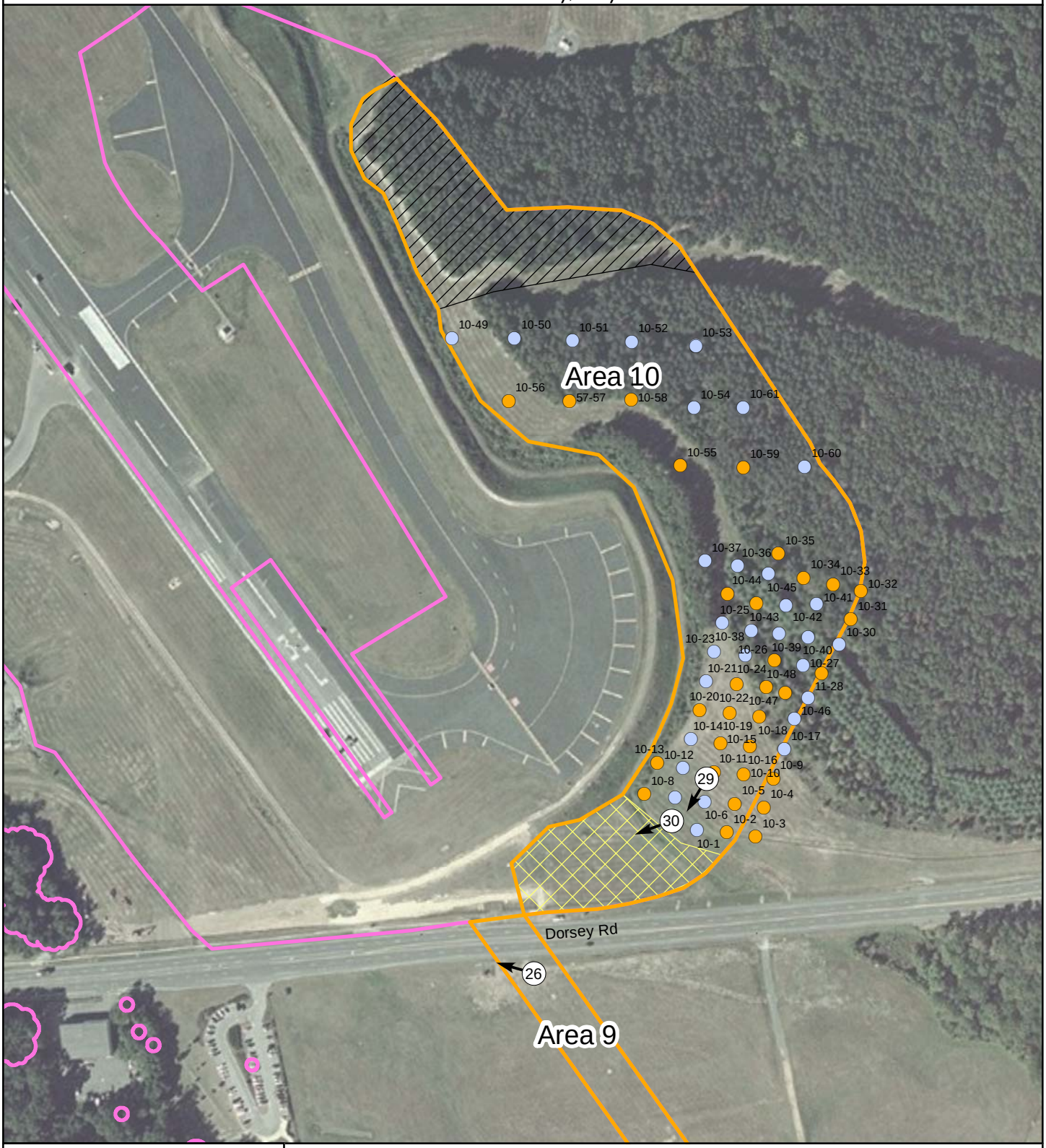
Map source: © 2009 i-cubed

Figure 8E: Area 9A
BWI Survey Plan with STP and Photograph Location
Baltimore/Washington International Thurgood Marshall Airport
Planned Near-Term Improvement Projects (2008-2012)
Phase IB Archeological Survey
Anne Arundel County, Maryland

Map Document: (O:\Projects\P-8201 BWI ALP EA\GIS\Mapping\Phase IA\Fig8E_Area9A.mxd)
9/30/2009 -- 3:12:28 PM

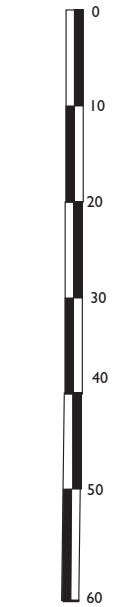
Map source: © 2009 i-cubed

Figure 8F: Area 9 and Area 10
BWI Survey Plan with STP and Photograph Location
Baltimore/Washington International Thurgood Marshall Airport
Planned Near-Term Improvement Projects (2008-2012)
Phase IB Archeological Survey
Anne Arundel County, Maryland



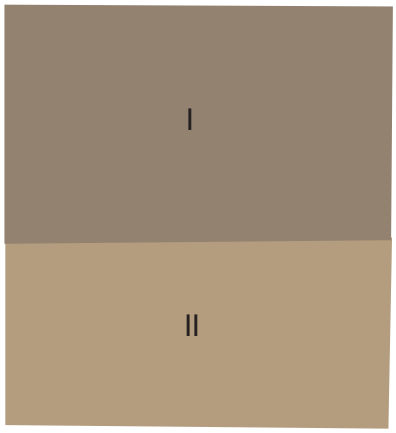
Map Document: (O:\Projects\P-8201 BWI ALP EA\GIS\Mapping\Phase1A\Fig8F_Area9_10.mxd)
9/30/2009 -- 3:15:49 PM

Map source: © 2009 i-cubed



Scale... 1 inch = 20cm

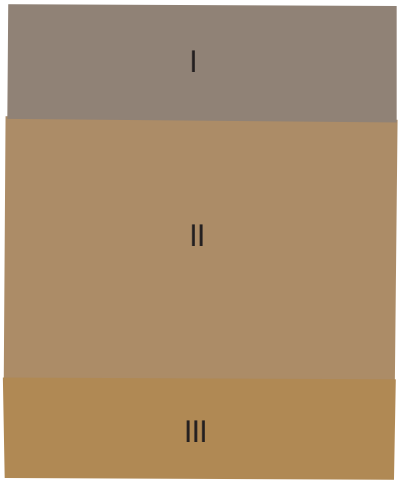
Area 2
STP# 12



Stratum I: 10YR 4/3 Brown mottled with 2.5 Y 4/8 Red clay

Stratum II: 2.5 Y 5/4 Light olive brown clay with manganese staining

Area 2A
STP# 1



Stratum I(fill): 10YR 4/2 Dark grayish brown sandy loam

Stratum II: 10YR 5/6 Yellowish brown mottled with 10YR 4/2 Dark grayish brown coarse sandy loam

Stratum III: 10YR 5/8 Yellowish brown compact sandy loam

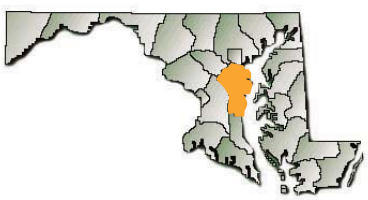


Figure 9

Representative STP Profiles from Area 2

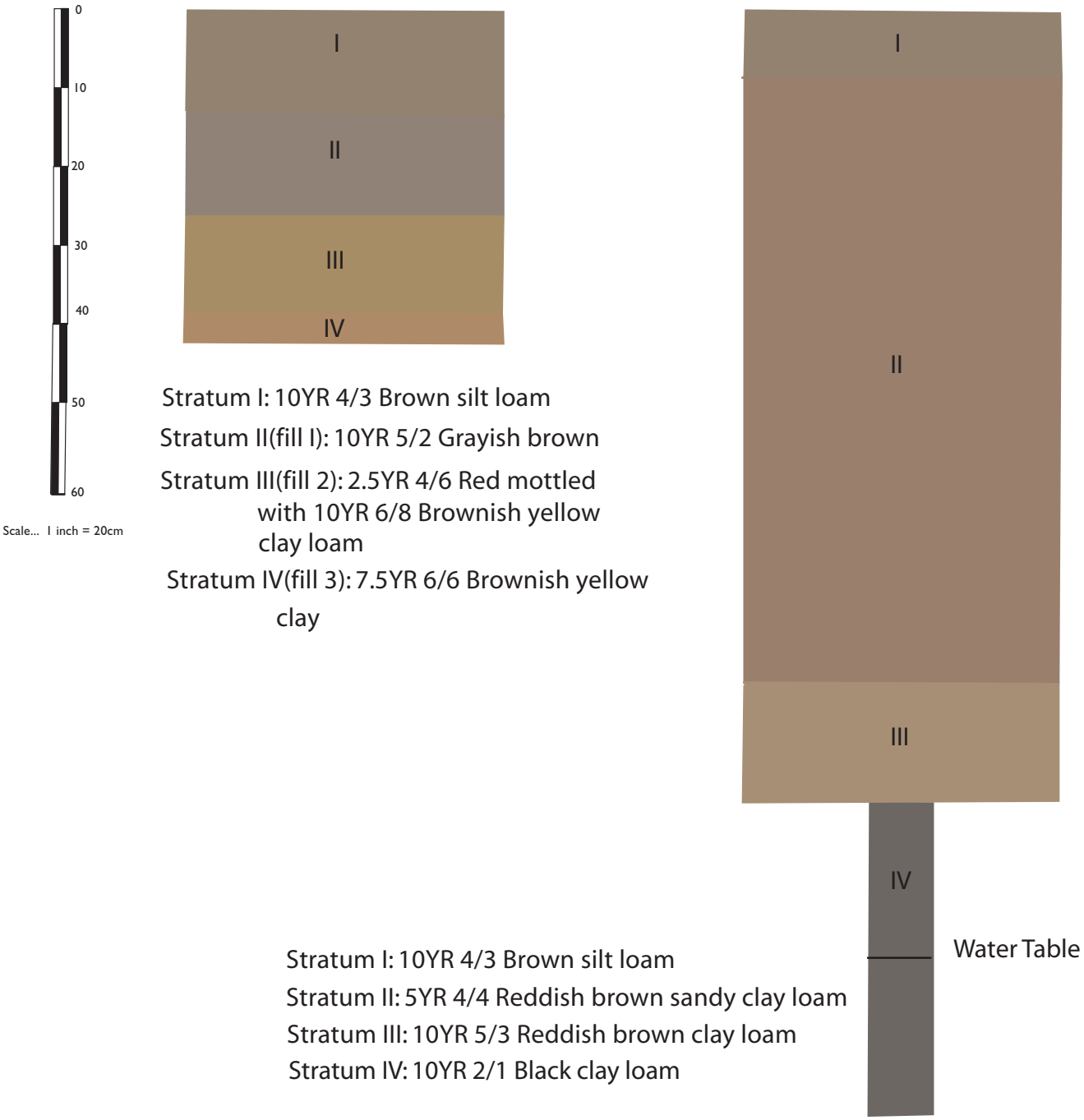
Baltimore=Washington International Thurgood Marshall Airport ALP

Phase IB Archeological Survey Report

Anne Arundel County, Maryland

Source: A.D. Marble shovel test pit profile, 2009.

Map Document X: Graphics\Projects\P-820\Imapping\archaeology\Fig. 9\ Area 2 and Area 2A STP Profiles.ai



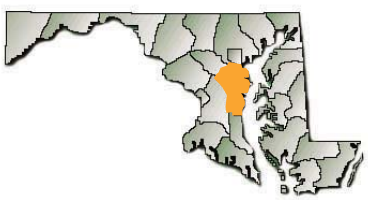
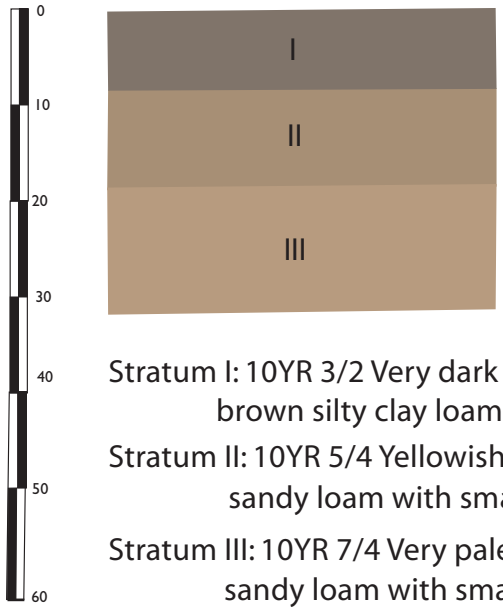


Figure 10
Representative STP Profiles from Area 3
Baltimore-Washington International Thurgood Marshall Airport ALP
Phase IB Archeological Survey Report
Anne Arundel County, Maryland

Source: A.D. Marble shovel test pit profile, 2009.

Map Document X:\Graphics\Projects\P-820\mapping\archaeology\Fig. 10\Area 3 STP Profiles.ai

Area 4
STP 1



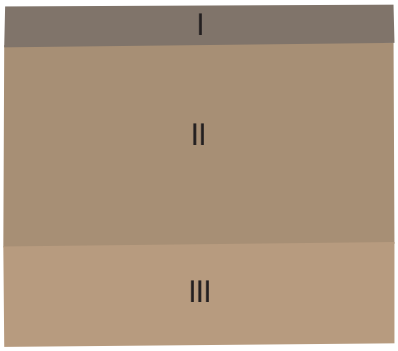
Stratum I: 10YR 3/2 Very dark grayish brown silty clay loam

Stratum II: 10YR 5/4 Yellowish brown sandy loam with small pebble

Stratum III: 10YR 7/4 Very pale brown sandy loam with small pebble

Scale... 1 inch = 20cm

Area 4
STP 6



Stratum I: 10YR 3/2 Very dark grayish brown silty clay loam

Stratum II: 10YR 5/4 Yellowish brown sandy loam with small pebble

Stratum III: 10YR 7/4 Very pale brown sandy loam with small pebble

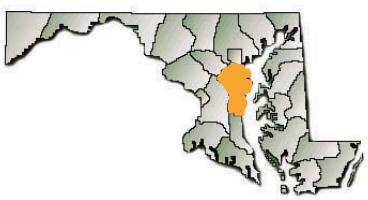


Figure 11

Representative STP Profiles from Area 4

Baltimore-Washington International Thurgood Marshall Airport ALP

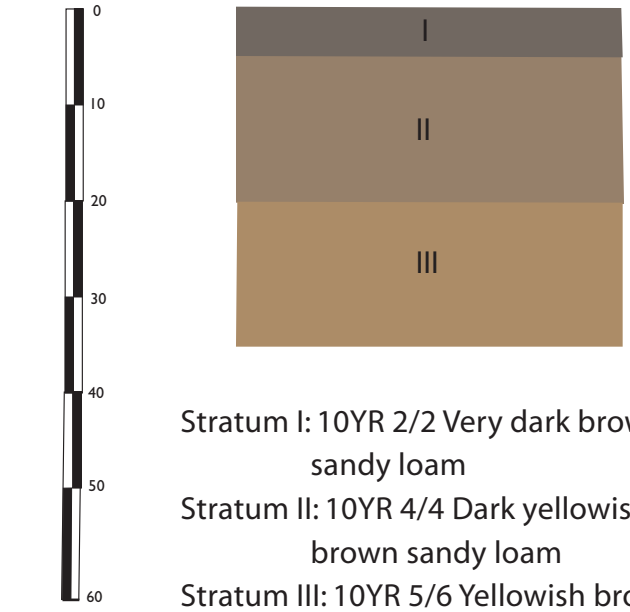
Phase IB Archeological Survey Report

Anne Arundel County, Maryland

Map Document X: Graphics\Projects\P-820\Mapping\archaeology\Fig. 11\Area 4 STP Profiles.ai

Source: A.D. Marble shovel test pit profile, 2009.

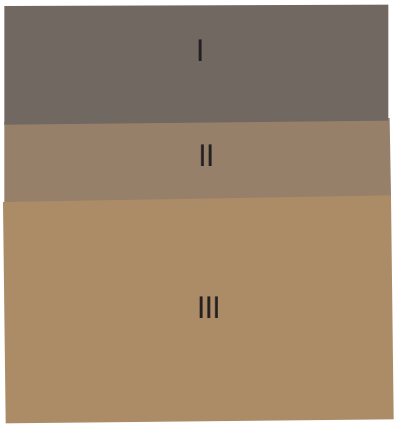
Area 5
STP 17



Scale... 1 inch = 20cm

Stratum I: 10YR 2/2 Very dark brown sandy loam
Stratum II: 10YR 4/4 Dark yellowish brown sandy loam
Stratum III: 10YR 5/6 Yellowish brown sandy clay loam

Area 5
STP 18



Stratum I: 10YR 2/2 Very dark brown sandy loam
Stratum II: 10YR 4/4 Dark yellowish brown sandy loam
Stratum III: 10YR 5/6 Yellowish brown sandy clay loam

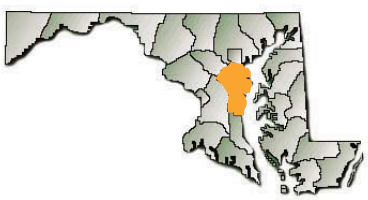
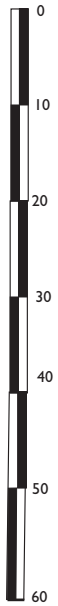


Figure 12
Representative STP Profiles from Area 5
Baltimore/Washington International Thurgood Marshall Airport ALP
Phase IB Archeological Survey Report
Anne Arundel County, Maryland

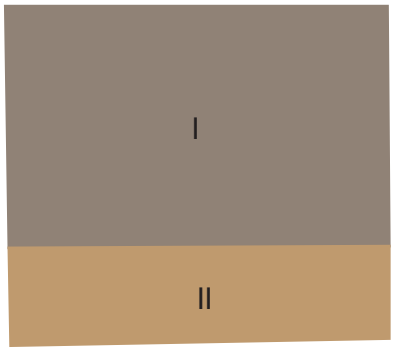
Map Document X: Graphics\Projects\P-820\Mapping\archaeology\Fig. 12\Area 5 STP Profiles.ai

Source: A.D. Marble shovel test pit profile, 2009.



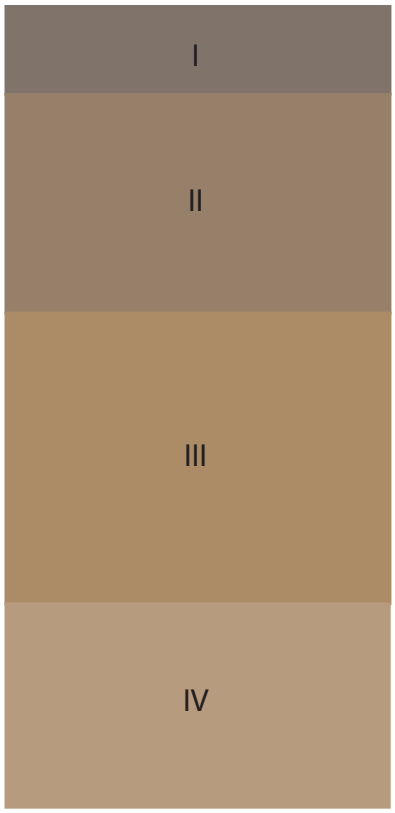
Scale... 1 inch = 20cm

Area 6
STP 2



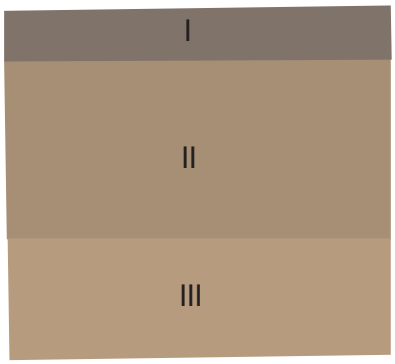
Stratum I: 10YR 4/2 Dark grayish brown sandy silty loam
Stratum II: 10YR 6/6 Brownish yellow sandy loam

Area 6
STP 3



Stratum I: 10YR 3/2 Very dark grayish brown silty loam
Stratum II(Fill I): 10YR 5/3 Brown silty clay loam
Stratum III(Fill 2): 10YR 5/4 Yellowish brown mottled with 10YR 6/4 Light yellowish brown clay sandy loam
Stratum IV: 10YR 6/4 light yellowish brown sandy loam

Area 6
STP 4



Stratum I: 10YR 3/2 Very dark grayish brown sandy silty loam
Stratum II: 10YR 5/4 Yellowish brown sandy loam
Stratum III: 10YR 7/4 Very pale brown sandy loam

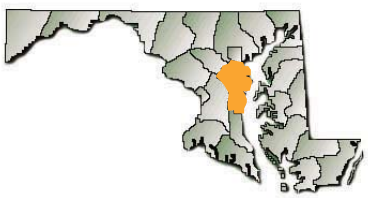
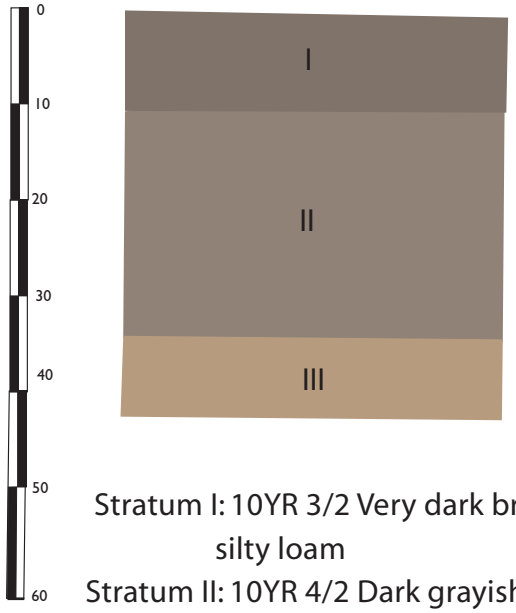


Figure 13
Representative STP Profiles from Area 6
Baltimore-Washington International Thurgood Marshall Airport ALP
Phase IB Archeological Survey Report
Anne Arundel County, Maryland

Map Document X: Graphics\Projects\P-820\Mapping\archaeology\Fig. 13\Area 6 STP Profiles.ai

Source: A.D. Marble shovel test pit profile, 2009.

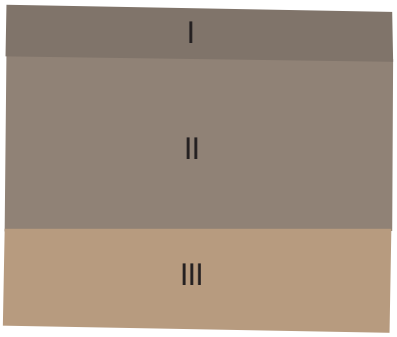
Area 7
STP 1



Scale... 1 inch = 20cm

Stratum I: 10YR 3/2 Very dark brown silty loam
Stratum II: 10YR 4/2 Dark grayish brown clay sandy loam
Stratum III: 10YR 7/4 Very pale brown loamy sand

Area 7
STP 7



Stratum I: 10YR 3/2 Very dark brown silty loam
Stratum II: 10YR 4/2 Dark grayish brown sandy silty loam
Stratum III: 10YR 7/4 Very pale brown sandy loam

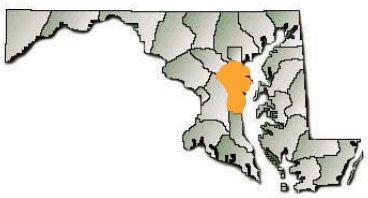
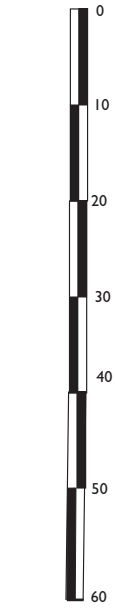


Figure 14
Representative STP Profiles from Area 7
Baltimore/Washington International Thurgood Marshall Airport
Phase IB Archeological Survey Report
Anne Arundel County, Maryland

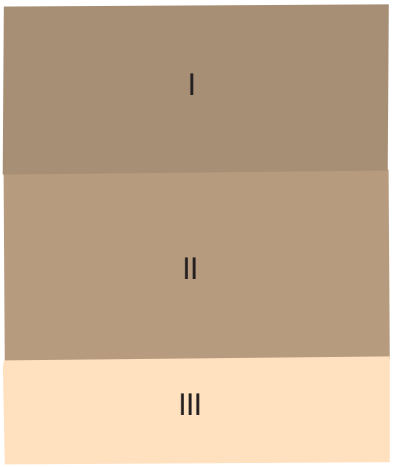
Source: A.D. Marble shovel test pit profile, 2009.

Map Document X: Graphics\Projects\P-820\\mapping\archaeology\Fig. 14\Area 10 STP Profiles.ai



Scale... 1 inch = 20cm

Area 8
STP 4



Stratum I: 10YR 5/4 Very dark brown silty loam
Stratum II: 10YR 7/4 Very pale brown mottled with 10YR 5/4 yellowish brown loamy sand
Stratum III: 10YR 8/2 Very pale brown mottled with 10YR 7/6 yellow clay sandy loam

Area 8
STP 12

Stratum I: 10YR 5/3 Brown sandy loam
Stratum II: 7.5YR 6/4 Light brown sandy loam

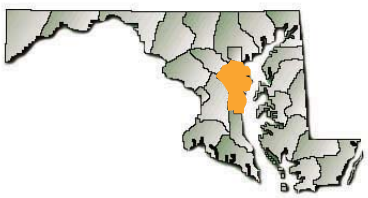
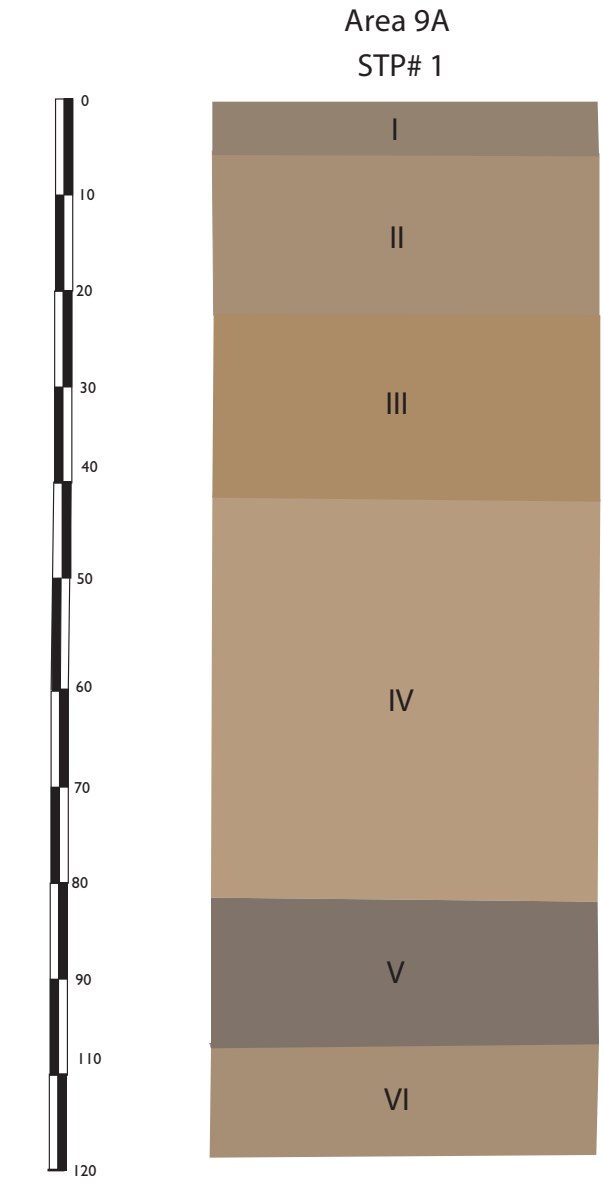


Figure 15
Representative STP Profiles from Area 8
Baltimore-Washington International Thurgood Marshall Airport ALP
Phase IB Archeological Survey Report
Anne Arundel County, Maryland

Map Document: X: Graphics\Projects\P-820\Mapping\archaeology\Fig. 15\Area 8 STP Profiles.ai

Source: A.D. Marble shovel test pit profile, 2009.



Stratum I: 10YR 5/3Brown sandy loam
Stratum II(Fill I): 10YR 5/4 Yellowish brown mottled with 10YR 7/6 Yellow sandy loam
Stratum III(Fill 2): 10YR 5/3 Brown mottled with 10YR 5/6 Yellowish brown sandy loam
Stratum IV(Fill 3): 10YR 6/4 Light yellowish brown sandy loam
Stratum V: 10YR 3/2 Very dark grayish brown sandy loam
Stratum VI: 10YR 5/3 Brown sandy loam

Stratum I: 10YR 4/3 Brown sandy loam
Stratum II: 10YR 6/6 Brownish yellow mottled with 2.5Y Light gray medium sandy loam
Stratum III: 7.5 YR 3/2 Very dark grayish brown sandy loam

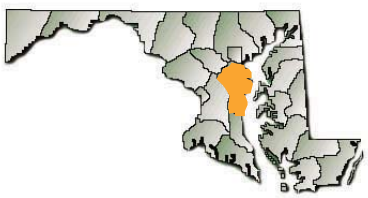


Figure 16

Representative STP Profiles from Area 9A

Baltimore-Washington International Thurgood Marshall Airport ALP

Phase IB Archeological Survey Report

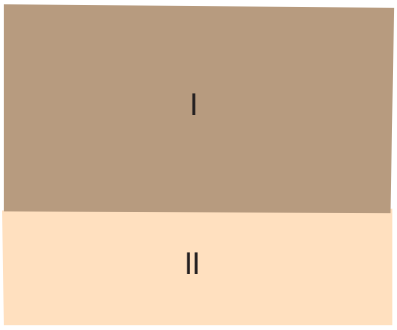
Anne Arundel County, Maryland

Map Document X:\Graphics\Projects\P-820\mapping\archaeology\Fig. 16\Area 9A STP Profiles.ai

Source: A.D. Marble shovel test pit profile, 2009.

Scale... 1 inch = 20cm

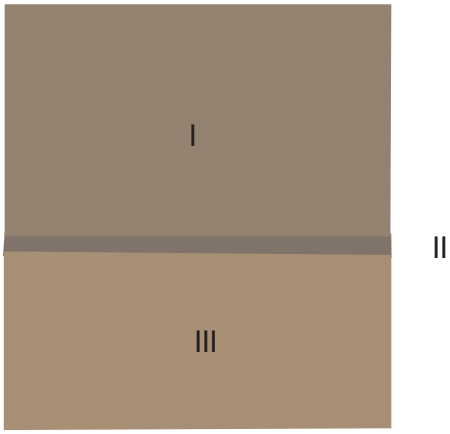
Area 10
STP# 8



Stratum I: 10YR 6/3 Pale brown sandy loam

Stratum II: 10YR 8/2 Very pale brown sandy loam with ferric staining

Area 10
STP# 48



Stratum I: 10YR 4/3 Brown sandy loam

Stratum II: 10Y 3/2 Very dark grayish brown sandy loam

Stratum III: 10YR 5/4 Yellowish brown sandy loam

Figure 17

Representative STP Profiles from Area 10

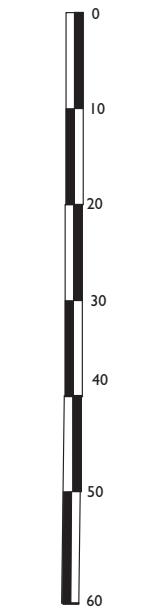
Baltimore-Washington International Thurgood Marshall Airport ALP

Phase IB Archeological Survey Report

Anne Arundel County, Maryland

Map Document X:\Graphics\Projects\P-820\mapping\archaeology\Fig. 17\Area 10 STP Profiles.ai

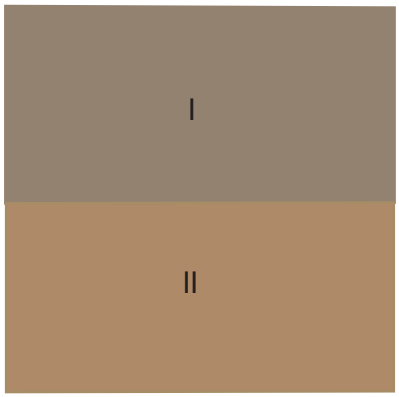
Source: A.D. Marble shovel test pit profile, 2009.



Scale... 1 inch = 20cm

Area 11

STP#1

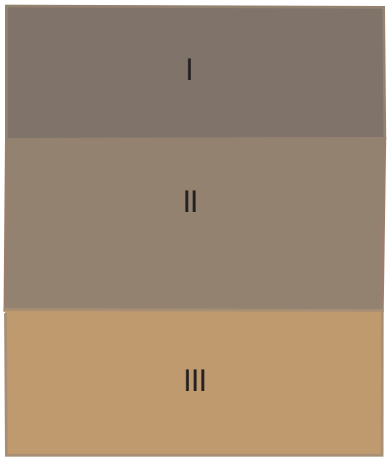


Stratum I: 10YR 5/3 Brown silt loam mottled with 10YR 7/4 Very pale brown clay sandy loam

Stratum II: 7.5YR 6/6 Brownish yellow sandy loam

Area 11

STP# 3



Stratum I: 10YR 3/2 Very dark grayish brown silty loam

Stratum II: 10YR 5/3 Brown silty clay

Stratum III: 10YR 6/6 Brownish yellow silty clay

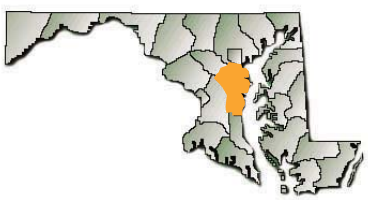


Figure 18

Representative STP Profiles from Area 11

Baltimore-Washington International Thurgood Marshall Airport ALP

Phase IB Archeological Survey Report

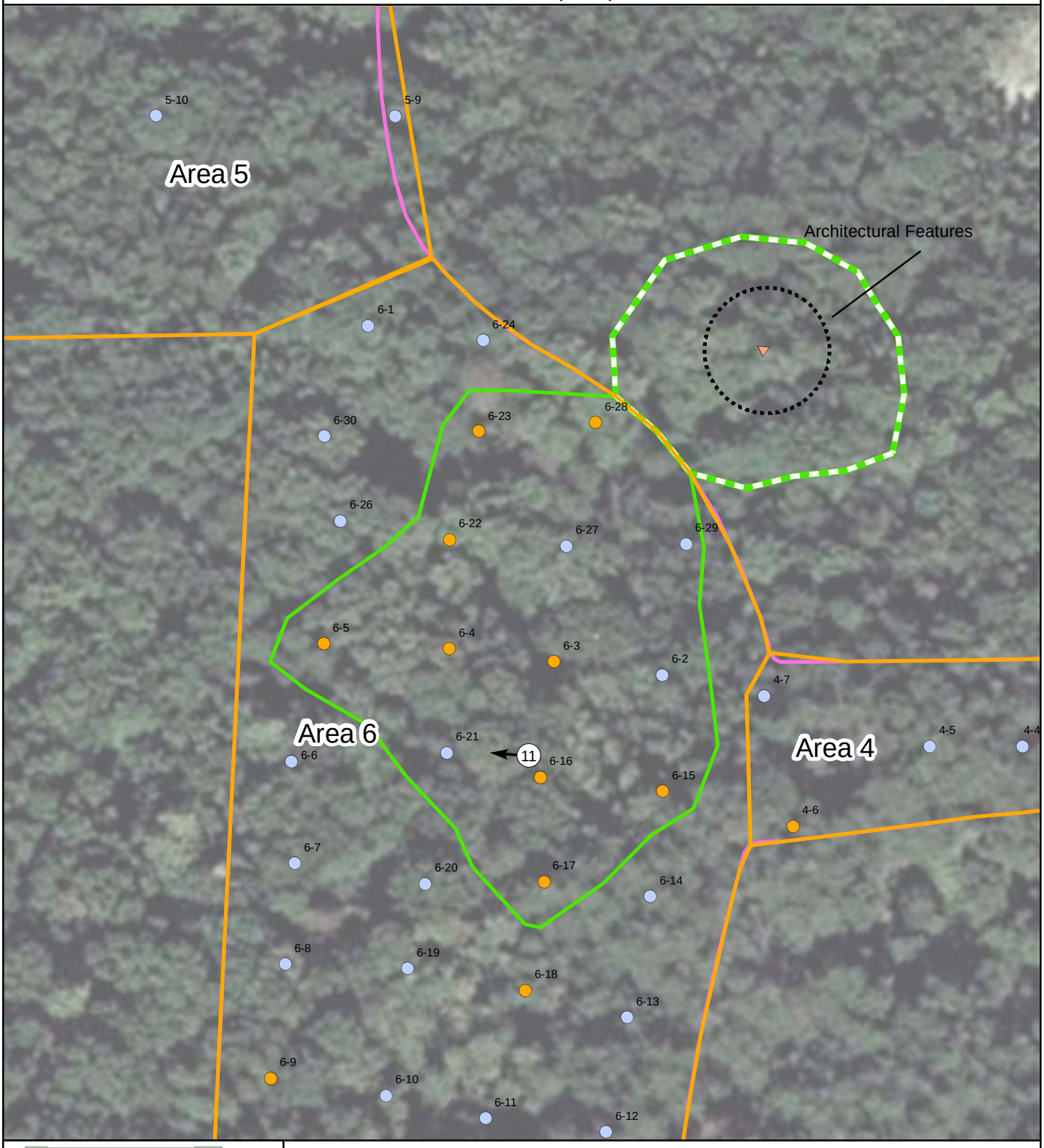
Anne Arundel County, Maryland

Map Document X: Graphics\Projects\P-8201\mapping\archaeology\Fig. 18\Area 11 STP Profiles.ai

Source: A.D. Marble shovel test pit profile, 2009.

Figure 19: Approximate Site Boundary T.W. Cole Site (18AN1427)
BWI Survey Plan with STP and Photograph Location

Baltimore/Washington International Thurgood Marshall Airport
Planned Near-Term Improvement Projects (2008-2012)
Phase IB Archeological Survey
Anne Arundel County, Maryland



Map Document: (O:\Projects\P-8201 BWI ALP EA\GIS\Mapping\Phase IA\Fig19ColeSite.mxd)
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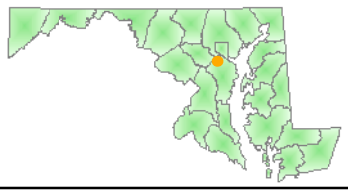
Map source: © 2009 i-cubed

Figure 20: Approximate Site Boundary Jas. Phelps Site (18AN1428) Loci 1
BWI Survey Plan with STP and Photograph Location
Baltimore/Washington International Thurgood Marshall Airport
Planned Near-Term Improvement Projects (2008-2012)
Phase IB Archeological Survey
Anne Arundel County, Maryland



N

50 0 50
Feet

Photograph Location

Project Area
Approximate Site Boundary
Test Area

Map source: © 2009 i-cubed

Map Document: (O:\Projects\P-8201 BWI ALP EA\GIS\Mapping\Phase IA\Fig20PhelpsSite.mxd)
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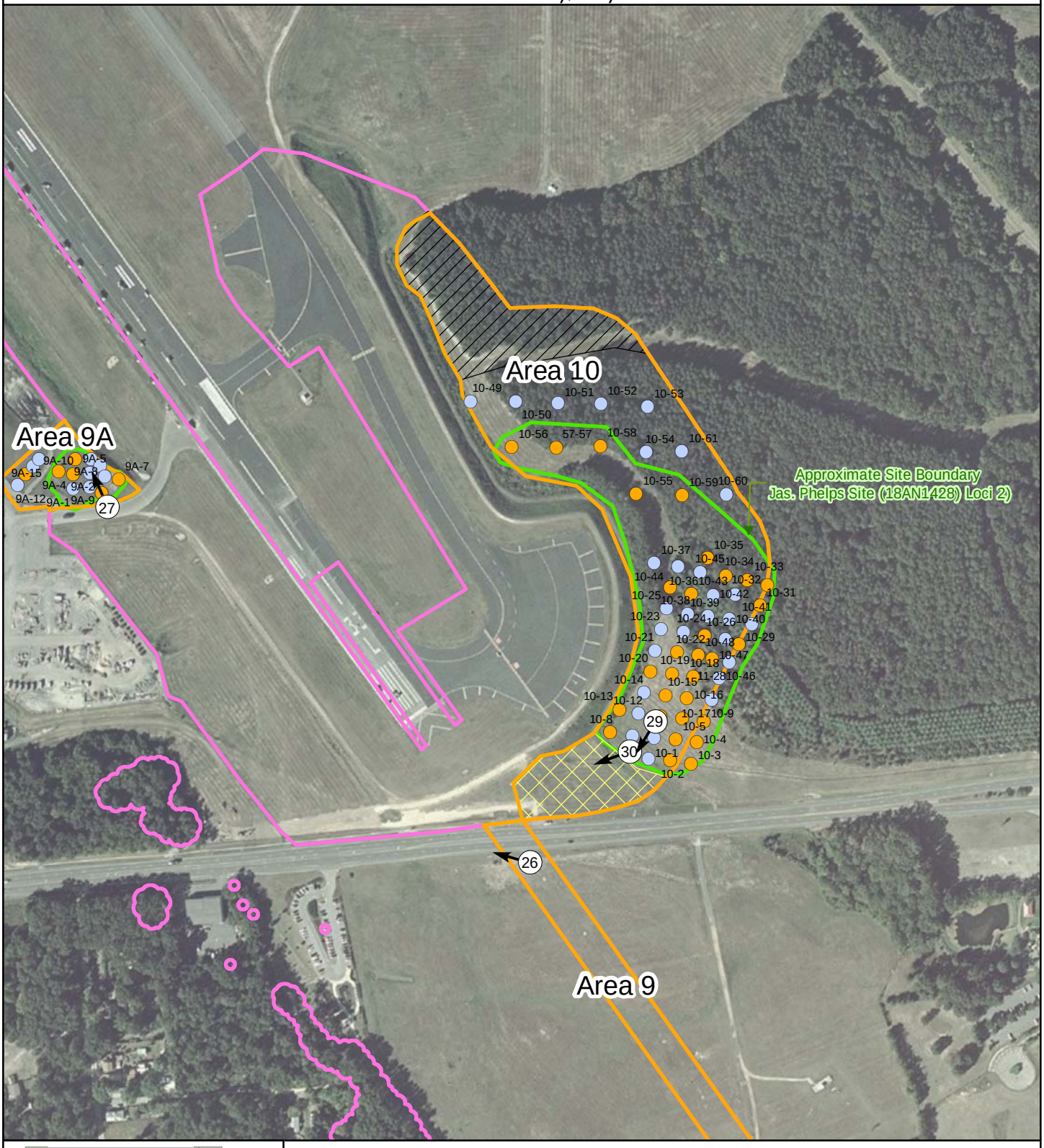
Figure 21: Approximate Site Boundary Jas. Phelps Site (18AN1428) Loci 2
BWI Survey Plan with STP and Photograph Location

Baltimore/Washington International Thurgood Marshall Airport
Planned Near-Term Improvement Projects (2008-2012)
Phase IB Archeological Survey
Anne Arundel County, Maryland



Map Document: (O:\Projects\P-8201 BWI ALP EA\GIS\Mapping\Phase I A\Fig2 ILoci2.mxd)
10/1/2009 -- 11:25:03 AM

Map source: © 2009 i-cubed

Photographs

Photograph 1: Overview of Area 1 showing the location of APE in relation to the runway lights. Facing northeast (May 2009).

Photograph 2: View of typical types of disturbance identified within Area 1. Facing northeast (May 2009).

Photograph 3: View of the gravel road that runs through Area 2A. Facing southwest (May 2009).

Photograph 4: View of the rip-rap gravel drainage separating Area 2A from Area 2. Facing northeast (May 2009).

Photograph 5: Overview of Area 2 showing the open grassy area, the gravel and asphalt access road, and the edge of the wooded portion. Facing northwest (May 2009).

Photograph 6: Typical type of disturbance in Area 2 that was not subjected to archeological testing. Facing northwest (May 2009).

Photograph 7: Overview of Area 3 showing the grassy and wooded landscape. Facing southeast (May 2009).

Photograph 8: View of the STP 2 profile in Area 3 showing the disturbed and landscaped soils. Facing southeast (May 2009).

Photograph 9: Overview of Area 4 showing heavy woods. Facing northwest (May 2009).

Photograph 10: Overview of Area 5 showing heavy woods. Facing northwest (May 2009).

Photograph 11: Overview of Area 6 showing the heavily overgrown woods. Facing northwest (May 2009).

Photograph 12: Surface Feature 1, a tire dump, located in Area 6. Facing west (May 2009).

Photograph 13: Surface Feature 2, a concrete roller, located in Area 6. Facing northwest (May 2009).

Photograph 14: Surface Feature 3, a pair of large concrete pipes, located in Area 6. Facing northwest (May 2009).

Photograph 15: Surface Feature 4, a heavily overgrown and abandoned roadway located between Areas 5 and 6. Facing north (May 2009).

Photograph 16: Surface Feature 5, one of two granite pillars on either side of the abandoned road in Areas 5 and 6. Facing southwest (May 2009).

Photograph 17: Surface Feature 6, a concrete boundary marker with cruciform engravings on all four sides, located in Area 6. Facing west (May 2009).

Photograph 18: Surface Feature 7, a concrete and stone culvert that sits below the abandoned road just outside the APE in Area 6. Facing east (May 2009).

Photograph 19: Surface Feature 8, a concrete and brick well head, located outside the APE for this project near Area 6. Facing west (May 2009).

Photograph 20: Overview of the heavily wooded section of Area 7. Facing northwest (May 2009).

Photograph 21: Overview of the grassy section of Area 8 inside the airport property fence. Facing south (May 2009).

Photograph 22: View of typical type of disturbance consisting of modern landscaping in and around Area 8 inside the airport property fence. Facing north (May 2009).

Photograph 23: Overview of the wooded section of Area 8 outside the airport property fence. Facing north (May 2009).

Photograph 24: Overview of the grassy section of Area 8 outside the airport property fence showing the gravel and asphalt road running through the APE. Facing south (May 2009).

Photograph 25: View of the typical types of modern landscaping disturbance in the southern section of Area 8 outside the airport property fence. Facing north (May 2009).

Photograph 26: Overview of Area 9 under current construction and soil disturbing activities. Facing northwest (May 2009).

Photograph 27: Overview of Area 9A showing the modern landscaping and terra forming in and around the location. Facing northwest (May 2009).

Photograph 28: View of the deep fill profile of STP 5 in Area 9A. Facing south (May 2009).

Photograph 29: Overview of the grassy section of Area 10. Facing southwest (May 2009).

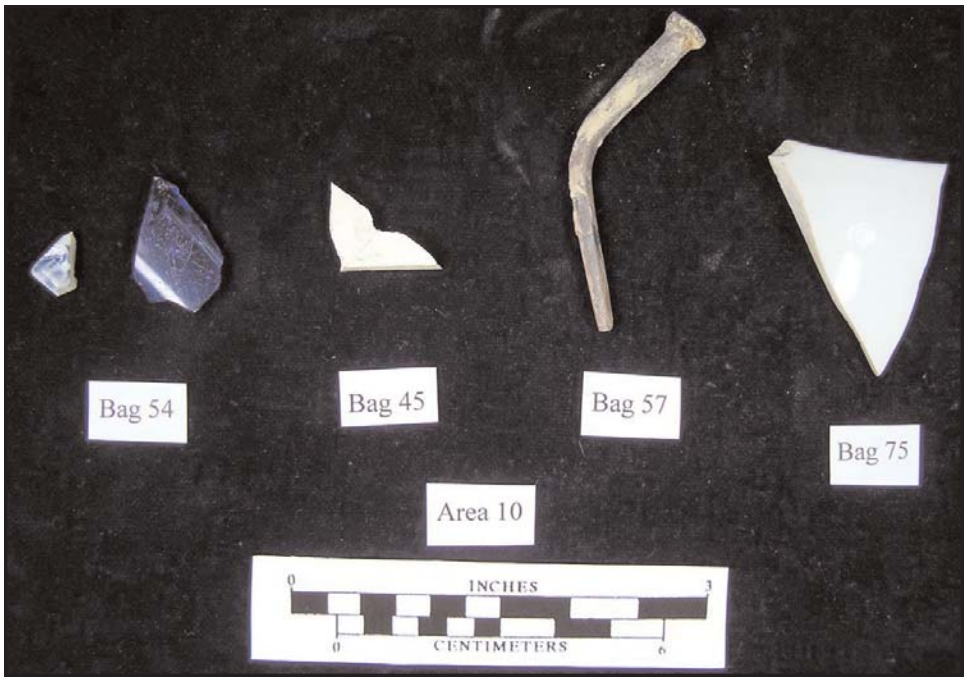
Photograph 30: View of the northeast section of Area 10 consisting of airport-related landscaping including terra forming and drainage-associated wetland. Facing southwest (May 2009).

Photograph 31: Glass fragments from STP 3 at the T.W. Cole Site (18AN1427).

Photograph 32: Representative collection of non-glass artifacts from STP 3 at the T.W. Cole Site (18AN1427).

Photograph 33: Representative collection of artifacts recovered from Area 9A Loci 1 of the Jas. Phelps Site (18AN1428).

Photograph 34: Representative collection of artifacts recovered from STP 11 in Area 10 Loci 2 of the Jas. Phelps Site (18AN1428).



Photograph 35: Representative collection of typical artifacts recovered from Loci 2 Jas. Phelps Site (18AN1428).

Photograph 36: Representative collection of typical artifacts recovered from Loci 2 Jas. Phelps Site (18AN1428).

Appendix A:
Recorded Archeological Sites

Abbreviations for Appendix A

The following abbreviations or phrases are used to describe site locations, temporal periods, or cultural components for the recorded archaeological sites in Anne Arundel (AN), Baltimore (BA), and Howard (HO) Counties.

Ceramics:
Acco = Accokeek Creek
cord = corded decoration
crush rx = crushed rock temper
Marcey = Marcey Creek
Mayaone = Mayaone ware
Pot Ck = Potomac Creek
qtz temp = quartz temper
Rap = Rappahannock
steatite temp = steatite temper

Projectile points:
Bare = Bare Island (LA)
Brew = Brewerton (MA LA)
Calvert = Calvert (EW MW)
Clagett = Clagett (similar to Halifax, MA LA TA)
conver = converging stemmed
fish = fishtail stemmed (TA EW)
Halif = Halifax (MA LA TA)
Kan = Kanawha (EA MA)
Lev = Levanna triangular (LW)
Mac = MacCorkle (EA)
MM = Morrow Mountain (MA)
Nor = Normanskill (LA)
Otter = Otter Creek (LA)
Pisc = Piscataway (MW LW)
Sav = Savannah River (LA TA)
SN = side notched
Stan = Stanly (MA)
stem = stemmed
tri = triangular (often LW, but possibly LA)
Ver or Vern = Vernon (EW)

Raw materials, lithic:
Cecil Co ch = Cecil County chert
chal = chalcedony
ch = chert
granite = granite
green = greenstone
hem = hematite

Raw materials, lithic (continued)
ironst = ironstone
jas = jasper
sil = silicified sandstone
steatite = steatite
rhy = rhyolite
qte = quartzite
qtz = quartz

Cultural period:
Paleo or PI = Paleoindian
Ar = Archaic
EA MA LA TA = Early, Middle, Late, Transitional Archaic
Wd = Woodland
EW MW LW = Early, Middle, Late Woodland
c = century (18th, 19th, 20th)

Other:
bif(s) = biface(s)
BWI = Baltimore-Washington International Thurgood Marshall Airport
BWP = Baltimore-Washington Parkway
cer = ceramics
ext = extensive
FCR = fire-cracked rock
fks = flakes
grd = ground stone artifacts
multi = multi-component
pt(s) = point(s)
Rd = Road

18AN	Name	Water (m)	Landform	Culture	Diagnostics	Recorder/Yr	Location
27	Clark 27 Site	120	terrace	ext LA-Wd	Bare Halif fish Calvert tri	O'Reilly 01	S of BWP
171	Piney Run North	0	hilltop/bluff	LA	qte	Gibbs 70	S of BWP
172	Wesley Grove South	38	terrace	Ar	rhy qtz grd shells	Gibbs 70	S of BWP
181	Saints Rest	183	terrace high	historic	cemetery	Gibbs 70	S of BWP
190	unknown						S of BWP
262	Stoney Run Station	23	terrace	LA & Wd	grd cer rhy qtz	Baumgartner 73	S of BWP
583	Weeping Willow	122	terrace high	preh, 19c	FCR qtz	Frye 86	S of BWP
597	Shipley Burial Grd	?	hilltop/bluff	mid 19-early 20c	cemetery 1833-1923	Eaton 87	S of BWP
1150	Linda Avenue	458	upland flat	19-20c hse site		Rottweiler 00	S of BWP
1151	B. Smith	519	int. flat, hillslope	late 18-early 19c;	mid 19-20c; late 19 tenant	Younts 00	S of BWP
1152	Old Ridge Road	702	interior flat	mid 20c domestic	farmstead	Rottweiler 00	S of BWP
1153	Hagen	702	int. flat, hillslope	20c artifacts		Rottweiler 00	S of BWP
1154	BWI/Hanover 5	427	hillslope	late 19-early 20c	tenant house foundation	Harris 00	S of BWP
1155	Donnick	427	terrace, hillslope	early-mid 20c	house site	Rottweiler 00	S of BWP
1156	Adamiski	677	interior flat	early 20c	house site	Younts 00	S of BWP
1157	BWI/Hanover 6	183	upland flat	mid 20c	house site	Horne 99	S of BWP
1158	BWI/Hanover 7	229	upland flat	mid 20c	house site	Horne 99	S of BWP
1159	Hatcher	183	terrace high	prehistoric	rhy qtz qte	Ebright 00	S of BWP
1160	Fauber (Harman?)	76	hillslope	Wd late 18-late 19	FCR qtz qte cer crush rx	Rottweiler 00	S of BWP
1161	Maule	34	hillslope	LW, 20c artifacts	FCR cer ch tri rhy qtz qte	Harris 00	S of BWP
1162	Arford	61	hillslope	prehistoric	qtz qte ironstone	Harris 00	S of BWP
1163	Diffendal	244	h/bluff, hillslope	late 19-late 20c	house site masonry	Rottweiler 00	S of BWP
1164	Plummer Cemetery	366	h/bluff, hillslope	late 18-early 19c	1764-1783, 1814-1848	Rottweiler 00	S of BWP
1169	Younts	396	h/bluff, hillslope	early-mid 20c	house site	Rottweiler 00	S of BWP
1170	Rottweiler	244	h/bluff, hillslope	mid-late 20c	ext. frame house	Rottweiler 00	S of BWP
1171	Old Stoney Run Rd	457	h/bluff, hillslope	mid-late 20c	house site	Rottweiler 00	S of BWP
1172	Donieki	183	h/bulff, hillslope	late 19-early 20c;	mid 20c ext. frame house	Rottweiler 00	S of BWP
1196	Stoney Ridge	20	terrace low	prehistoric	chert qtz	O'Reilly 01	S of BWP
1197	Smith-Clark House	180	terrace	late 19-early 20c	frame farmstead ruin	O'Reilly 01	S of BWP
1200	Elliott-Cole	274	upland flat	LW, late 19-20c	triangle point, house ruin	Emory 01	S of BWP
1209	Selby grist mill, dam	0	flood plain	18-19c mill dam	also head race	Clark 02	S of BWP
1219	Smith Hse & Cem.	168	hilltop/bluff	mid-19c farm	frame hse site & cemetery	Clark 02	S of BWP
1221	Gambrill's Cemetery	244	up flat, ridgetop	19c church?, 20c	Afr-Amer cemetery	Clark 02	S of BWP
596	The Wilderness	?	hillslope	19c farm, forge?	German-American	Eaton 87	S of Dorsey Rd
598	Harmon-Tubbs	46	h/bluff, knoll	late 19-early 20c	cemetery	Eaton 87	S of Dorsey Rd
618	MDOT Site 1	15	hilltop/bluff	preh, hist 20c?	qtz 2 fks	Wheaton 87	S of Dorsey Rd

18AN	Name	Water (m)	Landform	Culture	Diagnostics	Recorder/Yr	Location
1261	Helms Deep 1	50	upland flat	prehistoric	qte	Ward 04	S of Dorsey Rd
1262	Helms Deep 2	50	upland flat	prehistoric	qte	Ward 04	S of Dorsey Rd
25	Friendship	0	terrace, hillslope	LA Wd	grd, cord cer, steatite	KJD 96	BWI
263	Stearns 9	61	unknown	prehistoric		Baumgartner 73	BWI
355	Airport A	183	unknown	LA	isolated rhy stemmed pt	Conrad 75	BWI
356	Airport B	305	unknown	prehistoric	isolated qtz blank, rhy tip	Conrad 75	BWI
357	Airport C	244	unknown	prehistoric	chert qtz 1 Vernon pt	Conrad 75	BWI
358	Airport D	61	unknown	prehistoric isolate	qtz pt tip fragment	Conrad 75	BWI
359	Airport E	61	unknown	prehistoric isolate	qtz CN pt	Conrad 75	BWI
360	Airport F	305	unknown	prehistoric isolate	qtz Clagett pt	Conrad 75	BWI
361	Airport G	610	unknown	prehistoric	qtz side notch pt	Conrad 75	BWI
362	BWI #1	61	terrace low	prehistoric	FCR rhy qtz	Conrad 75	BWI
363	BWI #2	15	terrace	Wd short term	cer rhy qtz	Conrad 75	BWI
364	BWI #3	30	terrace	Ar	qtz SN serrated pt, ch chal	Conrad 75	BWI
365	BWI #4	30	terrace	prehistoric	qtz 5 fks	Conrad 75	BWI
366	Airport H	0	upland flat	LA, late 18-20c	qtz qte	Toulmin 90	BWI
603	Preh. Procurement	0	fplain, terrace low	LA Wd short term	cer Mayaone or Pot Ck	Flanagan 86	BWI
778	BWI-1	61	upland flat	preh, 18?-20c	qtz, 2 pts from site 357	Petraglia 90	BWI
877	Leak	150	ridgetop	LA EW, late 19-20	rhy SN pt, qtz SN pt	Ebright 92	BWI
879	Cromwell Bus. Pk I	30	interior flat	LA EW, late 19-20	preh plus truck farmstead	Gaber 92	E of BWI
880	Cromwell Bus. Pk II	30	interior flat	MA?LA EW, 19-20	preh plus truck farmstead	Gaber 92	E of BWI
964	Field Site No. 2	10	interior flat	early 20c	shell paved road	Sterling 95	BWI
965	Field Site No. 3	?	terrace	EA LA, MW dates	FCR, pts: 2 EA, Otter Ck	Sterling 97	BWI
1011	Friendship Cem.	91	interior flat, h/bluff	late 19-20c	cemetery	Bickford 91	BWI
1012	Cole/Disney Cem.	400	ridgetop	19c	cemetery	Bickford 91	BWI
1048	BWI HCC 1	30	terr low, hillslope	LA (Brewerton?)	FCR qtz SN pt	Sterling 97	BWI
1049	BWI HCC 2	120	terrace, hillslope	prehistoric	qtz	Sterling 97	BWI
1050	BWI HCC 3	20	terr low, hillslope	preh short term	FCR qtz	Sterling 97	BWI
1051	B. Gaither House	183	hilltop/bluff	early 19c farm	late 19c seasonal worker	Sterling 97	BWI
22	Lower Kitten Branch	100	terrace	prehistoric	unknown	KJD 96	BWI E of RR
23	Upper Kitten Branch	100	terrace	prehistoric	rhy qtz	KJD 96	BWI E of RR
245	Pipe Spring	0	hilltop/bluff	prehistoric lithic	rhy qtz	Clark 72	BWI E of RR
489	Higgins (18AN23B)	30	h/bluff, hillslope	Paleo-LW multi	wide range of pts	Ebright 91	BWI E of RR
619	Emittsville North	91	terrace	late 19-20 hse site	abandoned ca. 1950	Clark 87	BWI E of RR
621	Emittsville Indian	61	terrace, h/bluff	EA Mac pt, LA?	FCR rhy qtz qte green	Clark 87	BWI E of RR
29A	Harmans A	0	terrace low	LA, Wd village	LA MW pts, EW LW cer	KJD no year	BWI RR

18AN	Name	Water (m)	Landform	Culture	Diagnostics	Recorder/Yr	Location
29B	Harmans B	0	terrace low	Ar Wd	rhy qtz, qtz pt triangle?	MCG 99	BWI RR
704	Field Site 1	150	interior flat	19-20c	house ruin	Neumann 89	N of BWI
705	Field Site 2	250	interior flat	late 19-20c	structure?	Neumann 89	N of BWI
706	Field Site 3	250	hilltop/bluff	19-20c	artifact scatter	Neumann 89	N of BWI
707	Field Site 4	360	hilltop/bluff	MW, 19-20c	cer Mockley	Neumann 89	N of BWI
950	Field Site No. 1	0	hilltop/bluff	late 19-20c farm	Slavic/East European	Klein 94	N of BWI
1027	Hamilton "Andover"	183	upland flat	preh, late 19-20c	Dr. S P Hamilton hse	Ebright 96	N of BWI
20	Big Holly Branch	0	terrace	Ar ext, LW minor	LA MW pts, LW cer	KJD 96	N of BWP
24	Patapsco Lakes	0	unknown	Ar & Wd	qtz	KJD 96	N of BWP
30	Elkridge	0	terrace high	LA Wd	stratified village	Clark 70	N of BWP
246	Pumphrey Lakes	0	terrace low	prehistoric	qtz	Clark 99	N of BWP
253	Power Line	27	terrace, h/bluff	Wd short term qtz	Acco cer FCR jas rhy qte	Phelps 73	N of BWP
405	Field D Jones	244	terrace high	Wd	cer	B-Wagner 76	N of BWP
494	Selby Grist Mill	0	terrace, fplain	hist 19c	grist mill	Curry 79	N of BWP
620	Furnace Rd Spring	0	hillslope	preh, 20c hse site	qtz steatite cobble	Clark 87	N of BWP
250	Simms	0	hillslope	LA	rhy qtz qte	Bastian 72	N of Dorsey Rd
553	Youth Center	15	terrace	prehistoric	qtz destroyed	Curry 77	N of Dorsey Rd
554	Locust Knoll	15	hilltop/bluff	prehistoric	qtz	Curry 77	N of Dorsey Rd
579	Timbuktu 1	46	terrace	LA qtz quarry	FCR qtz chal, stem pt	Frye 86	N of Dorsey Rd
582	Timbuktu 2	46	terrace high	prehistoric	qtz	Frye 86	N of Dorsey Rd
35	Upper Stony I	0	terrace low	Ar extensive	rhy qtz, pts	Clark 70	S of BWP
184	Upper Stony II	0	hillslope	Wd short term	rhy qtz, pts	Clark 70	S of BWP
185	Upper Stony III	0	hillslope	Ar LW short term	Pot Ck cer rhy qtz	Clark 70	S of BWP
186	Upper Stony IV	0	fplain, hillslope	EW short term	steatite temper cer rhy qtz	Clark 70	S of BWP
187	Upper Stony V	0	flood plain	LW triangle pt	Pot Ck & Rap cer, rhy qtz	Clark 70	S of BWP
1135	Arundel Mills 7	52	terrace low	late 19-early 20	standing frame farmstead	Ingram 99	S of BWP
164	Siggers	0	unknown	MA LA? (100 pts)	jas rhy qtz qte Cecil Co ch	Bastian 99	S of Dorsey E of RR
350	Twin Barns North	229	unknown	late 19-early 20c	barn? Foundations	Conrad 75	S of Dorsey E of RR
351	Twin Barns Quarry	30	unknown	prehistoric quarry?	qtz cobble exploitation?	Conrad 75	S of Dorsey E of RR
352	Sawmill Creek	152	h/bluff, knoll	Ar short (65 fks)	rhy qtz qte	Conrad 75	S of Dorsey E of RR
369	Burleytown	30	unknown	prehistoric	jas rhy qtz	Conrad 76	S of Dorsey E of RR
585	Ridge	0	hilltop/bluff	20c frame ruins		Frye 86	S of Dorsey E of RR
587	Oliver	0	upland flat	historic	farm ruin	Frye 86	S of Dorsey E of RR
588	Wagner	610	upland flat	prehistoric	qtz	Frye 86	S of Dorsey E of RR
953	Sawmill Terrace 1	20	terrace	preh in plow zone	qtz	Wall 99	S of Dorsey E of RR
954	Sawmill Terrace 2	25	terrace	preh in plow zone	chert qtz qte	Wall 99	S of Dorsey E of RR

18AN	Name	Water (m)	Landform	Culture	Diagnostics	Recorder/Yr	Location
977	Area B-2 Site 1	0	fplain, terrace low	19-20c	farmstead, homestead	Majarov 95	S of Dorsey E of RR
1095	Dorchester 1	9	terrace low	MA LA Wd base	Halif MM Nor Pisc Marcey	Clarke 99	S of Dorsey E of RR
1119	Arundel Mills 1	30	terr low, hillslope	Wd short term	FCR 40 fks 1 qtz tri pt	Clarke 99	S of Dorsey E of RR
1121	Arundel Mills 3	40	terrace high	prehistoric	FCR qtz qte, 14 fks 1 core	Clarke 99	S of Dorsey E of RR
1122	Arundel Mills 4	20	terr, hillslope, h/b	preh, mid 19-20c	FCR qtz qte	Clarke 99	S of Dorsey E of RR
1123	Arundel Mills 5	190	terr high, hillslope	mid 19-20c		Clarke 99	S of Dorsey E of RR
1124	Arundel Mills 6	70	terr, hillslope, h/b	19-early 20c		Clarke 99	S of Dorsey E of RR
1218	Hawkins-Clark Farm	500	hillslope, h/bluff	19-20c	truck farm	Clark 02	S of Dorsey E of RR
1265	Benson	457	upland flat	mid 19-late 20c	rural with cemetery	Ward 05	S of Dorsey E of RR
165	Kopper's Run West	0	h/bluff, ridgetop	prehistoric	rhy, qtz 4 pts	Clark 70	S of Dorsey W RR
237	Hess Farm	30	terrace high	prehistoric	unknown (Webb: pts)	Bastian 72	S of Dorsey W RR
238	Lake	30	terrace	MW or LW	qtz pts Acco J, Pisc	Bastian 72	S of Dorsey W RR
261	Harman's Crossing N	0	terrace	LA Wd base	chert steatite grd cer	Baumgartner 73	S of Dorsey W RR
302	Big Island East	0	h/bluff, island	prehistoric	15 qtz 2 hematite	Baumgartner 74	S of Dorsey W RR
580	Koppers East	46	hillslope, up flat	EA/MA LA	Kanawha, SN & stem pts	Ward 05	S of Dorsey W RR
584	Piny	8	terrace low	preh & historic	qte	Frye 86	S of Dorsey W RR
1096	Dorchester 2	30	terrace, hillslope	MA?LA LW, 19-20	FCR Halif, Pot Ck, qtz cer	Ingram 99	S of Dorsey W RR
1097	Dorchester 3	41	terrace low	prehistoric	FCR chert rhy qtz	Auman 98	S of Dorsey W RR
1098	Dorchester 4	165	terr, knoll, hslope	MA, late 19-mid 20	1 rhy 3 qtz qte, Otter Ck pt	Auman 98	S of Dorsey W RR
1099	Dorchester 5	137	terrace, hillslope	prehistoric	FCR 18 qtz 2 qte	Auman 98	S of Dorsey W RR
1100	Dorchester 6	137	terrace	prehistoric	2 FCR 7 qtz	Auman 98	S of Dorsey W RR
1101	Dorchester 7	69	terrace, hillslope	preh (nondiag pt)	3 FCR 6 rhy 63 qtz qte	Auman 98	S of Dorsey W RR
1102	Dorchester 8	70	terrace, hillslope	preh, 19c found.	2 FCR 1 rhy 25 qtz	Auman 98	S of Dorsey W RR
1120	Arundel Mills 2	110	h/bluff, hillslope	preh (20 fks/chips)	2 FCR qtz qte	Clarke 99	S of Dorsey W RR
1136	Arundel Mills 8	10	terrace low	prehistoric	qtz qte	Simons 99	S of Dorsey W RR
1176	Prospect ME Church	270	hillslope	mid 19c (1856)	cemetery	Stone 00	S of Dorsey W RR
1238	Arundel Preserve A1	70	upland flat	20c farmstead	frame ruin	Maymon 03	S of Dorsey W RR
1239	Arundel Preserve B1	40	terrace	late 19-20c farm	frame structure ruin	Maymon 03	S of Dorsey W RR
1259	Shipley	566	upland flat	early 20c	house ruin	Ward 04	S of Dorsey W RR
1304	Sewell 1	457	upland flat	mid-late 20c	agricultural	Ward 05	S of Dorsey W RR
1305	Sewell 2	430	upland flat	mid-late 20c	farmhouse	Ward 05	S of Dorsey W RR
1306	Sewell 3	457	upland flat	early-late 20c	family cemetery	Ward 05	S of Dorsey W RR
243	Crystal Springs	100	terr low, int flat	Ar Wd extensive	jas ch rhy qtz qte	Gaber 92	Savage quad
518	Hobbs-Dashiell	244	terrace high	prehistoric	qtz	Myers 81	Savage quad
519	Dorsey's Cedar	61	terr high, ridgetop	Ar EW	grd rhy stem pt qtz Ver pt	Coerper 81	Savage quad
520	Otis	305	terrace, ridgetop	prehistoric	rhy qtz	Myers 81	Savage quad

18AN	Name	Water (m)	Landform	Culture	Diagnostics	Recorder/Yr	Location
521	Worthington	312	ridgetop	prehistoric	rhy qtz	Coerper 81	Savage quad
557	Cedar Knoll	30	hilltop/bluff	Wd base	pts: SN, lg tri, conver stem	Curry 78	Savage quad
1178	Horne	137	upland flat	prehistoric	qtz 7 fks	Horne 00	Savage quad
1179	Jacob Duvall Cem.	290	hilltop/bluff	early-mid 19c	cemetery: 1842, 1863	JKC 01	Savage quad
1180	National Jr. Republic	198	upland flat	late 19-early 20c	orphanage/reformatory	Horne 00	Savage quad
1232	T-2	250	terrace	late 19-early 20c	house site	Moose 03	Savage quad
1269	Rinngold 1	30	upland gully	late 19-early 20c	refuse, concrete foundation	Ward 05	Savage quad
1270	Rinngold 2	30	upland gully	late 19-early 20c	refuse	Ward 05	Savage quad
367	Harmans N	61	terrace	LA short	qtz fishtail stem pt	Conrad 75	W of BWI
264	Disney Farm	0	terrace	Wd	rhy qtz grd cer	Baumgartner 73	W of BWP
400	Intersection	0	unknown	LA Wd	stem pts, 1 tri pt	Bastian 76	W of BWP
516	Jones	305	upland flat	MA LA	owner collection	Herbert 80	W of BWP

18BA	Name	Water (m)	Landform	Culture	Diagnostics	Recorder/Yr	Location
91	High Herbert	20	terrace low	prehistoric	qtz	MCG 96	E of RR
31	Bluff on Patapsco	45	hilltop/bluff	late 19c	site midden	MCG 96	W of RR
34	Boweman's Shore	0	floodplain	Ar Wd base	grd cer rhy qtz	MCG 96	W of RR
176	White	0	fplain/hillslope	historic unknown	ruin	MCG 96	W of RR

18HO	Name	Water (m)	Landform	Culture	Diagnostics	Recorder/Yr	Location
8	Dorsey Run	0	int flat, up flat	prehistoric	grd steatite (Jones)	Ballweber 93	Savage quad
60	TD Jones Field H	30	terrace	prehistoric	unknown	B-Wagner 76	Savage quad
68	Wesley Grove	65	hilltop/bluff	MA LA	34 qtz Otter pt, 2 bifs	Curry 77	Savage quad
69	Dorsey Speedway	20	terrace	LA qtz unk pt, 15 fks	Bare pt: 1 rhy, 1 qtz	Curry 77	Savage quad
77	ES 1617 A-1	60	hillslope	prehistoric	unknown	Herbert/Gandy 80	Savage quad
82	Neighbor	100	hilltop/bluff	LA short term	1 FCR 42 qtz Vern pt	Myers/Coerper 81	Savage quad
83	Vine's Chance	70	hilltop/bluff	LW short term	1 rhy 52 qtz Lev pt	Myers/Coerper 81	Savage quad
84	Second Discovery	100	hilltop/bluff	MA	rhy Stan pt, qtz base	Myers/Coerper 81	Savage quad
85	Brown's Purchase	300	hilltop/bluff	prehistoric short term	2 rhy 35 qtz	Myers/Coerper 81	Savage quad
118	Haslup Cemetery	400	hilltop/bluff	mid 19-mid 20c	cemetery 1851, 1872	Cosham 05	Savage quad
132	Meadow Ridge 1	150	upland flat	20c	frame house	Frye 85	Savage quad
133	Meadow Ridge 2	180	upland flat	20c	frame hse destroyed	Frye 85	Savage quad
162	CN-9	0	terrace	preh qtz bif, qte bif?	1 rhy 10 qtz 6 qte 1sil	Sanders 91	Savage quad
163	CN-10	0	terrace	late 19c	artifacts	Sanders 91	Savage quad
266	Haslup House	300	ridgetop	mid 19-mid 20c	farmstead, 3 buildings	Cosham 05	Savage quad
268	Troy House	174	hilltop/bluff	early 19c	farmstead masonry	Lee 05	Savage quad
4	Lower Hanover	70	fplain, hillslope	prehistoric unknown		Clark 70	W of BWP
5	Middle Hanover	35	fplain, hillslope	EA LA LW (53 pts)	ch rhy qtz cer granite?	Clark 70	W of BWP
7	Upper Hanover	0	fplain, terrace	LA LW (19 pts)	qtz grd cer 1 ch pt	Clark 70	W of BWP
31	Upper Deep Run W	0	fplain, hillslope	prehistoric unknown		Baumgartner 73	W of BWP
32	Middle Deep Run W	100	fplain, hillslope	prehistoric unknown		Baumgartner 73	W of BWP
33	Lower Deep Run W	0	fplain, hillslope	prehistoric unknown		Baumgartner 73	W of BWP
34	Patapsco Flats	50	floodplain	LA short term	ch rhy Sav pt qtz jas	Clark 73	W of BWP
38	Elk Landing	10	terrace low	LW short term	qtz tri pts, tri knives	Clark 75	W of BWP
56	Field B- TD Jones	0	floodplain	prehistoric unknown		B-Wagner 76	W of BWP
57	Field II- TD Jones	250	hillslope	prehistoric unknown		B-Wagner 76	W of BWP
58	Field K- TD Jones	550	hillslope	prehistoric unknown		B-Wagner 76	W of BWP
59	Field Pit- TD Jones	100	floodplain	prehistoric unknown		B-Wagner 76	W of BWP
134	Dorsey East	50	interior flat	20c	frame house ruin	Frye 86	W of BWP
136	Lost Pond 1	300	hilltop/bluff	prehistoric	qtz 9 fks	Frye 86	W of BWP
137	Lost Pond 2	300	hilltop/bluff	prehistoric workshop	qtz 13 fks 8 shatter	Frye 86	W of BWP
138	Lost Pond 3	300	hilltop/bluff	prehistoric	qtz 5 fks oyster shell	Frye 86	W of BWP
203	Shultz Farm 1	0	fplain, terrace	PI? EW LW Pisc 19c	ch rhy qtz qte grd cer	Simons 93	W of BWP
204	Shultz Farm 2	30	fplain, terr low	prehistoric quarry	4 FCR 125 qtz, 1 core	M. Barse 92	W of BWP
205	Loudon Ave Ruin	30	terrace high	early 20c	house ruin	M. Barse 92	W of BWP
206	Beehive	20	fplain, terr low	LA quarry grd FCR jas	qtz Sav/Bare rhy qte	Simons 93	W of BWP

Appendix B:
MASS Form

MARYLAND INVENTORY OF HISTORIC PROPERTIES

ARCHEOLOGICAL SITE SURVEY: BASIC DATA FORM

Date Filed:

Check if update: ☐

Maryland Department of Planning
Maryland Historical Trust
Division of Historical and Cultural Programs
100 Community Place
Crownsville, Maryland 21032

Site Number: 18AN1428
County: Anne Arundel

A. DESIGNATION

1. Site Name: Jas. Phelps

2. Alternate Site Name/Numbers: Survey Areas 9A and 10

3. Site Type (describe site chronology and function; see instructions):
Farmstead/Domestic Late Nineteenth to Early Twentieth Century

4. Prehistoric _____ Historic X Unknown _____

5. Terrestrial X Submerged/Underwater _____ Both _____

B. LOCATION

6. USGS 7.5' Quadrangle(s): Relay Quad | (For underwater sites) NOAA Chart No.:

(Photocopy section of quad or chart on page 4 and mark site location)

7. Maryland Archeological Research Unit Number: 7

8. Physiographic Province (check one):

_____ Allegany Plateau	_____ Lancaster/Frederick Lowland
_____ Ridge and Valley	_____ Eastern Piedmont
_____ Great Valley	X Western Shore Coastal Plain
_____ Blue Ridge	_____ Eastern Shore Coastal Plain

9. Major Watershed/Underwater Zone (see instructions for map and list): 9-Patapsco

C. ENVIRONMENTAL DATA

10. Nearest Water Source: tributary of Sawmill Creek Stream Order: 1st

11. Closest Surface Water Type (check all applicable):

_____ Ocean	X Freshwater Stream/River
_____ Estuarine Bay/Tidal River	_____ Freshwater Swamp
_____ Tidal or Marsh	_____ Lake or Pond
	_____ Spring

12. Distance from closest surface water: 91 meters (or 300 feet)

C. ENVIRONMENTAL DATA [CONTINUED]

13. Current water speed: _____ knots 14. Water Depth: ___ meters

15. Water visibility: _____

16. SCS Soils Typology and/or Sediment Type: EoB- Evesboro loamy sand and EaC-

17. Topographic Settings (check all applicable):

_____ Floodplain	_____ Hilltop/Bluff
___X__ Interior Flat	_____ Upland Flat
_____ Terrace	_____ Ridgetop
_____ Low Terrace	_____ Rockshelter/Cave
_____ High Terrace	_____ Unknown
_____ Hillslope	_____ Other:

18. Slope: ____

19. Elevation: _30_ meters (or 100 and 120 feet) above sea level

20. Land use at site when last field checked (check all applicable):

_____ Plowed/Tilled	_____ Extractive
_____ No-Till	_____ Military
X-Area 10 Wooded/Forested	_____ Recreational
_____ Logging/Logged	_____ Residential
X-Area 10 Underbrush/Overgrown	_____ Ruin
_____ Pasture	_____ Standing Structure
_____ Cemetery	_____ Transportation
_____ Commercial	_____ Unknown
_____ Educational	_X-Area 9a and portions of Area 10 grassy_ Other:

21. Condition of site:
    - ___X__ Disturbed
    - _____ Undisturbed
    - _____ Unknown

22. Cause of disturbance/destruction (check all applicable):

___X__ Plowed	_____ Vandalized/Looted
_____ Eroded/Eroding	_____ Dredged
_____ Graded/Contoured	_____ Heavy Marine Traffic
_____ Collected	_____ Other:

23. Extent of disturbance:
    - _____ Minor (0-10%)
    - ___X__ Moderate (10-60%)
    - _____ Major (60-99%)
    - _____ Total (100%)
    - _____ % unknown

C. ENVIRONMENTAL DATA [CONTINUED]

24. Describe site setting with respect to local natural and cultural landmarks (topography, hydrology, fences, structures, roads). Use continuation sheet if needed.

    Site is located within the confines of the Baltimore Washington National Airport property. Area 9A is located directly adjacent to Runway 15R-33L, an access road and terra formed drainage. Area 10 is located along the northern boundary of the property in a slightly undulating field and wooded area bordered by a small creek that drains into a wetland.

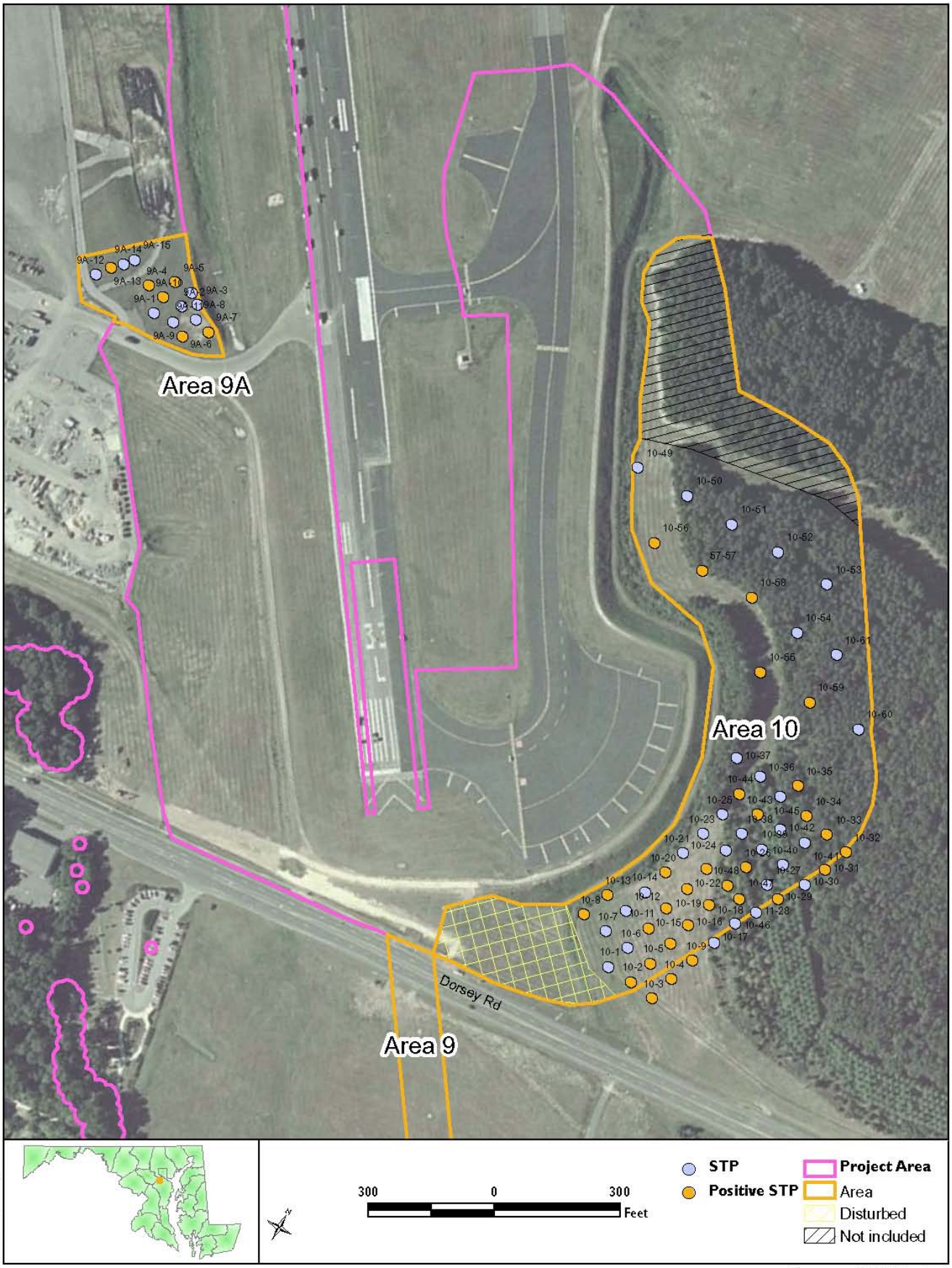
25. Characterize site stratigraphy. Include a representative profile on separate sheet, if applicable. Address plowzone (presence/absence), subplowzone features and levels, if any, and how stratigraphy affects site integrity. Use continuation sheet if needed.

    Soil profile within Area 9a consisted of more than 0.80 meters of fill overlying a temporally mixed artifact bearing fill horizon over subsoil.

    Soil profiles within Area 10 consist of a sandy silt loam plowzone over subsoil. Artifacts were consistently spread throughout the area and primarily recovered from the plowzone context. The gradual slope of Area 10 toward a wetland and subsequent plowing may have caused artifact to migrate in a northeasterly direction.

26. Site size: _____ meters by _____ meters (or _____ feet by _____ feet) Unknown

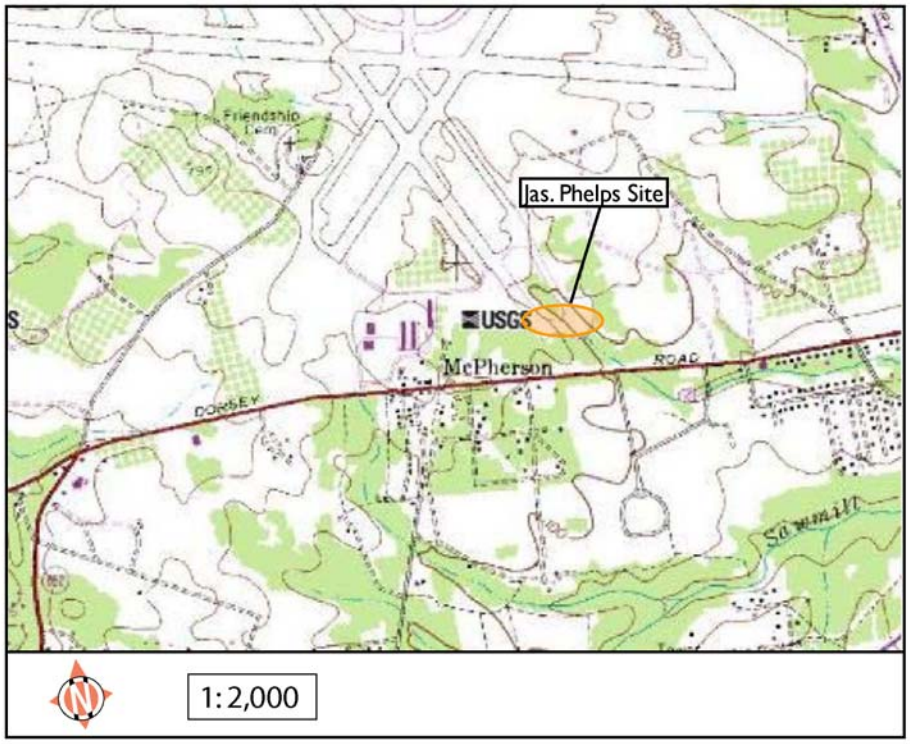
27. Draw a sketch map of the site and immediate environs, here or on separate sheet:



Map source: © 2009 i-cubed

Map Document:(C:\Projects\P-8201 BWI ALP EA\GIS\Mapping\Phase1 A\Area10_SiteForm.mxd)
6/29/2009 -- 12:59:15 PM

Photocopy section of quadrangle map(s) and mark site location with heavy dot or circle and arrow pointing to it.



D. CONTEXT

28. Cultural Affiliation (check all applicable):

PREHISTORIC
_____ Unknown
_____ Paleoindian
_____ Archaic
_____ Early Archaic
_____ Middle Archaic
_____ Late Archaic
_____ Terminal Archaic
_____ Woodland
_____ Adena
_____ Early Woodland
_____ Middle Woodland
_____ Late Woodland

_____ CONTACT

HISTORIC:
_____ Unknown
17th century
_____ 1630-1675
_____ 1676-1720
18th century
_____ 1721-1780
_____ 1781-1820
19th century
__X__ 1821-1860
__X__ 1861-1900
20th century
__X__ 1901-1930
_____ post-1930

____ UNKNOWN

E. INVESTIGATIVE DATA

29. Type of investigation:

____X__ Phase I
_____ Phase II/Site Testing
_____ Phase III/Excavation
_____ Archival Investigation
_____ Monitoring
_____ Field Visit
_____ Collection/Artifact Inventory
_____ Other:
_____

30. Purpose of investigation:

____X__ Compliance
_____ Research
_____ Regional Survey
_____ Site Inventory
_____ MHT Grant Project
_____ Other:
_____

31. Method of sampling (check all applicable):

_____ Non-systematic surface search
_____ Systematic surface collection
_____ Non-systematic shovel test pits
____X__ Systematic shovel test pits
_____ Excavation units
_____ Mechanical excavation
_____ Remote sensing
_____ Other: _____

32. Extent/nature of excavation: systematic Phase I STP survey within project impact area

_____
_____

F. SUPPORT DATA

33. Accompanying Data Form(s):

_____ Prehistoric
____X__ Historic
_____ Shipwreck

34. Ownership: _____ Private _____ Federal ____X__ State _____ Local/County
_____ Unknown

35. Owner(s): Maryland Aviation Administration
Address: _____
Phone: _____

36. Tenant and/or Local Contact: _____
Address: _____
Phone: _____

37. Other Known Investigations: Greiner Inc. (Marvin Brown et al. 1995, later edition 1996) MHT # AN 268

38. Primary report reference or citation: Phase IB Archaeological Survey, A.D. Marble & Company, date pending

39. Other Records (e.g. slides, photos, original field maps/notes, sonar, magnetic record)?

_____ Slides	__X__ Field record	_____ Other: ____
__X__ Photos	_____ Sonar	
__X__ Field maps	_____ Magnetic record	

40. If yes, location of records: A.D. Marble & Company (ultimately with collections)

41. Collections at Maryland Archeological Conservation (MAC) Lab or to be deposited at MAC Lab?
__X__ Yes
_____ No
_____ Unknown

42. If NO or UNKNOWN, give owner: _____
location: _____
and brief description of collection: _____

43. Informant: _____
Address: _____
Phone: _____

44. Site visited by Richard White
Address: A.D. Marble & Company, 375 East Elm Street, Conshohocken PA 19428
Phone: 484-533-2500 Date: April 15, 2009

45. Form filled out by: Richard White, David Weinberg and Brooke Blades
Address: A.D. Marble & Company, 375 East Elm Street, Conshohocken PA 19428
Phone: 484-533-2500 Date: June 10, 2009

46. Site Summary/Additional Comments (append additional pages if needed):

The “Jas. Phelps” house was noted on the 1860 Martenet Map and the 1878 Hopkins Atlas of Anne Arundel County (Fifth District). The artifacts recovered from the site reflected occupation in the later nineteenth and early twentieth century. The house would have been destroyed during the creation of Friendship Airport in the late 1940s if not before that date. The portion of the site tested during the 2009 project was disturbed but it remains possible that additional portions of the site outside of the project impact area may contain intact deposits.

MARYLAND ARCHEOLOGICAL SITE SURVEY: HISTORIC DATA FORM

Site Number 18AN1428

1. Site class (check all applicable, check at least one from each group):

a.
- [X] domestic
- [ ] industrial
- [ ] transportation
- [ ] military
- [ ] sepulchre
- [ ] unknown

b.
- [ ] urban
- [X] rural
- [ ] unknown

c. standing structure:
- [ ] yes
- [X] no
- [ ] unknown

d. above-grade/visible ruin:
- [ ] yes
- [ ] no
- [ ] unknown

2. Site Type (check all applicable):
- [X] artifact concentration
- [ ] possible structure
- [ ] post-in-ground structure
- [ ] frame structure
- [ ] masonry structure
- [X] farmstead
- [ ] plantation
- [ ] townsite
- [ ] mill (specify: _____)
- [ ] raceway
- [ ] quarry
- [ ] furnace/forge
- [ ] other industrial (specify): _____
- [ ] road/railroad
- [ ] wharf/landing
- [ ] bridge
- [ ] ford
- [ ] battlefield
- [ ] military fortification
- [ ] military encampment
- [ ] cemetery
- [ ] unknown
- [ ] other: _____

3. Ethnic Association:
- [ ] Native American
- [ ] African American
- [ ] Angloamerican
- [ ] other Euroamerican (specify): _____
- [ ] Hispanic
- [ ] Asian American
- [ ] unknown
- [ ] other: _____

4. Categories of material remains present (check all applicable):
- [X] ceramics
- [X] bottle/table glass
- [ ] other kitchen artifacts
- [X] architecture
- [ ] furniture
- [ ] arms
- [ ] clothing
- [ ] personal items
- [ ] tobacco pipes
- [ ] activity items
- [ ] human skeletal remains
- [X] faunal remains
- [ ] floral remains
- [ ] organic remains
- [ ] unknown
- [X] other: Industrial

5. Diagnostics (choose from manual and give number recorded or observed):

Whiteware (n=23)
Machine cut nails (n=5)
Decal decorated Whiteware (n=2)
Decal decorated Porcelain (n=2)
Wire nail (n=2)
White glass mason jar liner (n=2)

6. Features present:
   _____yes
   __X__no
   _____unknown

7. Types of features present:

_____ construction feature	_____ road/drive/walkway
_____ foundation	_____ depression/mound
_____ cellar hole/storage cellar	_____ burial
_____ hearth/chimney base	_____ railroad bed
_____ posthole/postmold	_____ earthworks
_____ paling ditch/fence	_____ raceway
_____ privy	_____ wheel pit
_____ well/cistern	_____ unknown
_____ trash pit/dump	_____ other:
_____ sheet midden	_____
_____ planting feature	

8. Flotation samples collected:
   _____ yes
   __X__ no
   _____ unknown

   analyzed:
   _____ yes, by _____
   _____ no
   _____ unknown

9. Soil samples collected:
   _____ yes
   __X__ no
   _____ unknown

   analyzed:
   _____ yes, by _____
   _____ no
   _____ unknown

10. Other analyses (specify):_____
    _____
    _____
    _____

11. Additional comments:

12. Form filled out by: Dave Weinberg
    Address: A.D. Marble & Company, 375 East Elm St, Conshohocken PA 19428
    Date: April 30, 2009

MARYLAND INVENTORY OF HISTORIC PROPERTIES

ARCHEOLOGICAL SITE SURVEY: BASIC DATA FORM

Date Filed:

Check if update: ☐

Maryland Department of Planning
Maryland Historical Trust
Division of Historical and Cultural Programs
100 Community Place
Crownsville, Maryland 21032

Site Number: 18AN1427
County: Anne Arundel

A. DESIGNATION

1. Site Name: T.W. Cole

2. Alternate Site Name/Numbers: Survey Area 6

3. Site Type (describe site chronology and function; see instructions):
Historic Farmstead/Domestic Late Nineteenth to early Twentieth Century

4. Prehistoric _____ Historic X Unknown _____

5. Terrestrial X Submerged/Underwater _____ Both _____

B. LOCATION

6. USGS 7.5' Quadrangle(s): Relay Quad | (For underwater sites) NOAA Chart No.:

(Photocopy section of quad or chart on page 4 and mark site location)

7. Maryland Archeological Research Unit Number: 7

8. Physiographic Province (check one):

_____ Allegany Plateau	_____ Lancaster/Frederick Lowland
_____ Ridge and Valley	_____ Eastern Piedmont
_____ Great Valley	X Western Shore Coastal Plain
_____ Blue Ridge	_____ Eastern Shore Coastal Plain

9. Major Watershed/Underwater Zone (see instructions for map and list): 9-Patapsco

C. ENVIRONMENTAL DATA

10. Nearest Water Source: tributary of Stony Run Stream Order: 1st

11. Closest Surface Water Type (check all applicable):

_____ Ocean	X Freshwater Stream/River
_____ Estuarine Bay/Tidal River	_____ Freshwater Swamp
_____ Tidal or Marsh	_____ Lake or Pond
	_____ Spring

12. Distance from closest surface water: 366 meters (or 1200.79 feet)

C. ENVIRONMENTAL DATA [CONTINUED]

13. Current water speed: _____ knots 14. Water Depth: ___ meters

15. Water visibility: _____

16. SCS Soils Typology and/or Sediment Type: Rumford loamy sand

17. Topographic Settings (check all applicable):

_____ Floodplain	_____ Hilltop/Bluff
_____ Interior Flat	_____ Upland Flat
_____ Terrace	_____ Ridgetop
_____ Low Terrace	_____ Rockshelter/Cave
_____ High Terrace	_____ Unknown
_____ Hillslope	_____ Other: _____

18. Slope: ____

19. Elevation: 40 meters (or 131.20 feet) above sea level

20. Land use at site when last field checked (check all applicable):

_____ Plowed/Tilled	_____ Extractive
_____ No-Till	_____ Military
X Wooded/Forested	_____ Recreational
X Logging/Logged	_____ Residential
_____ Underbrush/Overgrown	_____ Ruin
_____ Pasture	_____ Standing Structure
_____ Cemetery	_____ Transportation
_____ Commercial	_____ Unknown
_____ Educational	_____ Other: _____

21. Condition of site:
- X Disturbed
- _____ Undisturbed
- _____ Unknown

22. Cause of disturbance/destruction (check all applicable):

X Plowed	_____ Vandalized/Looted
_____ Eroded/Eroding	_____ Dredged
X Graded/Contoured	_____ Heavy Marine Traffic
_____ Collected	_____ Other: _____

23. Extent of disturbance:
- _____ Minor (0-10%)
- _____ Moderate (10-60%)
- X Major (60-99%)
- _____ Total (100%)
- _____ % unknown

C. ENVIRONMENTAL DATA [CONTINUED]

24. Describe site setting with respect to local natural and cultural landmarks (topography, hydrology, fences, structures, roads). Use continuation sheet if needed.

Site is located within the Baltimore Washington International Airport property. The site is in a wooded area of secondary growth trees near an abandoned gravel road. A number of above ground features are located within the boundaries of the site area and include manuported debris and several structural features.

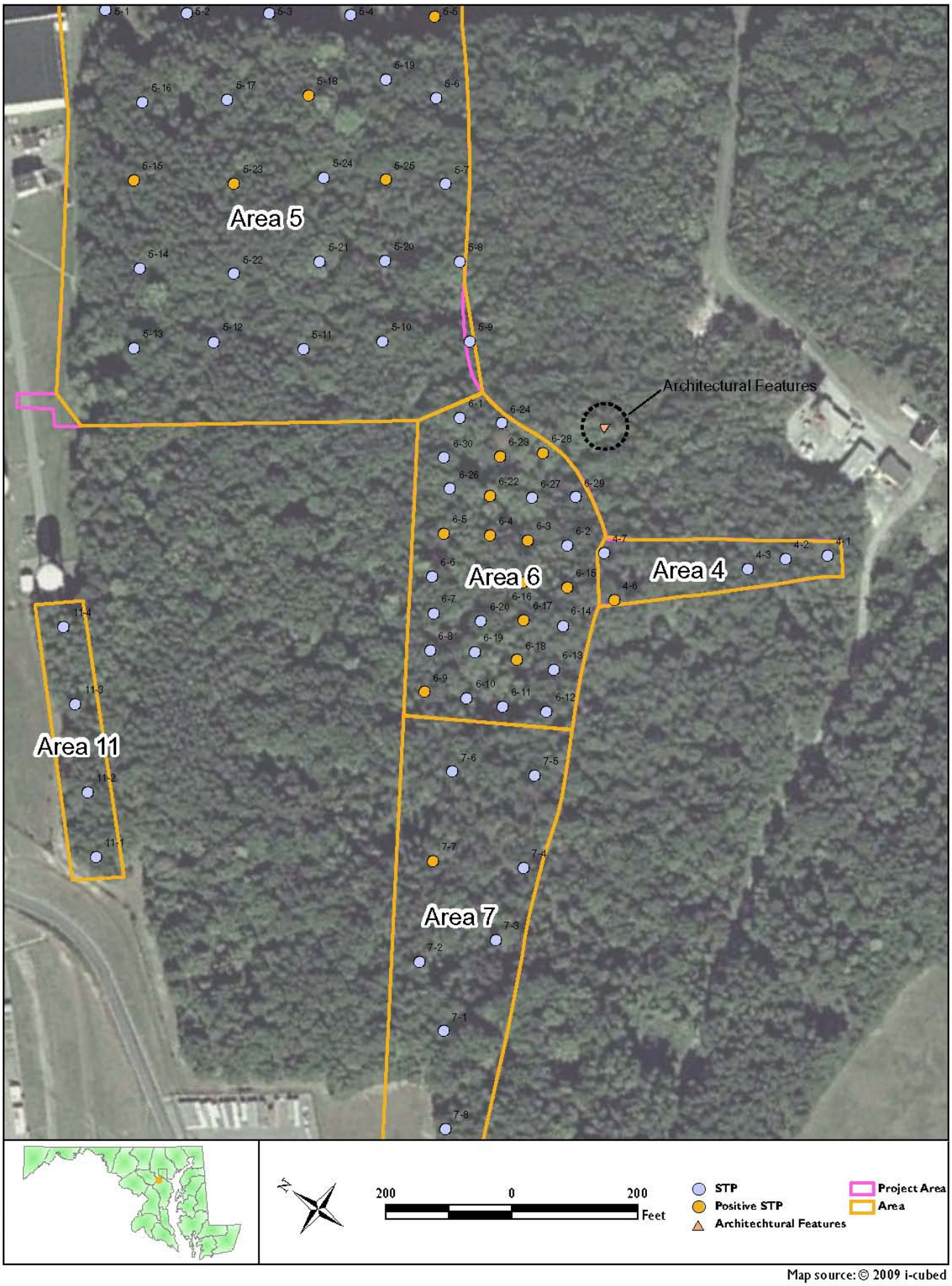
Manuported debris consists of large chunks of concrete, several large concrete pipes, a concrete roller and a pile of rubber automobile tires. Structural features include two stone gate pillars, a concrete and brick well head as well as a number of concrete property markers with a cruciform decoration on all four sides (See attached photographs).

25. Characterize site stratigraphy. Include a representative profile on separate sheet, if applicable. Address plowzone (presence/absence), subplowzone features and levels, if any, and how stratigraphy affects site integrity. Use continuation sheet if needed.

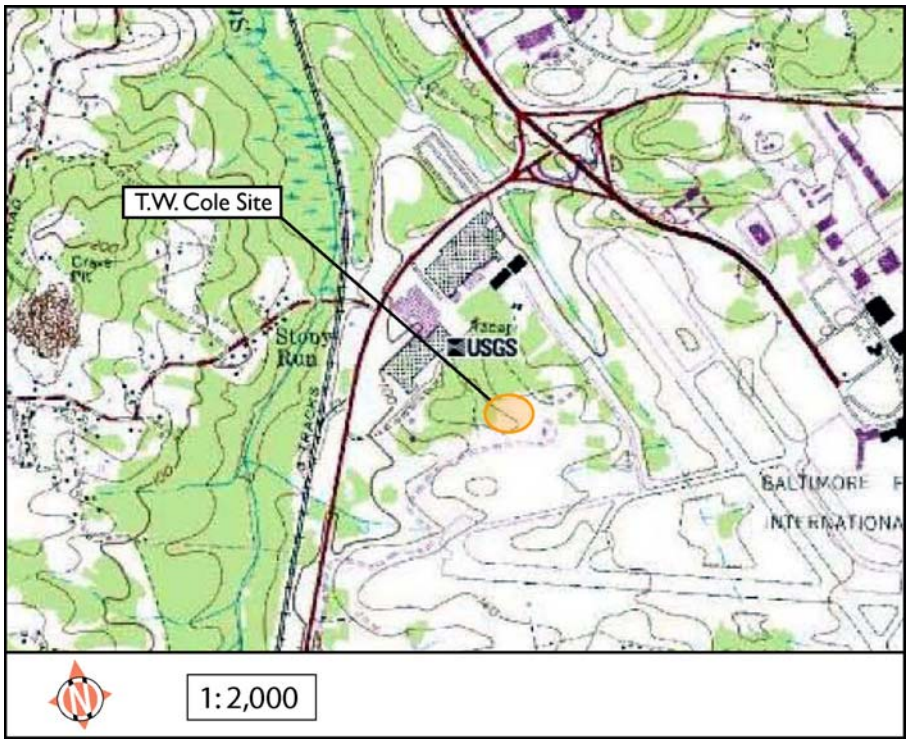
Soil profiles were relatively similar across the site area that was investigated and consisted of a modern O horizon over a disturbed plowzone horizon over subsoil. No subsurface features were identified within the site area under investigation.

26. Site size: _____ meters by _____ meters (or _____ feet by _____ feet) Unknown

27. Draw a sketch map of the site and immediate environs, here or on separate sheet:



Photocopy section of quadrangle map(s) and mark site location with heavy dot or circle and arrow pointing to it.



D. CONTEXT

28. Cultural Affiliation (check all applicable):

PREHISTORIC
_____ Unknown
_____ Paleoindian
_____ Archaic
_____ Early Archaic
_____ Middle Archaic
_____ Late Archaic
_____ Terminal Archaic
_____ Woodland
_____ Adena
_____ Early Woodland
_____ Middle Woodland
_____ Late Woodland

_____ CONTACT

HISTORIC:
_____ Unknown
17th century
_____ 1630-1675
_____ 1676-1720
18th century
_____ 1721-1780
_____ 1781-1820
19th century
__X__ 1821-1860
__X__ 1861-1900
20th century
__X__ 1901-1930
_____ post-1930

____ UNKNOWN

E. INVESTIGATIVE DATA

29. Type of investigation:

____X__ Phase I
_____ Phase II/Site Testing
_____ Phase III/Excavation
_____ Archival Investigation
_____ Monitoring
_____ Field Visit
_____ Collection/Artifact Inventory
_____ Other:
_____

30. Purpose of investigation:

____X__ Compliance
_____ Research
_____ Regional Survey
_____ Site Inventory
_____ MHT Grant Project
_____ Other:
_____

31. Method of sampling (check all applicable):

_____ Non-systematic surface search
_____ Systematic surface collection
_____ Non-systematic shovel test pits
____X__ Systematic shovel test pits
_____ Excavation units
_____ Mechanical excavation
_____ Remote sensing
_____ Other: _____

32. Extent/nature of excavation: systematic Phase I shovel test survey within project impact area

F. SUPPORT DATA

33. Accompanying Data Form(s):

_____ Prehistoric
____X__ Historic
_____ Shipwreck

34. Ownership: _____ Private _____ Federal __X__ State _____ Local/County
_____ Unknown

35. Owner(s): Maryland Aviation Administration
    Address: _____
    Phone: _____

36. Tenant and/or Local Contact: _____
    Address: _____
    Phone: _____

37. Other Known Investigations: Greiner Inc. (Marvin Brown et al. 1995, later edition 1996) MHT # AN 268

38. Primary report reference or citation: Phase IB Archaeological Survey, A.D. Marble & Company, date pending

39. Other Records (e.g. slides, photos, original field maps/notes, sonar, magnetic record)?

_____ Slides	__X__ Field record	_____ Other: ____
__X__ Photos	_____ Sonar	
__X__ Field maps	_____ Magnetic record	

40. If yes, location of records: A.D. Marble & Company (ultimately with collections)

41. Collections at Maryland Archeological Conservation (MAC) Lab or to be deposited at MAC Lab?
    __X__ Yes
    _____ No
    _____ Unknown

42. If NO or UNKNOWN, give owner: _____
    location: _____
    and brief description of collection: _____

43. Informant: _____
    Address: _____
    Phone: _____

44. Site visited by Richard White
    Address: A.D. Marble & Company, 375 East Elm Street, Conshohocken PA 19428
    Phone: 484-533-2500 Date: April 15, 2009

45. Form filled out by: Richard White, Dave Weinberg and Brooke Blades
    Address: A.D. Marble & Company, 375 East Elm Street, Conshohocken PA 19428
    Phone: 484-533-2500 Date: June 10, 2009

46. Site Summary/Additional Comments (append additional pages if needed):

The “T W Cole” house was shown on the 1860 Martenet Map and the 1878 Hopkins Atlas of Anne Arundel County (Fifth District). The artifacts recovered from the site reflected occupation in the later nineteenth and early twentieth century. The house would have been destroyed during the creation of Friendship Airport in the late 1940s if not before that date. The portion of the site tested during the 2009 project was disturbed but it remains possible that additional portions of the site outside of the project impact area may contain intact deposits.

MARYLAND ARCHEOLOGICAL SITE SURVEY: HISTORIC DATA FORM

Site Number 18AN1427

1. Site class (check all applicable, check at least one from each group):

a.
- [X] domestic
- [ ] industrial
- [ ] transportation
- [ ] military
- [ ] sepulchre
- [ ] unknown

b.
- [ ] urban
- [X] rural
- [ ] unknown

c. standing structure:
- [ ] yes
- [X] no
- [ ] unknown

d. above-grade/visible ruin:
- [ ] yes
- [ ] no
- [ ] unknown

2. Site Type (check all applicable):
- [X] artifact concentration
- [ ] possible structure
- [ ] post-in-ground structure
- [ ] frame structure
- [ ] masonry structure
- [X] farmstead
- [ ] plantation
- [ ] townsite
- [ ] mill (specify: _____)
- [ ] raceway
- [ ] quarry
- [ ] furnace/forge
- [ ] other industrial (specify): _____
- [X] road/railroad
- [ ] wharf/landing
- [ ] bridge
- [ ] ford
- [ ] battlefield
- [ ] military fortification
- [ ] military encampment
- [ ] cemetery
- [ ] unknown
- [ ] other: _____

3. Ethnic Association:
- [ ] Native American
- [ ] African American
- [ ] Angloamerican
- [ ] other Euroamerican (specify): _____
- [ ] Hispanic
- [ ] Asian American
- [ ] unknown
- [ ] other: _____

4. Categories of material remains present (check all applicable):
- [X] ceramics
- [X] bottle/table glass
- [X] other kitchen artifacts
- [X] architecture
- [X] furniture
- [ ] arms
- [X] clothing
- [X] personal items
- [ ] tobacco pipes
- [X] activity items
- [ ] human skeletal remains
- [X] faunal remains
- [ ] floral remains
- [ ] organic remains
- [ ] unknown
- [X] other: Industrail

5. Diagnostics (choose from manual and give number recorded or observed):

Whiteware (n=1)	
Blue painted Poreclain (n=1)	
Machine cut nails (n=7)	
Wire nails (n=8)	
Crown Top bottle lip finish (n=1)	
Canning Jar (Ball) (n=7)	

6. Features present:
   - X yes Surface Features
   - ____ no
   - ____ unknown

7. Types of features present:

____ construction feature	X road/drive/walkway
____ foundation	____ depression/mound
____ cellar hole/storage cellar	____ burial
____ hearth/chimney base	____ railroad bed
____ posthole/postmold	____ earthworks
____ paling ditch/fence	____ raceway
____ privy	____ wheel pit
X well/cistern	____ unknown
____ trash pit/dump	X other:
____ sheet midden	Modern Debris on Surface
____	
____ planting feature	

8. Flotation samples collected:
   - ____ yes
   - X no
   - ____ unknown

   analyzed:
   - ____ yes, by ____
   - ____ no
   - ____ unknown

9. Soil samples collected:
   - ____ yes
   - X no
   - ____ unknown

   analyzed:
   - ____ yes, by ____
   - ____ no
   - ____ unknown

10. Other analyses (specify): ____

11. Additional comments:

12. Form filled out by: Richard White
    Address: A.D. Marble & Company, 375 East Elm St., Conshohocken PA 19428
    Date: June 23, 2009

Photograph 1: Surface Feature 1, a tire dump, located in Area 6. Facing West (May 2009)

Photograph 2: Surface Feature 2, a concrete roller, located in Area 6. Facing Northwest (May 2009)

Photograph 3: Surface Feature 3, a pair of large concrete pipes, located in Area 6. Facing Northwest (May 2009)

Photograph 4: Surface Feature 4, a heavily overgrown and abandoned roadway, Located between Areas 5 and 6. Facing North (May 2009).

Photograph 5: Surface Feature 5, one of the two granite pillars on either side of the abandoned road In Areas 5 and 6. Facing southwest. (May 2009)

Photograph 6: Surface feature 6, a concrete boundary marker with cruciform Engravings on all 4 sides, located in Area 6. Facing west (May 2009)

Photograph 7: Surface Feature 7, a concrete and stone culvert that sits below the abandoned road Just outside of the APE in Area 6, Facing east (May 2009).

Photograph 8: Surface feature 8, a concrete and brick well head, located outside of the APE for this Project near Area 6. Facing west (May 2009)

Appendix C:
Artifact Inventory

Artifact Catalog by Area

Provenience		Strat	Depth (cm)	Count	Artifact Description		Material
Non-Site (Area 01)							
STP	11	I	0-27	1	Bottle Amber Fragment	embossed, most likely clorox (CL)	Glass
Non-Site (Area 02)							
STP	24	I	0-38	1	Whiteware Undecorated Fragment		Ceramic
STP	24	I	0-38	1	Yellowware Undecorated Fragment		Ceramic
STP	25	III	36-50	1	Whiteware Transfer Print Fragment	Blue	Ceramic
Non-Site (Area 04)							
STP	06		4-25	1	Bottle Light Olive Fragment		Glass
STP	06		4-25	1	Bottle Aqua Fragment		Glass
STP	06		4-25	5	Window glass Fragment		Glass
Non-Site (Area 05)							
STP	05	II	6-23	1	Bottle Colorless Fragment		Glass
STP	05	II	6-23	2	Shell Fragment	Eroded	Shell
STP	15	II	7-16	1	Whiteware Undecorated Fragment		Ceramic
STP	18	II	12-22	1	Bottle Aqua Fragment		Glass
STP	23	II	8-20	1	Brick Fragment	Burnt	Architectural Ceramic
STP	25	II	10-34	1	Pearlware Transfer Print Fragment	Black	Ceramic
T.W. Cole Site 18 AN 1427 (Area 06)							
STP	03	II	9-32	7	Window glass Fragment		Glass
STP	03	II	9-32	4	Can Fragments Fragment		Metal
STP	03	II	9-32	1	Snap Complete		Metal
STP	03	II	9-32	2	Complete	Small iron ring	Metal
STP	03	II	9-32	1	Lamp chimney glass Fragment		Glass
STP	03	II	9-32	3	Nail Cut Fragment		Metal
STP	03	II	9-32	1	Vessel Fragment	Opal milk glass	Glass
STP	03	II	9-32	5	Bottle Aqua Fragment		Glass
STP	03	II	9-32	7	Jar Canning Jar Fragment	"BALL"; dark aqua	Glass
STP	03	II	9-32	1	Bottle Aqua Lip	Machine made, banded finish	Glass
STP	03	II	9-32	2	Bottle Colorless Fragment	Panel Bottle	Glass
STP	03	II	9-32	9	Bottle Colorless Fragment		Glass
STP	03	II	9-32	1	Bottle Amber Fragment		Glass
STP	03	II	9-32	1	Vessel Fragment	Smoked glass; thin bodied	Glass
STP	03	II	9-32	2	Brick Fragment		Architectural Ceramic
STP	03	II	9-32	1	Entertainment Fragment	Vinyl record	Other synthetic
STP	03	II	9-32	1	Slag		
STP	03	III	32-62	1	Ironstone Undecorated Rim		Ceramic
STP	03	III	32-62	1	Fragment	Strap metal bracket with cut mounting nails and buckle attachment	Metal
STP	03	III	32-62	24	Bottle Light green 75-95% Complete	Crown top; soda/beer type, "INDEPENDENT TRADEMARK, FS< BALTIMORE, MD"	Glass
STP	03	III	32-62	14	Bottle Colorless Fragment		Glass

Provenience		Strat	Depth (cm)	Count	Artifact Description		Material
STP	03	III	32-62	4	Bottle Dark aqua Fragment		Glass
STP	03	III	32-62	2	Window glass Fragment		Glass
STP	03	III	32-62	1	Bottle Amber Fragment		Glass
STP	03	III	32-62	1	Bone Fragment		Bone
STP	03	III	32-62	1	Porcelain Undecorated Fragment		Ceramic
STP	03	III	32-62	1	Button Complete	Porcelain; painted, 4 holes	Ceramic
STP	03	III	32-62	1	Bottle Aqua Lip	Banded finish	Glass
STP	03	III	32-62	1	Sewing Foot-ring	Safety Pin cap	Metal
STP	03	III	32-62	1	Currency Penny Complete	Date not readable; wheat backede	Metal
STP	03	III	32-62	2	Nail Cut Fragment		Metal
STP	03	III	32-62	5	Sheet Metal Fragment		Metal
STP	03	III	32-62	5	Nail Wire Fragment		Metal
STP	03	III	32-62	3	Nail Unidentified Fragment		Metal
STP	04	II	5-24	1	Bottle Olive Fragment		
STP	05	II	10-28	2	Bottle Colorless Fragment		
STP	05	II	10-28	1	Window glass Fragment		
STP	09	II	6-31	1	Bottle Base	machine made	
STP	15	II	6-55	1	Window glass Fragment		
STP	15	II	6-55	1	Bottle Colorless Fragment		
STP	15	II	6-55	1	Whiteware Undecorated		
STP	15	II	6-55	1	Bottle Aqua Complete		
STP	16	II	11-45	1	Porcelain Rim	blue painted	
STP	16	II	11-45	1	Ironstone Undecorated Fragment		
STP	17	II	9-35	13	Window glass Fragment		
STP	18	II	5-23	3	Window glass Fragment		
STP	19	II	7-48	1	Cinder		
STP	19	II	7-48	2	Window glass Fragment		
STP	22	II	22-32	1	Nail Wire		
STP	22	II	22-32	1	Window glass Fragment		
STP	22	II	22-32	1	Nail Cut		
STP	23	II	10-25	1	Window glass		
STP	23	II	10-25	1	Bottle Colorless Fragment		
STP	28	II	10-27	2	Nail Wire		
STP	28	II	10-27	1	Nail Cut		
Non-Site (Area 07)							
STP	07		5-23	1	Vessel Fragment	lamp chimney	
STP	07		5-23	3	Bottle Colorless Fragment		
STP	07		5-23	2	Window glass Fragment		
Non-Site (Area 08)							
STP	12	I	0-13	1	Bottle Colorless Fragment		
STP	17	II	16-37	1	Bottle Colorless		
STP	17	II	16-37	1	Pearlware	transitinal pearlware	
STP	18		10-29	1	Shell Clam		
STP	18		10-29	2	Window glass		
STP	19	II	16-31	2	Window glass		

Phelps Site 18 AN 1428 (Area 9A)

Provenience		Strat	Depth (cm)	Count	Artifact Description		Material
STP	04	III	17-34	1	Unidentified plastic Rigid	Yellowed	
STP	04	III	17-34	1	Nail Wire		
STP	04	III	17-34	1	Brick		
STP	04	III	17-34	1	Nail Cut		
STP	04	III	17-34	1	Bottle Colorless	textured	
STP	05	II	31-80	1	Brick		
STP	05	II	31-80	1	Whiteware Decal		
STP	05	II	31-80	1	Bottle Aqua		Glass
STP	05	III	80-90	1	Bottle Colorless		
STP	05	III	80-90	2	Window glass		
STP	05	III	80-90	1	Unidentified plastic Rigid		Plastic
STP	05	III	80-90	2	Brick		
STP	05	III	80-90	1	Nail Wire		
STP	05	III	80-90	1	Lumber		
STP	06	III	61-96	1	Bottle Colorless		
STP	06	III	61-96	1	Whiteware Undecorated		
STP	07	I	0-25	1	Bottle Colorless	Textured	Glass
STP	10	I	0-17	2	Brick Fragment		Other
STP	10	I	0-17	2	Brick Fragment	With mortar	Other
STP	10	I	0-17	1	Nail Unidentified		Metal
STP	10	I	0-17	1	Bottle Aqua		Glass
STP	13	I	0-60	5	Fragment		Shell
STP	13	I	0-60	1	Nail	Wire?	Metal
STP	13	I	0-60	1	Window glass		Glass
STP	13	I	0-60	1	Plastic Fragment	Trash bag (discarded)	Plastic
STP	13	I	0-60	1	White Bodied Earthenware	Paste only	Ceramic
STP	13	II	60-87	4	Plastic	green bag plastic	Plastic
STP	13	II	60-87	1	Metal	large gauge wire	
STP	13	II	60-87	1	Plaster		
STP	13	II	60-87	1	Bottle Green		
STP	13	II	60-87	5	Bottle Colorless		Glass
STP	13	II	60-87	2	Brick		

Phelps Site 18 AN 1428 (Area 10)

STP	02	I	0-53	1	Whiteware Undecorated		Ceramic
STP	03	I	0-13	1	Bottle Colorless	Thin walled	Glass
STP	03	I	0-13	2	Fragment		Shell
STP	03	II	13-34	1	Whiteware Undecorated		Ceramic
STP	03	II	13-34	2			Shell
STP	03	II	13-34	2	Bottle Colorless		Glass
STP	03	II	13-34	1	Window glass		Glass
STP	04	I	0-19	1	Whiteware Undecorated		Ceramic
STP	04	I	0-19	1	Whiteware Undecorated Base		Ceramic
STP	05	I	0-16	1	Electrical Insulator Fragment	Possible	Ceramic
STP	05	I	0-16	1	Bottle Aqua		Glass
STP	05	I	0-16	2	Jar Lid Liner	Milk glass, embossed "OY"	Glass
STP	08	I	0-21	2	Window glass		Glass
STP	09	I	0-21	2	Bottle Colorless	Embossed	Glass

Provenience		Strat	Depth (cm)	Count	Artifact Description		Material
STP	09	I	0-21	1	Bottle Amber		Glass
STP	09	I	0-21	1	Bottle Colorless		Glass
STP	10	I	0-14	1	Bottle Colorless		Glass
STP	11	II	10-30	1	Glass	Milk glass with amber glass imbedded-decoration, impurity?	Glass
STP	11	II	10-30	11	Bottle Colorless		Glass
STP	11	II	10-30	1	Tumbler Hatched Rim Rim		Glass
STP	11	II	10-30	1	Bottle Amber		Glass
STP	11	II	10-30	1	Unidentified Metal		Metal
STP	11	II	10-30	2	Whiteware Undecorated Base		Ceramic
STP	11	II	10-30	1	Whiteware Undecorated Rim		Ceramic
STP	11	II	10-30	1	Whiteware Annular Rim	Green	Ceramic
STP	11	II	10-30	1	Ironstone Base	Makers Mark. "LEY"	Ceramic
STP	11	II	10-30	1	Porcelain Gilded	Floral design	Ceramic
STP	11	II	10-30	1	Porcelain	Floral desgin	Ceramic
STP	11	II	10-30	1	Whiteware		Glass
STP	11	II	10-30	1	Bottle Colorless		Glass
STP	13	I	0-20	1	Whiteware Decal	Floral	Ceramic
STP	15	I	0-23	1	Porcelain Undecorated		Ceramic
STP	16	I	0-24	1	Ironstone Undecorated Rim		Ceramic
STP	16	I	0-24	4	Bottle Colorless		Glass
STP	16	I	0-24	1	Window glass		Glass
STP	16	I	0-24	1	Whiteware	Burned, thin bodied	Ceramic
STP	18	I	0-18	1	Bottle Amber	Stippled	Glass
STP	18	I	0-18	1	Bottle Colorless		Glass
STP	19	I	0-14	3			Shell
STP	19	I	0-14	1	Bottle Colorless		Glass
STP	19	I	0-14	1	Brick		Other
STP	19	I	0-14	1	Porcelain Undecorated Rim		Ceramic
STP	20	I	0-30	1	Porcelain Decal Rim	Floral design	Ceramic
STP	20	I	0-30	1	Porcelain Undecorated		Ceramic
STP	20	I	0-30	1	Bottle Colorless		Glass
STP	20	I	0-30	1	Window glass		Glass
STP	22	I	0-14	1	Whiteware Undecorated		Ceramic
STP	26	I	0-38	1	Bottle Colorless		Glass
STP	26	I	0-38	1	Window glass		Glass
STP	26	I	0-38	1	Ironstone Undecorated		Ceramic
STP	26	I	0-38	1	Brick		Other
STP	29	I	0-31	1	Window glass		Glass
STP	31	I	0-12	1	Vessel Cobalt		Glass
STP	31	I	0-12	1	Porcelain	Blue decoration, underglaze	Ceramic
STP	31	I	0-12	1	Bottle Colorless		Glass
STP	31	II	12-24	1	Coal		Other
STP	31	II	12-24	2	Glass	Thick Walled	Glass
STP	31	II	12-24	1	Bottle Colorless		Glass
STP	31	II	12-24	2	Bottle	Coke Bottle	Glass
STP	31	II	12-24	1	Brick		Other

Provenience		Strat	Depth (cm)	Count	Artifact Description		Material
STP	32	II	11-29	1	Bottle Colorless	Solarized	Glass
STP	32	II	11-29	1	Whiteware	Stained	Ceramic
STP	32	II	11-29	1	Window glass		Glass
STP	33	II	12-40	1	Nail Cut Complete	Burned	Metal
STP	34	II	10-63	1	Whiteware Undecorated		Ceramic
STP	35	II	12-40	2	Bottle Colorless		Glass
STP	35	II	12-40	1	Window glass		Glass
STP	35	II	12-40	1	Porcelain Institutional		Ceramic
STP	43	I	0-17	1	Porcelain Undecorated		Ceramic
STP	44	I	0-23	1	Ironstone Base	Partial Makers Mark. "SY"	Ceramic
STP	46	I	0-28	1	Bottle Colorless		Glass
STP	47	I	0-17	1	Tumbler Hatched Rim Rim		Glass
STP	47	I	0-17	1	Window glass		Glass
STP	47	I	0-17	1	Porcelain Undecorated		Ceramic
STP	47	I	0-17	1	Porcelain Institutional Base		Ceramic
STP	47	I	0-17	1	Whiteware Undecorated Rim		Ceramic
STP	48	I	0-24	1	Brick		Other
STP	48	I	0-24	1	Whiteware Undecorated		Ceramic
STP	48	I	0-24	1	Porcelain Rim	Blue desgn underglaze	Ceramic
STP	48	I	0-24	1	Whiteware Polychrome	Floral design	Ceramic
STP	49	II	14-49	1	Glass Cobalt Blue		Glass
STP	49	II	14-49	1	Window glass		Glass
STP	49	II	14-49	3	Vessel Colorless	Molded	Glass
STP	49	II	14-49	1	Unidentified Metal		Metal
STP	49	II	14-49	2	Nail Cut Fragment	Possible	Metal
STP	49	II	14-49	1	Bottle Colorless		Glass
STP	50	I	0-10	3	Window glass		Glass
STP	51	I	0-13	1	Bottle Colorless		Glass
STP	52	I	0-9	1	Porcelain Undecorated		Ceramic
STP	52	I	0-9	1		Eroded	Shell
STP	52	I	0-9	1		Large animal	Bone
STP	52	II	9-32	1	Glass Complete	Ointment pot, screw top	Glass
STP	52	II	9-32	1	Vessel Green		Glass
STP	53	II	7-29	1	Vessel Cobalt		Glass
STP	53	II	7-29	2	Window glass		Glass
STP	53	II	7-29	1	Whiteware		Ceramic
STP	54	II	13-30	1	Porcelain Decal	Pink floral	Ceramic
STP	55	I	0-18	1	Porcelain Undecorated		Ceramic
STP	55	I	0-18	1	Whiteware Undecorated	Stained	Ceramic
STP	55	I	0-18	2	Bottle Colorless		Glass
STP	56	II	17-28	1	Vessel Colorless	Molded	Glass
STP	56	II	17-28	2	Bottle Colorless		Glass
STP	56	II	17-28	1	Whiteware Undecorated		Ceramic
STP	57	II	14-22	1	Nail Cut Fragment		Metal
STP	57	II	14-22	1	Whiteware Undecorated	Stained	Ceramic
STP	57	II	14-22	1	Whiteware Undecorated	Stained	Ceramic
STP	58	I	0-24	1	Whiteware Undecorated		Ceramic
STP	58	I	0-24	1	Porcelain Institutional Rim	Molded design	Ceramic

Provenience		Strat	Depth (cm)	Count	Artifact Description		Material
STP	59	II	13-22	1	Bottle Colorless Base		Glass
STP	59	II	13-22	1	Bottle Colorless	Embossed "B"	Glass

Appendix D:
MHT-Approved Archeological Permit

Maryland Department of Planning
Maryland Historical Trust

Martin O'Malley
Governor

Anthony G. Brown
Lt. Governor

Richard Eberhart Hall
Secretary

Matthew J. Power
Deputy Secretary

February 12, 2009

Ms. Robin Bowie
Manager
Division of Environmental Planning
Maryland Aviation Administration
P.O. Box 8766
BWI Airport, MD 21240-0766

Dear Ms. Bowie:

Thank you for your application for a permit to conduct terrestrial archeological investigations on Maryland State Owned lands associated with the project entitled *Planned Near-Term Improvement Projects (2008 – 2012) at Baltimore/Washington International Thurgood Marshall Airport.* The research proposed is well designed and will constitute a contribution to Maryland archeology. The original approved and signed permit is enclosed.

Please keep me informed of your progress (clhall@mdp.state.md.us), and let me know if there is anything I can do to assist you.

Sincerely,

Charles L. Hall
State Terrestrial Archeologist

enclosure

cc: Dr. Brooke Blades, A.D. Marble & Co.

100 Community Place • Crownsville, Maryland 21032-2023
Telephone: 410.514.7600 • Fax: 410.987.4071 • Toll Free: 1.800.756.0119 • TTY Users: Maryland Relay
Internet: www.marylandhistoricaltrust.net

Maryland Department of Planning

Maryland Historical Trust

APPLICATION FOR PERMIT UNDER MARYLAND ARCHEOLOGICAL HISTORIC PROPERTIES ACT: TERRESTRIAL ARCHEOLOGY

(Annotated Code of Maryland: SF § 5A-342)

1. **Name, title, position (if applicable), address, and telephone number of individual, firm, State agency, or institution applying for permit:**

   Ms. Robin Bowie, Manager
   Division of Environmental Planning
   Maryland Aviation Administration
   P.O. Box 8766
   BWI Airport, MD, 21240-0766
   (410) 859-7103

2. **If different from Item No. 1, list name and daytime telephone number of person to be contacted if questions arise about application or permit:**
   (☒ Same as Item No. 1 – check if applicable)

3. **Project title, if assigned:** Planned Near-Term Improvement Projects (2008-2012) at Baltimore/Washington International Thurgood Marshall Airport.

Location of lands for which permit is requested: Baltimore/Washington International Thurgood Marshall Airport

   a. **County**: Anne Arundel

Leave Blank if You Do Not Know How To Determine UTM Or Latitude/Longitude

   b. **UTM zone _____ ; Northing _____ ; Easting _____**

   c. **Attach written description and map, sketch, or plan showing specific sites or areas for which permit is desired. (Use Addendum Sheets as needed, and attach to application.)** Location map attached.

5. **Ownership of lands for which permit is requested:**
   a. **Name of State land unit and administering department *or*, if private land, name, address, and phone number of owner:** Primary land owner is the Maryland Aviation Administration. Portions of land owned by the Maryland State Highway Administration may also be surveyed.

   b. **Name, title/position (if applicable), and phone number of person designated by the State agency or landowner to serve as their principal contact/representative:** Robin Bowie, Manager, Division of Environmental Planning (410) 859-7103

6. **Detail the proposed work, including goals, techniques, and expected results. (Use Addendum Sheets as needed, and attach to application.):** Proposed work plan is attached.

7. **Discuss what the public benefits of the proposed project will be. (Use Addendum Sheets as needed, and attach to application.):** The proposed project will address needed improvements to BWI Thurgood Marshall Airport as identified on the latest version of the Airport Layout Plan currently under Federal Aviation Administration review.

8. **Name, address, and qualifications of person(s) in charge of the archeological work.**
   a. **In overall charge of archeological work (attach vita including academic and professional experience):** Brooke Blades (résumé attached)

   b. **If different from Item No. 8a, name, address, and qualifications of person(s) in charge who normally will be present at project site during fieldwork (attach vita including academic and professional experience):** Bryan Butina (résumé attached)

9. **Date fieldwork will begin:** January 2009

10. **Anticipated date fieldwork will conclude:** February 2009

11. **Expected date when the draft report will be submitted (a final report must be submitted within 90 days of receipt of comments on the draft report from the administering agency and/or the Maryland Historical Trust, unless a revised deadline has been approved by the Trust):** March 1, 2009

12. **Name and address of institution/organization where materials collected will be permanently curated:** The Maryland Archaeological Conservation Laboratory, St. Leonard, Maryland

13. **Provisions for publication/reporting and distribution of results of work:** These will be determined after the testing has been completed and the resulting data have been analyzed. This will likely be incorporated into any agreement document generated as a result of the archeological studies.

If this application is approved, the applicant agrees to carry out the proposed excavations in accordance with the special conditions listed on this form.

14. **Signature of applicant named in Item No. 1 above, and date of application:**

Robin M. Bourne — Signature

1/12/09 — Date

15. **Concurrence by agency administering land or owner of the land for which permit is requested, if different from Applicant in Item No. 14 above:**

Signature	Title	Date

Signature	Agency (if applicable)

16. **Application approved:**

Director, Maryland Historical Trust	Chief, Office of Archeology	Date
	Maureen Kavanagh	2/12/09

[APPLICATION FOR PERMIT UNDER MARYLAND ARCHEOLOGICAL HISTORIC PROPERTIES ACT: TERRESTRIAL ARCHEOLOGY]

SPECIAL CONDITIONS

Special conditions for carrying out archeological excavations under this permit:

a. The permit is not exclusive in character, and, for State-owned or controlled lands, the State of Maryland reserves the right to use, lease, or permit the use of said land or any part thereof for any purpose.

b. Permittee indemnifies and holds harmless the State of Maryland, it's employees, agents, and servants from any claim arising out of or in connection with all matters connected with the permit, to the extent permitted by law.

c. Such guidance and protection as is consistent with the duties of the State official in charge of the area will be afforded the permit holder and his party.

d. All excavated areas must be restored by filling in the excavations and otherwise leaving the areas in as near original condition as is practicable.

e. The permittee shall conduct all operations in such a manner as to prevent the erosion of the land, pollution of the water resources, and damage to the watershed, and do all things necessary to prevent or reduce to the fullest extent the scarring of the lands.

f. The fieldwork, records made, and objects recovered are subject to inspection by the Chief of the Office of Archeology, or designee, at reasonable times.

g. A final report on work accomplished under this permit is required and must be provided to the Maryland Historical Trust (see Special Condition n, below). Final reports shall meet or exceed the Standards and Guidelines for Archeological Investigations in Maryland (Shaffer and Cole1994), and no report shall be considered final until Office of Archeology review determines that these standards and guidelines have been met. If submission of a final report is expected to take longer than six months after conclusion of the fieldwork, two copies of a brief preliminary report of work performed under this permit must be sent to the Office of Archeology, Maryland Historical Trust within one month of completing fieldwork.

h. This permit shall not relieve permittee from complying with all State, Federal, or Local laws, rules, and regulations.

i. When applicable, after the permit is approved, but before undertaking any work, the permittee must coordinate with the individual named in Item 5b.

j. A permit must be signed by the Director of the Maryland Historical Trust, the Chief of the Office of Archeology, and the landowner or a responsible official of the agency administering the land covered by the permit.

k. Permits are valid for one year from the date of approval unless otherwise specified.

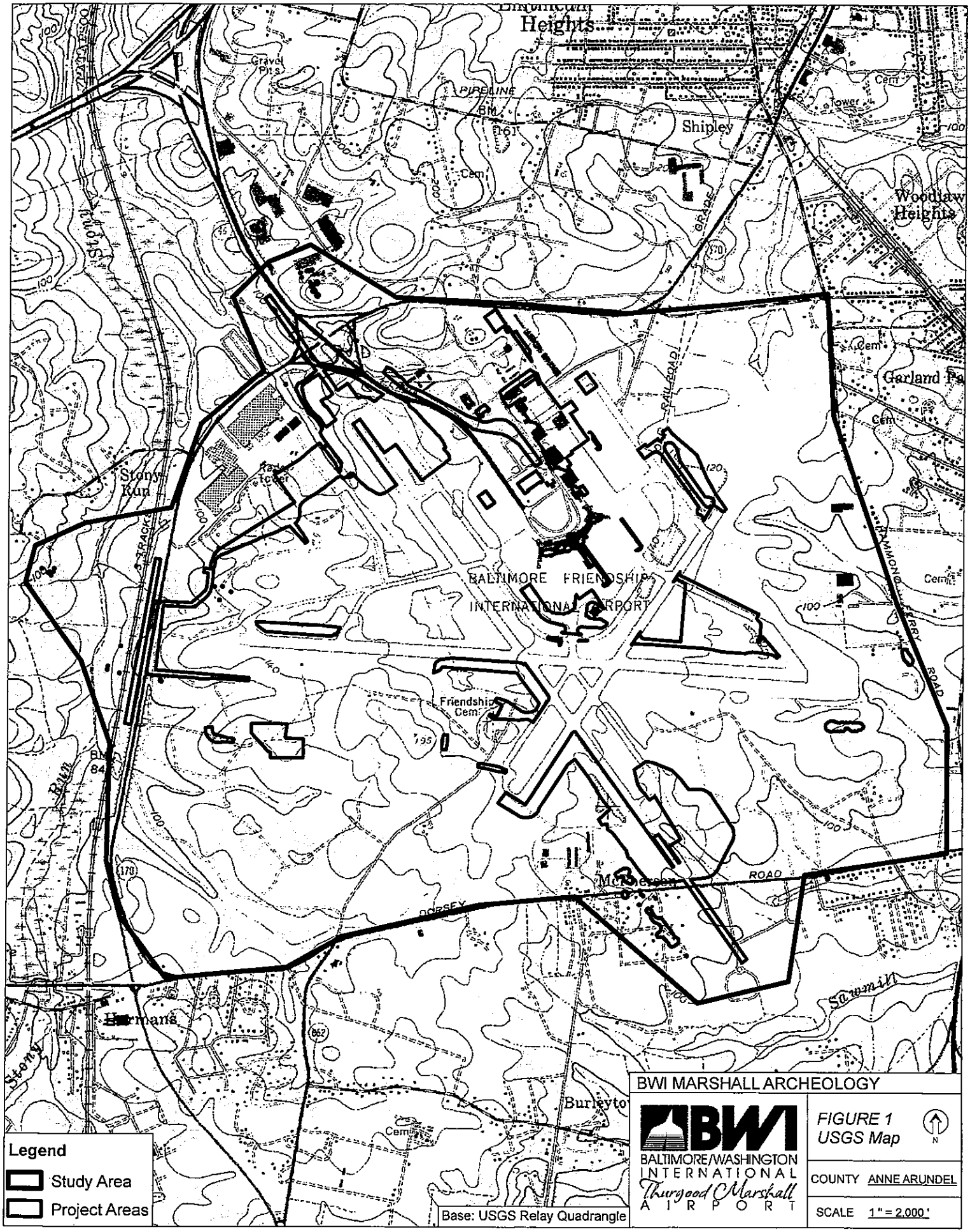
l. Renewal or extension of a terrestrial Archeology permit requires that a new application by submitted accompanied by a written report on the investigations covered by the previous permit.

m. All archeological specimens removed from State-owned or controlled land are State property (SF § 5A-339 of the Annotated Code of Maryland) and shall be conserved at the Maryland Archeological Conservation Laboratory at Jefferson Patterson Park and Museum in Calvert County (SF § 5-326(c)(3)), unless this requirement is specifically exempted by the Office of Archeology as part of this permit. All archeological specimens must be conserved, cleaned, and cataloged by methods consistent with Collections and Conservation Standards of the Maryland Historical Trust (*Technical Update No. 1 of the Standards and Guidelines for Archeological Investigations in Maryland,* revised July 1, 2005).

n. Three copies of all reports, published and unpublished, resulting from investigations made under the terms of this permit must be submitted to the Maryland Historical Trust's Office of Archeology. As appropriate, one copy of all reports must also be submitted to the head of the agency on whose land the work was performed, or the owner of the land.

o. Other special conditions (to be completed by the Maryland Historical Trust):

LOCATION MAP:


Heights
Gravel Pits
PIPELINE
BM 161
Shipley
Cem
Tower
Woodlaw Heights
GRADE
Garland Pa
Cem
RAILROAD
Stony Run
Radio Tower
TRACK
BALTIMORE FRIENDSHIP
INTERNATIONAL AIRPORT
RAMONA FERRY ROAD
Friendship Cem
McPherson
ROAD
DORSEY
Hermans
Stony
Burleyto
Cem
Sawmill
Legend
Study Area
Project Areas
Base: USGS Relay Quadrangle
BWI MARSHALL ARCHEOLOGY
BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT
FIGURE 1
USGS Map
N
COUNTY ANNE ARUNDEL
SCALE 1" = 2,000'

ARCHEOLOGICAL WORK PLAN:

ARCHEOLOGICAL WORKPLAN

PURPOSE AND NEED

The 18 proposed "interim" projects (2008-2012) indicated on the latest version of the BWI Interim ALP currently under FAA review (June 2007) are to be the basis for the purpose and need discussions included under this task . These projects are presented and addressed in greater detail below under "Alternatives".

The need for several of these projects was addressed in the latest revised *Interim Airport Layout Plan Narrative Report* (June 2007). This report, as well as the *Runway Safety Area Compliance Study* (July 2004), will be important resources in developing the purpose and need discussions. Follow-on discussions with appropriate MAA staff will serve to provide additional insights and helpful information to support the various projects. Prior planning and site selection studies will also be used for documenting the need for the proposed improvements.

The multi-project nature of the Interim ALP's proposed actions requires that purpose and need discussions be developed for each action or related group of actions. The Consultant intends to prepare this key section of the Draft EA in a project-by-project format similar to that used in the Narrative Report previously submitted to FAA for review with the Interim ALP itself. In addition, the Consultant intends to develop a working draft of this section for MAA review and comment as soon after the end of the Scoping process as possible. Upon incorporation of MAA comments, the Consultant will re-submit the section to MAA so they can forward it to FAA for their review. This step should allow us to finalize this section early in the process and facilitate future FAA reviews.

ARCHEOLOGICAL WORK PLAN

The archeological work will consist of identifying below-ground known and potential archaeological resources. This analysis will be conducted in accordance with FAA Orders 1050.1E and 5050.4B, Section 106 of the National Historic Preservation Act of 1966, and 36 CFR Part 800, *Protection of Historic and Cultural Properties*, the procedures of the Advisory Council on Historic Preservation for implementing the Act.

Phase IA Archaeological Survey – A Phase IA Archaeological Assessment will be performed for the APE. The Phase IA Assessment will include the following tasks: 1) background historic and prehistoric research; 2) field inspection of the project study area; and 3) analysis of the results of the field survey and background research.

Background research will be conducted to determine the presence and location of all documented cultural resources within or adjacent to the APE, predict the probability that undocumented cultural resources may be located within the study area and to obtain information necessary for providing a historic or archeological context within which to evaluate the findings from the field surveys.

The Phase IA assessment will include documentation of collected information (i.e., location and nature of known sites in the area, previous surveys and management plans, historic maps, existing

predictive models, soil types, level of disturbance, etc.), and an archaeological predictive model for the project area. A Phase IA Archaeological Assessment letter report will be completed and carried forth to determine the Phase IB survey approach. Recommendations on the need for a Phase IB survey will be based on results of the Phase IA assessment and in discussions with the MAA, Anne Arundel County OECR and MHT. The Consultant will prepare up to five (5) draft copies and ten (10) final copies of the Phase IA Archaeological Assessment Report as part of this project.

Phase 1B Detailed Studies and Testing –A Phase IB archaeological field survey will be conducted. The survey will consist of shovel test pit (STP) excavations. The APE will be divided into areas of high, medium, low and nil sensitivity to archaeological resources. Areas of nil and low sensitivity will be defined as those areas that have been disturbed, are remote (>200 meters) from water sources, and/or fall in areas of poor drainage or with ground slopes > 15 percent. They will not be subject to archaeological testing. In moderate sensitivity areas (i.e., those between 100-200 meters from water sources, with relatively well-drained soils, and with ground slopes <15 percent), shovel test pits will be excavated at 25-meter intervals (6 per acre). In areas of high sensitivity (i.e., those less than 100 meters from water sources with relatively well-drained soils, and with ground slopes <8 percent), STPs will be excavated at 15-meter intervals (16 per acre). In areas in which the historic archaeological potential is particularly high (i.e., areas within 100 feet of standing structures greater than 50 years of age or within 100 feet of the previous location of such structures, as indicated by historic maps), STPs will be excavated at 20-foot (6 meter) intervals (100 per acre). Additional shovel test pits may be excavated to bracket positive tests to more clearly define the boundaries of any archaeological sites identified in the APE.

All artifacts will be processed in the laboratory in accordance with MHT guidelines. Laboratory processing consists of cleaning and cataloging all artifacts. Any carbon collected or flotation samples taken during Phase IB testing will be prepared for their appropriate analysis, however, they will not be submitted to outside laboratory analysis as part of this contract. The catalog will contain a complete description of every artifact (form, function, material of manufacture) and its known cultural affiliation and dating. Photographs of diagnostic artifacts will be taken for use in the Phase I Report.

Analysis of the field findings includes the use of numerical techniques and qualitative assessment of the artifacts to evaluate the nature of the artifact deposits identified during testing and their depositional contexts. The goal of the analyses is to determine the integrity of the deposits and to reconstruct the occupational history of the site to provide MHT any significant information on the history or prehistory of the locale and region. Any recommendation for avoidance and/or further archaeological investigations within the study area will be based on the results of these analyses.

The Phase IB Archaeological Survey report will include a complete description of the exact field methodologies employed during the survey together with field results, the interpretation of those results, and any recommendation for further archaeological investigations or the need to develop an avoidance plan for sensitive areas with the APE. The Phase IB report will include mapping showing the location of all tests and a justification for any areas of the APE not tested during the investigation.

A complete catalog of all artifacts found during the investigation will also be presented in an appendix to the Phase IB report. This report will be prepared in accordance with MHT guidelines and recommendations. Revisions to the draft report requested by the MAA and/or the MHT will be incorporated by the Consultant into the final report.

Five (5) draft copies, one (1) final draft, and five (5) final copies of the Phase IB Report will be delivered to the MAA and MHT for approval.

All of the tasks will be performed by qualified professionals as defined by the Secretary of the Interior (36CFR §61). The analysis will be consistent with the principles and standards contained in *Archaeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines* (1983) and *Consulting About Archaeology Under Section 106* (Advisory Council on Historic Preservation 1990).

QUALIFICATIONS:

7. Brief resume of key persons specialists and individual consultants anticipated for this project.

a. Name & Title:

Brooke S. Blades

Archaeologist / Principal Investigator

b. Project Assignment:

Archaeology

c. Name of Firm with which associated:

A.D. MARBLE & COMPANY

d. Years experience: With This Firm 2 With Other Firms 30

e. Education: Degree(s)/Year/Specialization

Ph.D./1997/Anthropology, New York University
M.A./1978/American Civilization, University of Pennsylvania
B.A./1973/History, College of William and Mary

f. Active Registration: Year first Registered/Discipline

g. Other Experience and Qualifications relevant to the proposed project:

Dr. Blades has directed or co-directed archaeological projects in the Middle Atlantic States and Western Europe for over three decades. These studies were undertaken in association with the National Park Service, universities, state and city governments, and as a Fulbright Fellow in Northern Ireland. He was a research associate at the University of Maryland and a visiting professor at Lehigh University, where courses taught included North American prehistory and historical archaeology. He has considerable experience in the organization and management of archaeological projects and a thorough familiarity with federal preservation legislation and state guidelines for conducting archaeological investigations. His projects include:

New Market Park and Ride Lot, St. Mary's County, Maryland. Maryland Transportation Authority. Co-director of Phase I survey of proposed parking lot adjacent to Route 5.

Army Research Laboratory, Adelphi, Montgomery County, Maryland. Corps of Engineers Baltimore District. Principal investigator and field director of Phase II systematic investigations at site 18Mo396 that identified and evaluated spatially discrete late Archaic and early Woodland lithic concentrations, in addition to a possible Paleoindian point. Co-author of final report.

Goddard Space Flight Center, Greenbelt, Prince George's County, Maryland. NASA. Principal investigator for Phase I random survey of facility that located Archaic and Woodland occupation evidence on varying landforms, particularly on stream floodplains. Author of final report.

Fort McHenry, Baltimore, Maryland. National Park Service. Co-director of excavations of portion of 1830s terreplein wall and barracks site and of early 19c. sally port entrance in the fortifications. Co-author of final reports.

Hampton Mansion, Towson, Maryland. National Park Service. Excavator at site of garden orangery at 19c. plantation and around log workers quarters.

Mon-Fayette Corridor, Pennsylvania and West Virginia. PA Turnpike Commission. Director of lithic analysis from stratified series of Woodland occupations on stream terrace at 36Fa418. Also analyzed research data from Phases I-III excavations on ten Archaic and Woodland sites. Co-author of final report.

S.R. 0220, Section 077, Susquehanna Beltway. Lycoming and Clinton Counties, Pennsylvania. PennDOT District 3-0. Researcher who assisted in review of archaeological predictive model within 10-mile corridor and prepared portion of model addressing late Pleistocene and early Holocene (Paleoindian and Early Archaic) occupation.

I-95/Scudder Falls Bridge Improvement Project, Pennsylvania into New Jersey. PennDOT District 6-0, NJDOT, and FHWA. Principal Investigator for archaeological and geoarchaeological investigations of deeply stratified deposits along Delaware River and of site identification within 4-mile corridor (ongoing project).

Forts Duquesne and Pitt, Pittsburgh, Pennsylvania. PA Department of Conservation and Natural Resources. Director/coordinator of geoarchaeological and geophysical surveys at 18c. sites of Fort Duquesne and Fort Pitt. Also conducted historical research and prepared final report.

Dinwiddie and Prince George Counties, Virginia. National Park Service. Director of synthesis of regional prehistoric data and predictive evaluation of unknown site locations. The research focused on geographic and paleoenvironmental influences on settlement patters from early Holocene hunter-gatherers to late prehistoric agricultural groups within a regional chiefdom.

Prince George County, Virginia. National Park Service. Director or co-director of several excavations on prehistoric and historic sites. Archaeological and historical research at three 18-19c. plantations–Hare and Taylor near Petersburg and Eppes at City Point–explored landscape patterns, architectural remains, and material culture related to plantation owners and enslaved workers. A 17-18c. dwelling cellar was partially excavated at City Point on the James River. A systematic survey of Early Archaic to Late Woodland occupations was undertaken at City Point. Civil War earthworks at Petersburg and Union army quarters sites at City Point were also examined.

Colonial Williamsburg, Virginia. Colonial Williamsburg, Inc. Excavator and field director of excavations in 17-18c. Francis Nicholson and Thomas Jones dwelling cellars at the Public Hospital Site. Author of draft reports.

The Ulster Plantation, Northern Ireland. Fulbright-Hayes Senior Research Scholar at New University of Ulster. Director of archaeological and historical survey of village sites associated with 17c. English colony in County Londonderry. Study is particularly relevant to Chesapeake Tidewater due to contemporary period of earliest settlement. Author of final report and articles published in scholarly journals.

BRYAN T. BUTINA — **Field Director**

Mr. Butina has over 20 years of archaeological field technician and field supervisor experience. He has extensive experience in numerous Phase I, II and III cultural resource investigations throughout the eastern United States with extensive experience in historic structure surveys, cultural resource constraint mapping, and the excavation of deeply stratified sites. Mr. Butina has also taught U.S. history in the classroom. His relevant project experience includes:

Point State Park Project, Pennsylvania Department of Conservation and Natural Resources (DCNR). Junction of Monongahela and Allegheny Rivers in Pittsburgh, Pennsylvania. Field Director. The project entails archaeological monitoring during construction and limited field testing ahead of construction in association with improvements to the park's infrastructure. Precontact archaeological deposits and historic archaeological evidence of Fort Duquesne and Fort Pitt have been encountered.

Phillipsburg Center – Land Development, Center/Potter Townships, Pennsylvania. Field Supervisor. Responsibilities included directing field crew during Phase I, photography; project map interpretation directing; setting up a Cartesian grid over the project test area; drawing field maps; soil identification; and informant interviews. The Phase I survey of the project area included a 75-acre, 18-parcent property.

Petersburg Bridge and McAlevy's Bridges 1 & 2, S.R. 0305 and S.R. 0026, Petersburg and McAlevy's Fort, Pennsylvania. PennDOT District 9-0. Field Supervisor. Responsibilities included directing field crew during Phase I, photography; project map interpretation; setting up a Cartesian grid over the project test area; drawing field maps; soil identification; and informant interviews. Phase I survey of three bridge replacements in Huntington County, Pennsylvania.

S.R., Sections A 09/10 Phase II, Environmental, Pittsburgh, Pennsylvania. PennDOT District 11-0. Field Supervisor. Responsibilities included directing field crew during Phase I excavations that also included trench excavations. Additional responsibilities included photography; project map interpretation; setting up a Cartesian grid over the project test area; drawing field maps; soil identification; feature identifications, and informant interviews. Also over saw subsurface environmental drilling using hollow stem augers and split spoon sampling between the Norfolk and Southern Railroad and Route 28.

Beech Bottom Refuse Reclamation Project, Ohio and Brooke Counties, Beech Bottom, West Virginia. West Virginia Division of Environmental Protection. Field Supervisor, Responsibilities included directing field crew during Phase I, photography, project map interpretation; setting up a Cartesian grid over the project test area; drawing field maps; soil identification; and informant interviews. The project included three sites located along the Ohio River containing barren refuse piles ranging in size form 15 to 60 acres. A Phase I archaeological Survey of a proposed borrow area located in the Ohio River Floodplain was performed.

New River Parkway EIS, New River Gorge, West Virginia. West Virginia Department of Transportation. Field Supervisor, Responsibilities included directing field crew during Phase I and phase II, photography; project map interpretation directing; setting up a Cartesian grid over the project test area; drawing field maps; soil identification; feature identifications, and informant interviews. Responsible for Phase I survey and Phase II data recovery.

Experience Highlights:

- *Extensive experience with archaeological field studies.*
- *Extensive experience with archaeological laboratory procedures and artifact identification.*
- *Directed Phase I, II, and II investigations*

Total Experience:
20 Years

Education:

- *B.S., Secondary Education, California University of Pennsylvania*

Licenses/Certifications:

- *CPR Certified, PA, 2006*
- *First Aid/CPR Training, PA, 2006*
- *OHSA 40-hour HAZWOPER Certification, PA, 2007*
- *Railroad Safety Training, 2006*
- *American Heart Association CPR and Automated External Defibrillator (AED) Certification, PA, 2006*
- *Liberty Mutual Transportation Safety and Driver Trainer Program*
- *Railroad Safety Training, 2006*

Appendix E:
Qualifications of Researchers

Brooke S. Blades
Archaeologist/Principal Investigator

Dr. Blades has directed or co-directed archaeological surveys in the Middle Atlantic States and western Europe for over three decades. This research was undertaken in association with the National Park Service, universities, state and city governments, and as a Fulbright Fellow in Northern Ireland. He was a research associate at the University of Maryland and a visiting assistant professor at Lehigh University, where courses taught included North American prehistory and historical archaeology. He has considerable experience in the organization, direction, and management of archaeological projects and a thorough familiarity with federal preservation legislation and state guidelines for archaeological investigations.

Education

1997	Ph.D., Anthropology, New York University
1978	M.A., American Civilization, University of Pennsylvania
1973	B.A., History, College of William and Mary

Professional Experience

2003 to Present	A.D. Marble & Company	*Principal Investigator Archaeology*
2000 to 2002	National Park Service	*Archaeologist (Washington)*
2000 to 2002	Lehigh University	*Visiting Assistant Professor*
1998 to 2000	University of Maryland	*Research Associate*
1997	KCI Technologies	*Principal Investigator Archaeology*
1996	Rutgers University	*Principal Investigator Archaeology*
1994 and 1995	Hunter Research	*Principal Investigator Archaeology*
1989 and 1990	New York University	*Graduate Assistant/Instructor*
1974 to 1993	National Park Service	*Archaeologist (Philadelphia)*
1973 and 1974	Colonial Williamsburg	*Archaeological Intern*

Recent Publications

2003 European Military Sites as Ideological Landscapes. *Historical Archaeology* 37(3):46-54.

2003 End Scraper Reduction and Hunter-Gatherer Mobility. *American Antiquity* 68:141-156.

2001 *Aurignacain Lithic Economy: Ecological Perspectives from Southwestern France.* Interdisciplinary Contributions to Archaeology. Kluwer Academic/Plenum Publishers, New York..

Recent Professional Papers

2003 "Paradigms Lost: What the European Late Paleolithic should be telling us about early human occupation of eastern North America." ESAF, Mount Laurel, November.

2002 "Paleogeography and prehistory on Staten Island." Professional Archaeologists of New York City symposium, Museum of the City of New York., April.

Professional Associations
Society for American Archaeology
Eastern States Archaeological Federation
Paleoanthropology Society

Richard L. White
Archaeological Principal Investigator

Richard White is an Archaeological Principal Investigator with 14 years of experience in the excavation of archaeological sites and laboratory work. He has served in a supervisory role for more than eight years. His areas of expertise include OSHA standards, field excavations, and public outreach programs, in which he has extensive experience. He was in a supervisory field position for the Phase III Data Recovery excavations at the Independence Mall National Historic Park and the SugarHouse Casino Phase I/II Studies in Philadelphia. He has authored and coauthored more than 20 professional reports for submission to various state repositories including Pennsylvania, Virginia, Delaware, and New Jersey. At the request of individual clients, he has presented five papers at professional conferences throughout the Middle Atlantic States.

Education

2007	M.A., Archaeology and Heritage, University of Leicester
1995	B.A., Anthropology, Bloomsburg University, Pennsylvania

Professional Experience

2008 to Present	A.D. Marble Company	*Principal Investigator*
2007 to 2008	A.D. Marble Company	*Field Director*
2003-2007	McCormick Taylor Inc.	*Field Director*
2002	Richard Grubb and Associates	*Field Technician*
2000-2002	Kise, Straw & Kolodner	*Project Archaeologist*
1997-2000	Skelly and Loy Inc.	*Field Director/ Field Technician*
1996	Kittatinny Archaeological Research	*Field Technician*
1995	Ecoscience Inc.	*Field Technician*

Training

2006	OSHA Certification, Cocciardi and Assoc.
2006	Hazardous Waste Operations and Emergency Response Supervisor/Incident Command Training, Cocciardi and Assoc.
2004	“Section 106 Essentials,” Advisory Council on Historic Preservation

Professional Affiliations

Mid-Atlantic Archaeological Conference
Society for New Jersey Archaeology
Archaeological Society of Delaware

Bryan T. Butina
Archaeologist/Field Director

Mr. Butina is employed as a field director by A.D. Marble & Company to conduct Phase I archaeological surveys through Phase III archaeological data recoveries. With more than 17 years of experience as a Field Director, Mr. Butina has supervised or participated in numerous archaeological projects throughout the eastern United States. He has extensive experience in historic structure surveys, cultural resource constraint mapping, and excavation of deeply stratified sites. Mr. Butina has experience with GPS systems, Pentex Total Station and Adobe Illustrator. Mr. Butina earned a Batchelor's Degree in Secondary Education Social Sciences.

Education

1993 B.A., Secondary Education Social Sciences, California University of Pennsylvania

Professional Experience

2007 - Present	A.D. Marble & Company	*Field Director*
1992 - 2007	Michael Baker Jr., Inc.	*Field Director*

Professional Certifications

CPR Certified

First Aid/CPR Training

American Heart Association CPR and Automated External Defibrillator (AED) Certification, Pennsylvania

Liberty Mutual Transportation Safety and Driver Trainer Program

Railroad Safety Training

OSHA 40-hour HAZWOPER Certification

MDP

Maryland Department of Planning
Maryland Historical Trust

Martin O'Malley
Governor

Anthony G. Brown
Lt. Governor

Richard Eberhart Hall
Secretary

Matthew J. Power
Deputy Secretary

January 28, 2010

Robin M. Bowie, Manager
Division of Environmental Planning
Maryland Aviation Administration
P.O. Box 8766
BWI Airport, MD 21240-0766

Re: Archeological Survey Report
Planned Near-Term Improvement Projects (2008-2012)
BWI Thurgood Marshall Airport
Anne Arundel County, Maryland

Dear Ms. ~~Bowie~~ Robin

Thank you for providing the Maryland Historical Trust (Trust) with a copy of the following revised report produced for the above-referenced project: *Phase IB Archeological Investigations of the Near-Term Improvement Projects (2008-2012) at Baltimore/Washington International Thurgood Marshall Airport, Anne Arundel County, Maryland* (Blades and White 2009). A.D. Marble & Company prepared the report on behalf of the Maryland Aviation Administration (MAA).

Trust staff examined the submitted document pursuant to Section 106 of the National Historic Preservation Act of 1966 and the Maryland Historical Trust Act of 1985. The revised report effectively addresses the comments the Trust made on the draft report in our letter of September 21, 2009. The systematic survey efforts revealed extensive disturbances and lack of cultural materials in the majority of the areas examined. The survey identified two new archeological sites within sections of the areas tested: 18AN1427 (T.W. Cole site) in Survey Area 6 and 18AN1428 (Jas. Phelps site) in Survey Areas 9A and 10. Both sites represent the remains of former farmsteads dating from the late 19th – early 20th c. The consultant recommends no further work for either site as part of the current project, given site disturbances within the proposed impact areas, yet states that the sites may extend beyond the project area. The Trust concurs that no further archeological investigations are warranted for either site as part of the currently proposed improvements. The National Register eligibility of the sites remains unresolved since the resources extend beyond the limits and scope of the current project.

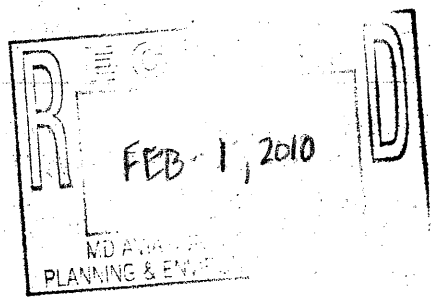
We appreciate MAA's proactive efforts in completing archeological investigations early in project planning and look forward to working with MAA to successfully complete the Section 106 consultation for the proposed undertakings once the Environmental Assessment is completed. If you have questions or need further assistance, please contact me at 410-514-7631 or bcole@mdp.state.md.us. Thank you for providing us this opportunity to comment.

Sincerely,

Beth Cole

Elizabeth J. Cole
Administrator, Project Review and Compliance

EJC/200904441
cc: Charlie Hall (MHT)



100 Community Place • Crownsville, Maryland 21032-2023
Telephone: 410.514.7600 • Fax: 410.987.4071 • Toll Free: 1.800.756.0119 • TTY Users: Maryland Relay
Internet: www.marylandhistoricaltrust.net

Maryland Aviation Administration

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

ADDENDUM TO THE PHASE IB ARCHEOLOGICAL INVESTIGATION FOR PROPOSED AIRPORT IMPROVEMENTS AT BWI MARSHALL AIRPORT

Anne Arundel County, Maryland

March 2011

Prepared by:

A.D. Marble & Company
10989 Red Run Boulevard, Suite 209
Owings Mills, MD 21117

A.D. MARBLE & COMPANY

ADDENDUM TO THE PHASE IB ARCHEOLOGICAL INVESTIGATION FOR PROPOSED AIRPORT IMPROVEMENTS AT BWI MARSHALL AIRPORT

Anne Arundel County, Maryland

Prepared for:
Maryland Aviation Administration
P.O. Box 8766
BWI Airport, Maryland 21240

Prepared By:

Richard White
A.D. Marble & Company
10989 Red Run Boulevard
Suite 209
Owings Mills, Maryland 21117

March 2011

ABSTRACT

In February, 2011, A.D. Marble & Company of Owings Mills, Maryland, conducted a Supplemental Phase IB Archeological Survey for the Maryland Aviation Administration (MAA) Proposed Airport Improvements at Baltimore/Washington International (BWI) Thurgood Marshall Airport in Anne Arundel County, Maryland. This report is an addendum to the *Phase IB Archeological Investigations of the Near-Term Improvements Projects (2008-2012) at Baltimore/Washington International Thurgood Marshall Airport, Anne Arundel County, Maryland* report prepared by A.D. Marble & Company for the MAA in 2009 (Blades and White 2009). The primary goal of the additional Phase IB archeological survey was to determine the presence or absence of potentially significant belowground cultural resources within the archeological APE that had not been surveyed during the previous investigations. Additional goals included the delineation of any identified resources, to the extent possible, and the development of recommendations regarding the need for further evaluation.

The methods used in this survey included documentary and map research, review of pertinent historic and archeological literature, visual inspection of the Area of Potential Effect (APE), and systematic subsurface investigation of undisturbed locations determined as possessing a high probability for the presence of prehistoric archeological resources. A total of 59 shovel test pits (STPs) were excavated at standard intervals in three distinct test areas that present a high potential for the presence of prehistoric archeological resources. The entire APE for this project measures 4.3 hectares (10.8 ac); approximately 1.6 hectares (4 ac) were subjected to archeological subsurface investigation. The remaining portion of the APE (approximately 2.8 hectares [6.8 ac]) exhibited obvious modern ground disturbance and was not subjected to subsurface examination.

The results of the Supplemental Phase IB Archeological Survey indicate that no areas of archeological sensitivity are present within the examined portions of the APE. No prehistoric artifacts or sites were identified during the Phase IB survey; therefore, it is A.D. Marble & Company's recommendation that no additional archeological investigations are necessary within the supplemental APE for this project.

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1.0 INTRODUCTION

This addendum report evaluates the results of the Supplemental Phase IB Archeological Survey investigations that were conducted in February 2011 at selected areas at the Baltimore/Washington International Thurgood Marshall Airport (BWI) in Anne Arundel County, Maryland (Figure 1). These areas are owned by the Maryland Aviation Administration (MAA) and are the locations of proposed airport improvements recommended in the Airport Layout Plan (ALP). This report is an addendum to the *Phase IB Archeological Investigations of the Near-Term Improvements Projects (2008-2012) at Baltimore/Washington International Thurgood Marshall Airport, Anne Arundel County, Maryland* report prepared by A.D. Marble & Company for the MAA in 2009 (Blades and White 2009).

The specific proposed impact areas are indicated on Figure 2. This archeological study represents one of several environmental studies that will be undertaken in the preparation of the Environmental Assessment (EA). In 2009, researchers from A.D. Marble & Company conducted a Phase IB archaeological survey of 13 (Areas 1 to 11) locations within the BWI property, and the results of that survey were reported and concurred upon by Maryland Historical Trust (MHT; Blades and White 2009). This project is an extension of the original Phase IB study, and this report has been prepared as an addendum to the original. The Area of Potential Effects (APE) for the supplemental archeological survey consists of three locations within the MAA-owned airport facility (Figure 1). These locations were evaluated during previous studies by Greiner, Inc. (Brown et al. 1995; Klein et al. 1995), as having high probabilities for archeological resources that would potentially be affected by the proposed actions.

This survey report was prepared for the MAA and URS Corporation by Richard White of A.D. Marble & Company, Owings Mills, Maryland. Phase IB survey crew consisted of Bryan Butina, (field director), Anna McAnnich (field technician), Chris Connallon (field technician), Kristen Norbut (field technician), and Jenn Babiarz (field technician). This Phase IB survey was prepared in compliance with federal and state regulations regarding cultural resources (the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470a[b][3][D],[E],[F], and [G]), and Article 83B, §§ 5-607 (b)(8), (10), and (12); 5-617 (f)(1); 5-618 (g); and 5-623 (b)(2), of the Annotated Code of Maryland. The archeological survey and report preparation will be prepared in accordance with the relevant guidelines from MHT (Shaffer and Cole 1994).

BWI was constructed across rural fields that had supplied Baltimore and much of the eastern United States with market vegetables and fruits since the latter half of the nineteenth century. A few vestiges of the rural communities, such as cemeteries, remain above ground. Traces of occupations from the late eighteenth, nineteenth, and early twentieth centuries consist of ruined farm dwellings and tenant or migrant worker housing remains, which have been frequently encountered in archeological survey excavations in and around the project area. The extensive development of transportation infrastructure for automobiles, rail, and air traffic obscures what was once an attractive natural environment for Native American hunters/gatherers. Archeological evidence of Native American occupations near the project area extends back to the early Holocene, when the Chesapeake Bay did not exist as the dominant geographical feature of the region as it is today.

1.1 Project Location

The BWI area is essentially bounded by BWI to the east and either the Baltimore/Washington Parkway (BWP) or by the Baltimore & Ohio (B&O) Railroad to the west. The area falls within northern Anne Arundel County, although Baltimore County lies immediately to the north beyond the Patapsco River, and Howard County lies to the west. The location is positioned on the innermost portion of the Coastal Plain on Maryland Archeological Research Unit 7 (Patapsco, Northern, and Southern drainages), as defined by the Council for Maryland Archeology and MHT (Shaffer and Cole 1994).

1.2 Project Description and Area of Potential Effects

The proposed projects in the EA document include several projects relating to safety enhancements as well as projects for additional airport facilities and pavement improvements. The safety enhancement projects will include improvements to Runway Safety Areas and obstruction removal to meet Federal Aviation Administration (FAA) standards. As a result of the proposed improvements to the Runway Safety Areas, certain navigation aids will also be relocated to meet FAA design standards. The APE for the archeological survey consists of three locations near the southeastern end of Runway 33R on the MAA-owned airport facility. These locations were evaluated during previous studies by Greiner, Inc., as having moderate to high probabilities for archeological resources that would potentially be affected by the proposed actions. The APE and the project area locations are depicted on Figure 2. The total area of proposed activities measured approximately 4.3 hectares (10.8.ac), of which 1.6 hectares (4 ac) were subjected to subsurface investigation. Approximately 2.8 hectares (6.8 ac) were determined to be obviously disturbed during construction activity related to the development of the airport, which includes recent drainage mediation activity. Obvious disturbance includes any evidence that activity has destroyed potential for the presence of belowground archaeological resources, including utility lines, roadways, and stormwater runoff drainage areas, as well as areas that are currently in use for staging and storing heavy equipment.

Area 12 is the largest portion of the supplemental APE at 2.2 hectares (5.4 ac) and is located southeast of Runway 33R (Figure 2). The parcel is amorphously shaped and includes asphalt roadways, a stone-covered staging area, and gently rolling open fields that appear to be heavily landscaped for drainage. Photographs 1 and 2 depict the recent disturbances and the current land use of Area 12.

Area 13 is located to the southwest of Runway 33R and encompasses 0.9 hectare (2.1 ac) of the supplemental APE (Figure 2). This area is comprised of open rolling fields bisected by stone-lined drainage ditches. An airport worker who happened to be in the vicinity of the area during the excavations reported that the area has undergone considerable landscaping in the recent past. Photographs 3 and 4 show the current conditions and document the considerable surface disturbances within this portion of the supplemental APE.

Area 14 is located north of Runway 33R and encompasses 1.3 hectares (3.3 ac) of the supplemental APE (Figure 2). This area is comprised of two sections separated by an asphalt access road (Photograph 5). The western section (Photograph 6) is currently in use as a water storage basin for drainage runoff. No excavation occurred in this obviously disturbed portion of Area 14. The eastern section of Area 14 is present within the woods just outside the airport

boundary fence (Photograph 7) and is bisected east and west by storm runoff drainage (Photograph 8). A very small portion of this section is present within a picnic area northeast of the runway (Photograph 9). The wooded section of Area 14 is moderately sloped, beginning at the fence and descending toward the storm drainage.

1.3 Report Organization

Following a discussion with Beth Cole of MHT, it was verbally agreed upon that an addendum to the original 2009 report would be the appropriate way to present the results of the supplemental Phase IB study. Section 1.0 introduces the reader to the proposed activities involved with the undertaking. It also includes the project location, a description of the project, and the APE. Section 2.0 defines the research goals and design, including the methods used for background research, field investigations, and laboratory provisions for dealing with recovered artifacts. Section 3.0 discusses the environment in which the project took place as well as the topography and geology of the project area, a list and description of the predominant soil types, and a description of existing conditions. It also provides the current land use of the area in which the activities will occur. Section 4.0 provides the results of the Phase I archeological field study, and Section 5.0 presents a discussion of those results. A summary of the Phase I archeological activities and recommendations for future study are presented in Section 6.0.

2.0 RESEARCH GOALS AND DESIGN

2.1 Research Goals

The purpose of this archeological survey is to evaluate known archeological resources and the potential for additional archeological sites in the impact areas on BWI property. Therefore, this survey represents an initial stage in the identification of sites that may require evaluation for eligibility for listing in the National Register of Historic Places.

2.2 Research and Field Methodology

Background information on previous archeological surveys and recorded archeological sites was reviewed at MHT's library in Crownsville in 2006 and again in 2009. A considerable number of surveys have occurred in the general vicinity of BWI, resulting in numerous recorded archeological sites. As a consequence, the area of existing data review was restricted to approximately 1 mile around BWI Airport. Nevertheless, nearly 200 archeological sites and roughly 56 previous archeological surveys of varying size and scope fall within the review area. Information on historical developments in northern Anne Arundel County was reviewed at the Maryland State Library in Annapolis, Maryland.

Numerous previous studies have been undertaken on BWI and neighboring properties. The most relevant studies for the current project and the ones that directed a sizable portion of the current work were prepared by Greiner, Inc. (Brown et al. 1995; Klein et al. 1995). The former report (Brown et al. 1995) constituted Part 1 of the Historic Preservation Plan for BWI and presented an overview of prehistoric and historic occupation and an inventory of sites known at the time. Part 2 of the Historic Preservation Plan (Klein et al. 1995) provided a planning manual and action plan for historic and archeological preservation at BWI Airport.

An element of the Part 1 overview and inventory was a predictive model for prehistoric deposits based on geomorphological research undertaken by Frank Vento. Vento defined areas of high probability for prehistoric occupation based on the likelihood of surviving buried deposits. These areas were defined using elevational data. Locations on the T1 and T2 terraces between 75 and 34 meters above mean sea level were considered to possess high probability for prehistoric sites. Those locations were indicated on maps or other sources as having historic occupations and as having experienced minimal disturbance from airport construction; therefore, the locations were considered to have a high probability for historic occupation. All other areas, except those destroyed by modern development, were evaluated as having moderate to low probability for prehistoric and/or historic sites (Brown et al. 1995:4.7). Shovel tests pits (STPs) for the supplemental survey were placed at 15-meter intervals in areas of high probability, where possible. In portions of the APE where obvious disturbance prevented the placement of standard-interval STPs, the STPs were placed advantageously to obtain the appropriate coverage.

Phase IB shovel testing occurred within project impact areas designated as having high probability for either prehistoric or historic resources, unless those areas proved to be substantially disturbed. No subsurface testing took place within moderate or low probability areas during the supplemental survey. Fifty-nine STPs were excavated within three distinct areas at standard intervals based on archeological probability, as previously mentioned.

All STPs were excavated a minimum of 10 centimeters into culturally sterile sediments. Split spoon soil probes were extended deeper in random STPs to ensure that buried deposits were not present beneath upper soils. Each soil stratum was excavated and screened separately, and artifacts were collected and recorded by stratigraphic layer. In some cases, artifacts less than 50 years of age were noted and discarded. All retained artifacts were bagged and removed to the A.D. Marble & Company laboratory in Conshohocken, Pennsylvania, for cataloging and analysis. Soil profile information, including measurements, soil texture, and color, was recorded on standardized forms. All STPs were identified on scaled base maps and backfilled upon completion of each test. Additionally, the locations of all STPs were recorded with the use of a high precision, hand-held Geographic Positioning System (GPS) instrument. Digital photographs were taken of the various project areas to illustrate the current project setting and document visible disturbances and cultural features, if present.

2.3 Laboratory Methods

All artifacts recovered during the course of the Phase I investigation were cataloged using classification terminology and typologies that are standard for historical material culture studies in the Mid-Atlantic Region. The catalog contains a complete description of every artifact and its known cultural affiliation (Appendix B). Historic artifacts were classified by functional class and material type. Glass color, vessel type, vessel portion, and decorative treatment were also noted when possible.

Artifact analyses performed in the laboratory consisted of statistical manipulation of the data in order to determine both horizontal and vertical artifact frequencies. Analysis of the field findings included the use of numerical techniques and qualitative assessment of the artifacts; this was done to evaluate the nature of the artifact deposits identified during testing and their depositional contexts. The goal of the analysis was to determine the integrity of the deposits and their potential to provide new and significant information on the history or prehistory of the locale and region. Any recommendation for further archeological investigations within the study area will be based on the results of these analyses.

The artifacts recovered during the study will be retained at the A.D. Marble & Company laboratory facilities in Conshohocken, Pennsylvania, until the final status of this project is determined or until otherwise notified. To date, a deed-of-gift agreement has not been secured from the current property owners. If such agreement is obtained, the artifacts will be curated at the appropriate state and local facilities. All artifacts recovered from Maryland property will be curated at the Maryland Archaeological Conservation Laboratory (MAC Lab) once the ownership requirements are met.

3.0 ENVIRONMENT

3.1 Topography and Geology

Northern Anne Arundel County is bordered by the Patapsco River at the interface of its estuary with the Chesapeake Bay south of Baltimore. The project area lies in the Western Shore Uplands Region of the Coastal Plain Physiographic Province, east of the transitional zone with the Piedmont Physiographic Province (Maryland Geological Survey [MGS] 1981). Numerous tributary creeks and streams flow northward through the area into the Patapsco River. Stony Run, Piny Run, and Deep Run are the principal tributaries. Topographical landforms vary from floodplains and lower terraces along the Patapsco River and its tributaries to slopes and level locations on higher elevations, which are at greater distances from the creeks and streams.

Northern Anne Arundel County is covered by Cretaceous Coastal Plain sediments of the Potomac Group that include quartz and quartzite gravels, sand, silts, and clay sediments (MGS 2000). These gravels have been found on stream terraces and slope exposures. The quartz and quartzite cobbles provided important sources of lithic raw materials for prehistoric occupants.

3.2 Soils

Soils within and near the project APE fall within two broad associations:

- Evesboro-Rumford-Sassafras sandy and loamy soils near BWI and Stony Run; and
- Loamy and clayey land-Muirkirk-Evesboro sandy soils around the BWP.

Evesboro sands and Rumford loamy sands are described as deep and underlain by either a clayey layer (Evesboro) or a sandy loam subsoil (Rumford). Sassafras soils are composed of fine sandy loam over sandy clay loam subsoil. Muirkirk soils consist of thick loamy sand over red clay subsoil (Kirby and Matthews 1973:6, 7).

3.3 Existing Conditions and Land Use

Roads and railroads passed through the area in the nineteenth century, but the construction of BWI hastened the development of a major transportation corridor between Baltimore, Washington, and Annapolis. Interstate 95 (I-95) and the BWP lie to the west, Interstate 97 (I-97) is to the east of BWI and connects Baltimore and Annapolis, and Maryland Route 100 (MD 100) is south of Dorsey Road and connects these transportation corridors. This extensive and expanding transportation network has encouraged the construction of industrial, commercial, and residential developments. Many of the data reviewed in this study were acquired during surveys prompted by proposed transportation corridor studies, commercial or housing construction, and airport improvements.

4.0 FIELD RESULTS

Thirteen survey areas (Areas 1 to 11) were examined during the previous Phase IB survey in 2009, and three areas were examined during the Supplemental Phase IB survey in February 2011. The entire supplemental APE for the BWI project measures 4.3 hectares (10.8 ac) and was divided into three locations designated Areas 12, 13, and 14, in order to remain consistent with the initial Phase IB survey report. Areas 12 to 14 were considered to possess a moderate to high potential for the presence of prehistoric archaeological resources. A total of 59 STPs were excavated at three individual locations within the supplemental APE. Figure 3 presents the location of STPs excavated during the supplemental study.

4.1 Area 12

A total of 27 STPs were excavated within Area 12. Twenty-nine artifacts were recovered from temporally mixed fill horizons in only four STPs. The artifacts were recovered from STPs 1 to 3 and STP 21, which are located parallel to the asphalt road (Figure 3). Soil profiles varied within this area, and most displayed evidence of considerable disturbance caused by landscaping during the construction of the airport. A truncated plowzone or subsoil was encountered at a general depth of 17 to 20 centimeters below the present surface of this section of the airport. Typical soil profiles, represented by the STP 2 profile shown in Figure 4, consisted of a series of fill soils. The first layer was a 10YR 3/2 very dark grayish brown silt loam covering a fill horizon of 10YR 4/3 brown sandy loam that contained gravel and pieces of asphalt. A third fill layer consisted of 10YR 4/6 dark yellowish brown sand. These fills covered a very truncated plowzone of 10YR 5/3 brown loamy sand. Removal of the plowzone, which was about 6 centimeters thick, exposed a 10YR 5/6 yellowish brown hard-packed, medium-grained sand subsoil. These soil conditions were encountered in STPs 1, 2, 5, 6, and 16 to 19 (Photograph 10). Other soil profiles lacked the plowzone entirely and are represented by STP 10 in Figure 4. These STPs (3, 4, and 7 to 15) consisted of various layers of sandy fill soils overlying the 10YR 5/6 yellowish brown subsoil. The soil profiles within Area 12 suggest that a considerable amount of ground disturbance has occurred, and was most likely during the construction of Runway 33R that included grading, landscaping, stormwater drainage installation, and everyday maintenance.

Artifacts in STP 1 were recovered from a heavily mottled Stratum III horizon, which appears to be a truncated plowzone. The artifacts included two fragments of colorless glass, one amber glass fragment, a single fragment of milk bottle glass, a fragment of window glass, and a small cylindrical red earthenware piece that likely came from an electrical insulator. STP 2 artifacts were recovered from Stratum IV, a temporally mixed fill horizon, and included pieces of macadam as well as three pieces of undecorated whiteware, two fragments of colorless glass, and one fragment of milk bottle glass. Stratum II of STP 3, also a temporally mixed fill horizon, produced three wire nail fragments, three pieces of undecorated whiteware, one fragment of semi-porcelain with a colorless interior glaze, five fragments of colorless bottle glass, and pieces of macadam and slag. A single whiteware fragment was recovered from Stratum I, a fill horizon, in STP 21.

4.2 Area 13

Twelve STPs were excavated in two standard interval transects within Area 13 (Figure 3). Of the 12 excavated STPs, only two produced artifacts. No intact soils horizons were identified within

this portion of the supplemental APE. Typical soil profiles, represented by STP 7 in Figure 5, consisted of various layers of mottled sands to a depth of at least 1 meter below the ground surface. STPs were excavated to a reasonable depth that would allow the removal of and visible examination of soil profiles. A split spoon was then used to examine the reminder of the profile. Photograph 11 presents a view of typical soil profiles identified within this area and documents the extensive amount of disturbance caused during landscaping and utility placement in Area 13.

Artifacts were recovered from two of the 13 STPs in Area 13. Stratum I of STP 3 produced ten fragments of colorless bottle glass, two fragments of window glass, one amber bottle glass fragment, one milk vessel fragment, and one piece of undecorated whiteware. Three pieces of molded floral decorated milk vessel glass were recovered from Stratum I in STP 11 and appear to be derived from the same vessel as the fragments recovered from STP 3.

4.3 Area 14

Due to the discontinuous landscape (separated by a modern storm drainage) within Area 14, STPs were placed throughout the area at advantageous locations rather than in a linear transect. At the discretion of the field director, STPs were placed in areas that were not obviously disturbed and held the highest potential for the presence of intact soil horizons and archaeological resources (Figure 3). STPs 1 to 12 were placed in the wooded section of Area 14, STPs 13 and 14 were excavated in the picnic area, and the remaining seven STPs were excavated between the access road and the security fence inside the airport boundary (Figure 3).

STPs 1 to 12 were excavated within the woods outside the boundary fence and exhibited relatively similar soil profiles as found in other areas discussed above. These STPs encountered fill soils that once again consisted of four different layers that extended to roughly 60 centimeters below surface. These fill lenses included 10YR 2/2 very dark brown sandy loam over 10YR 3/3 dark brown silt loam, followed by 10YR 2/2 very dark brown silt loam over 10YR 5/2 grayish brown coarse loamy sand. No subsoil was encountered within these STPs. As shown in Figure 6, all the STP soil profiles at this location exhibited abrupt breaks between each stratum, suggesting modern landscaping, grading, and stormwater runoff construction removed natural soils and created these fill deposits.

Excavation in this portion of the APE proceeded to the approximate depth of 60 centimeters below the ground surface, at which point water began to seep into the bottom of the STPs. Probes were placed in the bottom of several STPs to confirm the absence of buried horizons. Soil profiles examined during the probe investigation were consistent across the area, and no buried horizons were identified. No artifacts were recovered during the investigation of this section of Area 14. Photograph 12 presents a typical soil profile examined within Area 14.

STPs 13 and 14 were excavated within a picnic area just west of the wooded section of Area 14 (Figure 3). The soil profile in the picnic area, represented by STP 14 (Figure 6), consisted of similar sequences of fill soils beginning with 10YR 2/2 very dark brown silt loam over 10YR 5/2 grayish brown sand, followed by 10YR 6/2 light brownish gray sand over 10YR 3/2 very dark grayish brown sand. No artifacts were recovered during the excavation of STPs 13 and 14. Soil profiles were similar to those described in the wooded portion of the area, consisting of multiple layers of fill as a result of landscaping and grading during the construction of the airport and

runway. Average depths in this location extended to 50 centimeters below ground surface, at which point water began to seep into each STP.

STPs 15 to 21 were excavated in the open grassy area and at the edge of the woods between the security fence and the access road (Figure 3). STPs in this section of Area 14 presented heavily modified profiles represented by STP 16 in Figure 6 and Photograph 12. Typical profiles in this section of Area 14 consisted of multiple layers of mottled fill like those examined in STP 16. STP 16 exhibited a sequence of mottled fill soils beginning with 10YR 4/3 dark brown loamy sand overlying 10YR 5/6 yellowish brown loamy sand mottled with 10YR 6/2 light brownish gray, 10YR 8/3 very pale brown, and 10YR 3/3 dark brown sand. Stratum III consisted of 10YR 2/1 black loamy sand mottled with 10YR 5/6 yellowish brown sand. Stratum IV consisted of 10YR 6/1 light gray medium grained sand mottled with 10YR 3/1 very dark gray and 10YR 4/4 dark yellowish brown. The soils encountered during the shovel test excavations were unusually compact, and each STP became filled with water when the excavation exceeded 60 centimeters below the ground surface. This portion of Area 14 appears to have undergone the same type of ground-disturbing landscaping and grading activities associated with stormwater drainage and airport construction.

5.0 RESULTS DISCUSSION

Three survey areas were examined during the supplemental Phase IB survey. These areas possessed high to moderate prehistoric probability and were slated for project impacts related to the airport improvement construction. The soil profiles examined within each of the areas showed considerable disturbance as a result of landscaping during the previous construction of the airport and Runway 33R, and even more disturbance resulted from runway stormwater runoff mediation practices.

No prehistoric artifacts were recovered during the survey. Historic artifacts encountered in three survey areas within the APE are interpreted as minor field scatters recovered from heavily disturbed contexts. The recovered artifacts consist of collections of temporally mixed objects dating from the late nineteenth and twentieth centuries. The artifact locations were unevenly distributed and the deposits were substantially disturbed within the APE. Considering the extensive amount of prior disturbance; the lack of intact, natural soil stratigraphy; the absence of horizontal distribution patterns; and the generally mixed age of the artifacts, it is A.D. Marble & Company's opinion that the recovered artifacts do not meet the defining criteria for archaeological site designation.

6.0 RECOMMENDATIONS

Phase IB archeological survey investigations of three survey areas were conducted within the BWI property. A total of 59 STPs were excavated, and 64 artifacts dating from the late nineteenth to the twentieth centuries were recovered from disturbed contexts within the APE. No significant concentrations of artifacts or any historic features were identified, nor were any prehistoric artifacts recovered during the survey.

The results of the Supplemental Phase IB Archeological Survey indicate that no areas of archeological sensitivity are present within the examined portions of the APE. No prehistoric artifacts or sites were identified during the Phase IB survey. It is A.D. Marble & Company's recommendation that no additional archaeological investigations are necessary within the supplemental APE for this project.

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1974b Savage, MD, 7.5-minute quadrangle map. 1957, photorevised 1966 and 1974. United States Geological Survey, Reston, Virginia.

Figures

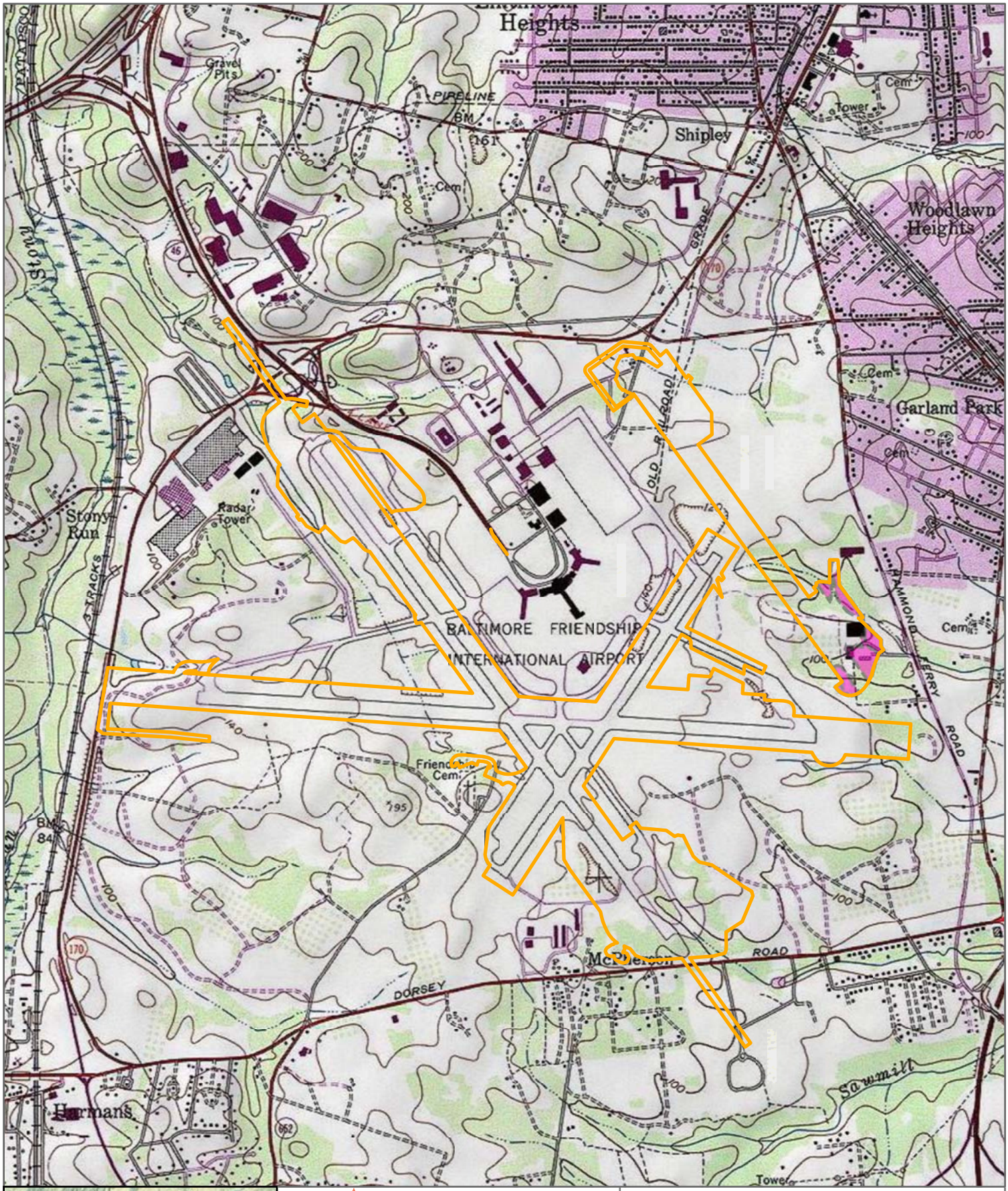

Figure 1
Project Location Map

Addendum to the Phase IB Archeological Investigation for Proposed Airport Improvements at BWI Marshall Airport Anne Arundel County, Maryland

Source: NRCS SCS; PAMAP Orthophotography; Tele Atlas.

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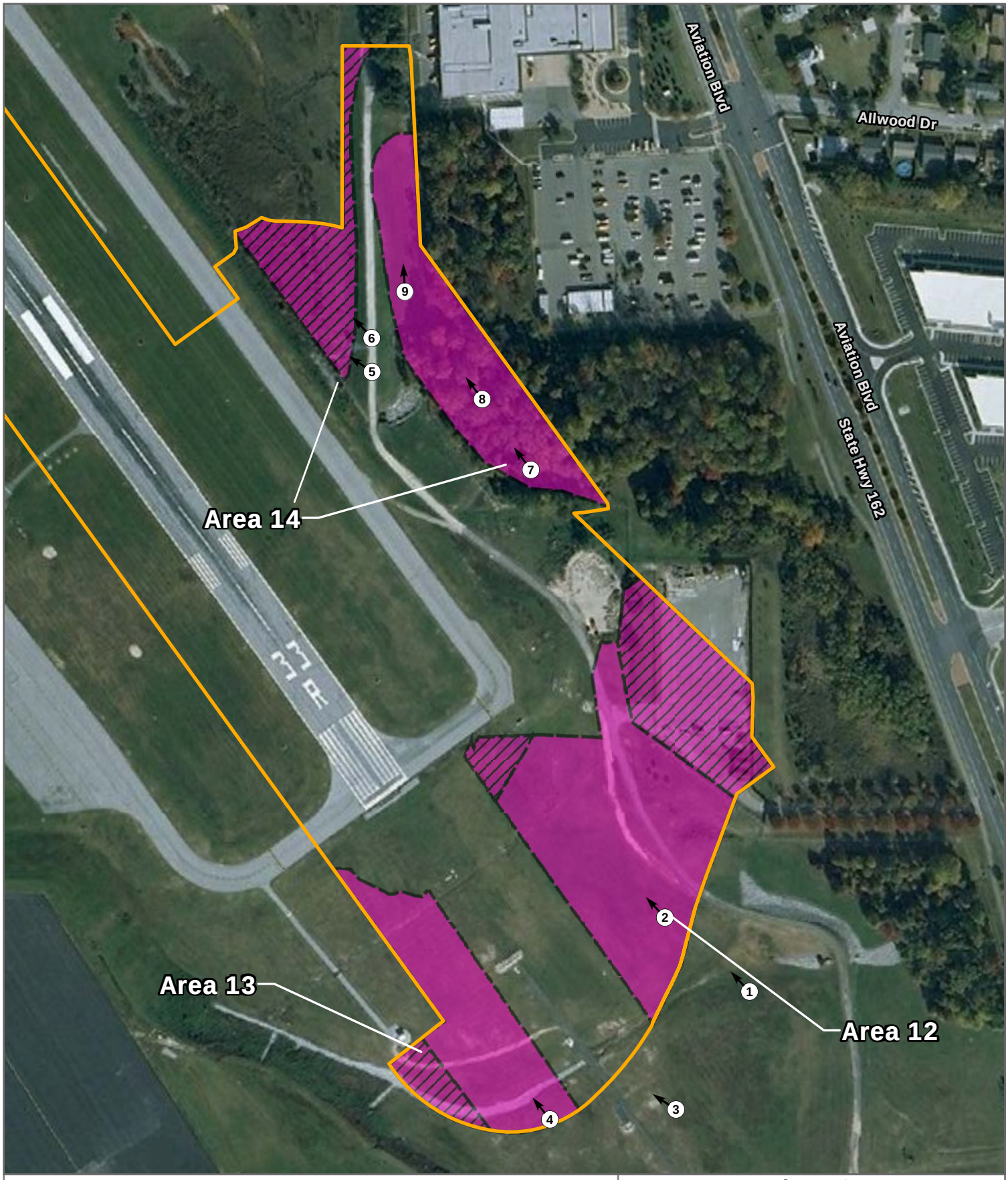

Figure 2
Area of Potential Effect and Photograph Location

Addendum to the Phase IB Archeological Investigation for Proposed Airport Improvements at BWI Marshall Airport Anne Arundel County, Maryland

Source: NRCS SCS; PAMAP Orthophotography; Tele Atlas.

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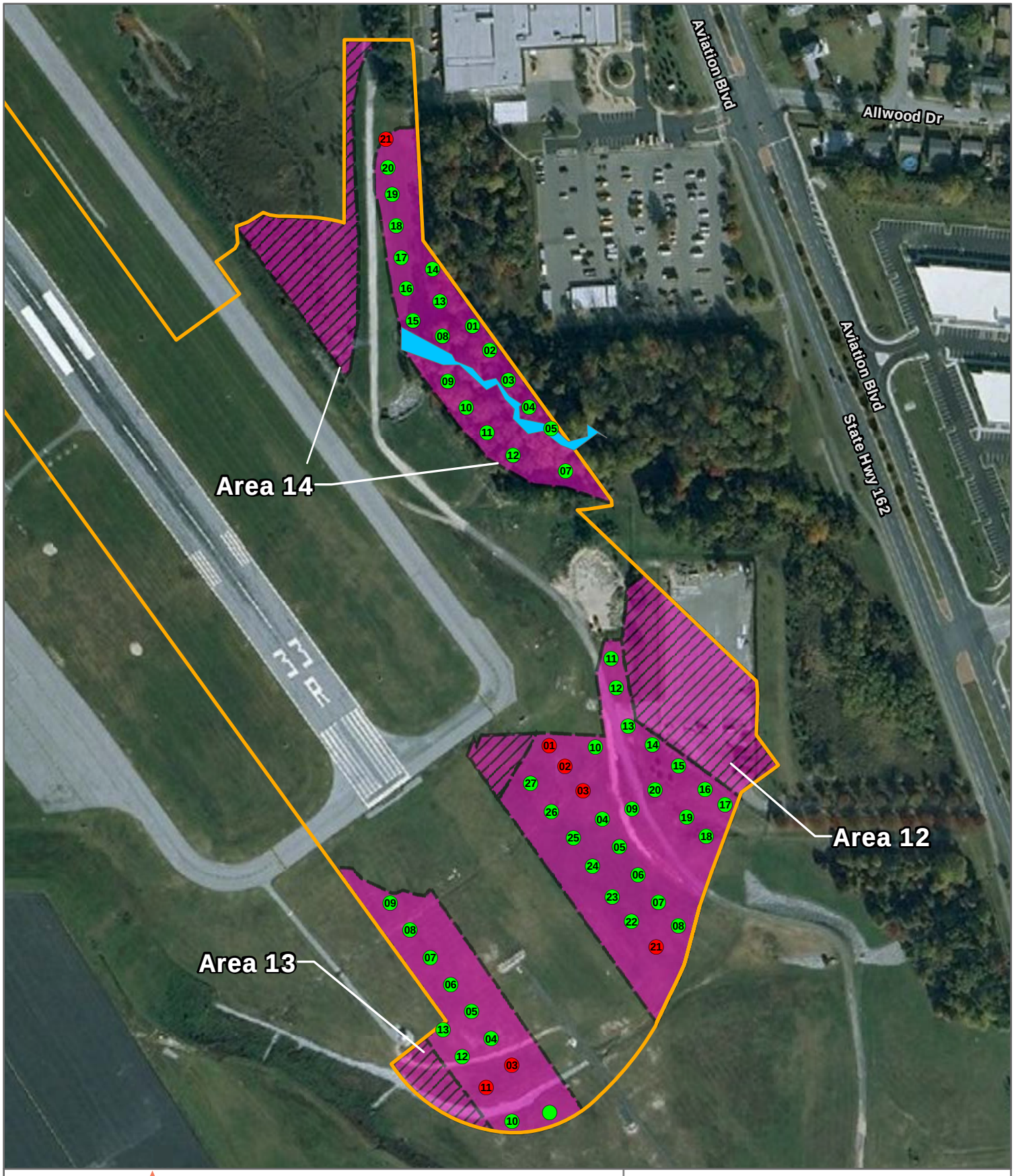


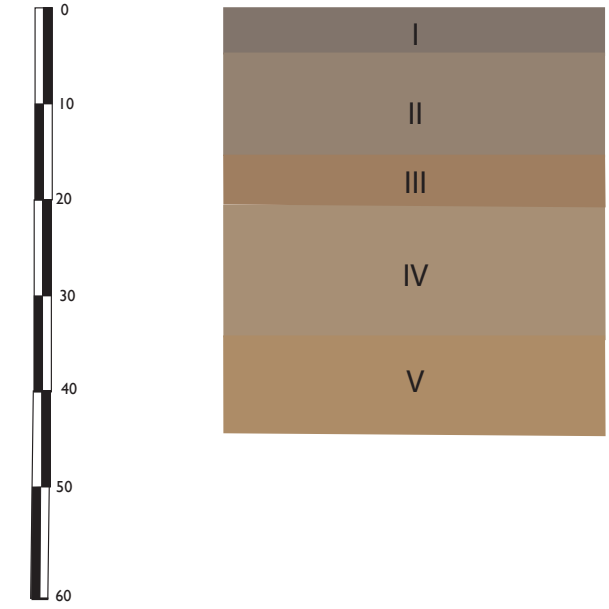
Figure 3
Shovel Test Pit Locations

Addendum to the Phase IB Archeological Investigation for Proposed Airport Improvements at BWI Marshall Airport Anne Arundel County, Maryland

Source: NRCS SCS; PAMAP Orthophotography; Tele Atlas.

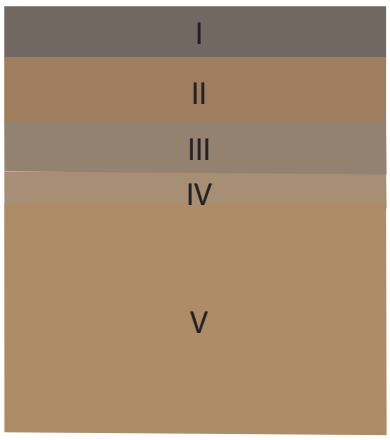
X:\Projects\P820A\Mapping\Fig03STPLoc.mxd
March 11, 2011 10:38 AM

STP 2



Stratum I: 10YR 3/2 Very dark grayish brown silty loam (fill)
Stratum II: 10YR 4/3 Dark brown sandy loam mixed with gravel and asphalt
Stratum III: 10YR 4/6 Dark yellowish brown sand-truncated plowzone
Stratum IV: 10YR 5/3 Brown loamy sand (subsoil)
Stratum V: 10YR 5/6 Yellowish brown medium loamy sand (subsoil)

STP 10



Stratum I: 10YR 2/2 Very dark brown sandy loam (fill)
Stratum II: 10YR 4/6 Dark yellowish brown loamy sand (fill)
Stratum III: 10YR 4/3 Dark brown sandy loam with gravel (fill)
Stratum IV: 10YR 5/4 Yellowish brown loamy sand (subsoil)
Stratum V: 10YR 6/6 Brownish yellow loamy sand (subsoil)

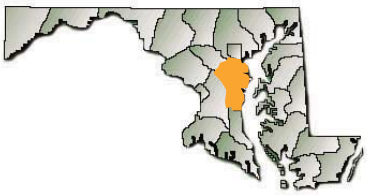
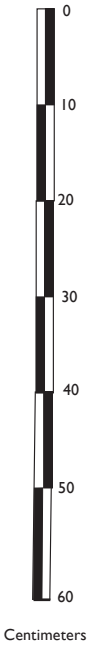


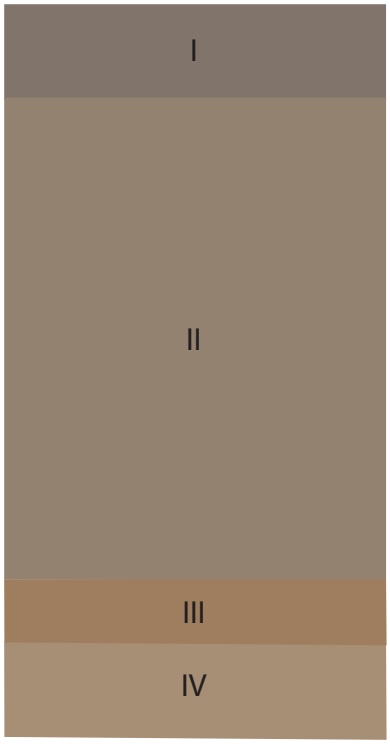
Figure 4
Area 12 Shovel Test Pit Profiles
Addendum to the Phase IB Archeological Investigation for
Proposed Airport Improvements at BWI Marshall Airport
Anne Arundel County, Maryland

Source: A.D. Marble & Company 2011

Map Document X:\Graphics\Projects\P-1255\mapping\area 2 st profiles.ai

STP 7





Stratum I: 10YR 3/2 Very dark grayish brown loamy sand (fill)

Stratum II: 10YR 7/6 Yellow sand mottled with 10YR 6/8 Brownish yellow sand (fill)

Stratum III: 10YR 5/4 Yellowish brown loamy sand mottled with 10YR 7/6 Yellow (fill)

Stratum IV: 10YR 7/6 Yellow sand mottled with 10YR 6/8 Brownish yellow sand (fill)

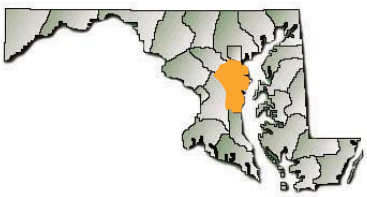
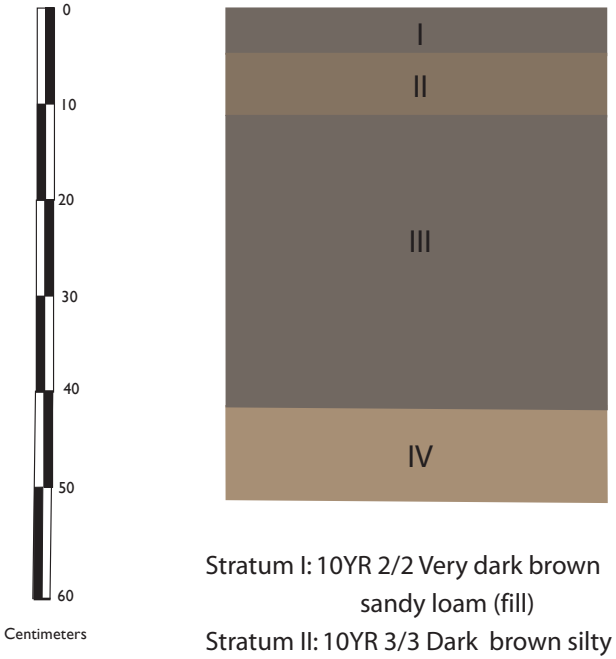


Figure 5
Area 13 Shovel Test Pit Profiles
Addendum to the Phase IB Archeological Investigation for
Proposed Airport Improvements at BWI Marshall Airport
Anne Arundel County, Maryland

Source: A.D. Marble & Company 2011

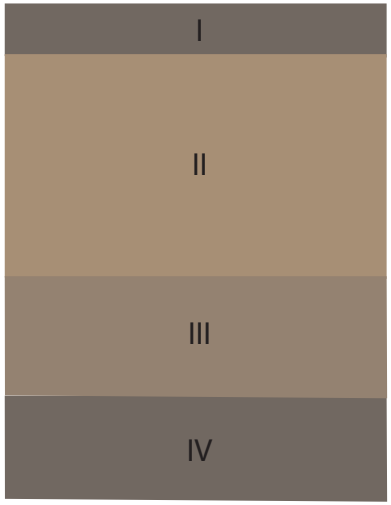
Map Document X: Graphics\Projects\P-1255\mapping\area 13 st profiles.ai

STP 8



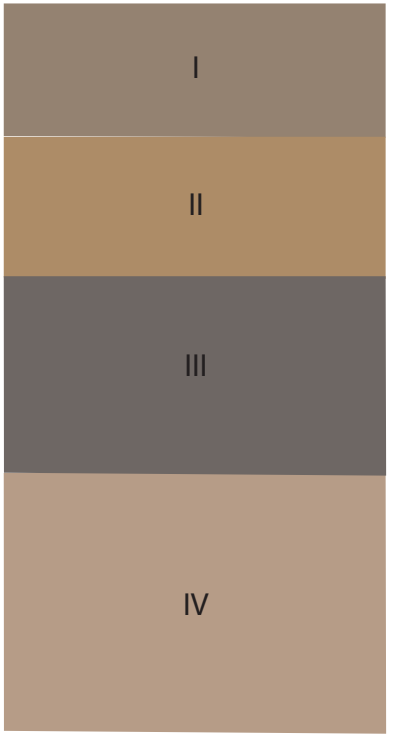
Stratum I: 10YR 2/2 Very dark brown sandy loam (fill)
Stratum II: 10YR 3/3 Dark brown silty loam (fill)
Stratum III: 10YR 2/2 Very dark brown silty sand (fill)
Stratum IV: 10YR 5/2 Grayish brown loamy sand (fill)

STP 14



Stratum I: 10YR 2/2 Very dark brown silty loam (fill)
Stratum II: 10YR 5/2 Grayish brown sand (fill)
Stratum III: 10YR 4/2 Dark grayish brown sand (fill)
Stratum IV: 10YR 3/2 Very dark grayish brown sand (fill)

STP 16



Stratum I: 10YR 4/3 Dark brown loamy sand (fill)
Stratum II: 10YR 5/6 Yellowish brown loamy sand mottled with10YR 6/2 Light brownish gray, 10YR 8/3 Very pale brown and 10YR 3/3 Dark brown (fill)
Stratum III: 10YR 2/1 Black loamy sand mottled with10YR 5/6 Yellowish brown sand (fill)
Stratum IV: 10YR 6/1 Light gray medium sand mottled with10YR 3/1 Very dark gray and 10YR 4/4 Dark yellowish brown sand (fill)

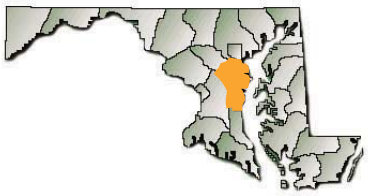


Figure 6
Area 14 Shovel Test Pit Profiles

Addendum to the Phase IB Archeological Investigation for
Proposed Airport Improvements at BWI Marshall Airport
Anne Arundel County, Maryland

Source: A.D. Marble & Company 2011

Map Document X: Graphics\Projects\P-1255\mapping\area 14 st profiles.ai

Photographs

Photograph 1: An overview of Area 12 showing the rolling hills and open lawn at the southeast end of Runway 33R. Facing northwest (February 2011).

Photograph 2: An overview of the landscaped portion of Area 12. Facing northwest (February 2011).

Photograph 3: An overview of the landscaped portion of Area 13. Facing northwest (February 2011).

Photograph 4: An overview of the landscaped portion of Area 13 showing the stone-lined drainage that bisects the area. Facing northwest (February 2011).

Photograph 5: An overview of Area 14 showing the drainage basin, the access road, and the woods to the far right of the photograph. Facing northwest (February 2011).

Photograph 6: A view of the western part of Area 14 showing the drainage basin and storm drainage flow gate. Facing northwest (February 2011).

Photograph 7: An overview of the wooded section of Area 14. Facing northwest (February 2011).

Photograph 8: An overview of the heavily scoured storm runoff drainage bisecting the woods in Area 14. Facing northwest (February 2011).

Photograph 9: Archeologists excavate an STP in Area 14 of the APE. Facing northwest (February 2011).

Photograph 10: Profile of STP 16 in Area 12 showing fill over a truncated plowzone and subsoil (February 2011).

Photograph 11: Profile of STP 1 in Area 13 showing fill horizons typical of the STPs in this area (February 2011).

Photograph 12: Profile of STP 16 in Area 14 documenting the extent of disturbance in this area (February 2011).

Appendix A:
Qualifications of Researchers

Richard L. White
Archaeological Principal Investigator

Richard White is an Archaeological Principal Investigator with 14 years of experience in the excavation of archaeological sites and laboratory work. He has served in a supervisory role for more than eight years. His areas of expertise include OSHA standards, field excavations, and public outreach programs, in which he has extensive experience. He was in a supervisory field position for the Phase III Data Recovery excavations at the Independence Mall National Historic Park and the SugarHouse Casino Phase I/II Studies in Philadelphia. He has authored and coauthored more than 20 professional reports for submission to various state repositories including Pennsylvania, Virginia, Delaware, and New Jersey. At the request of individual clients, he has presented five papers at professional conferences throughout the Middle Atlantic States.

Education

2007	M.A., Archaeology and Heritage, University of Leicester
1995	B.A., Anthropology, Bloomsburg University, Pennsylvania

Professional Experience

2008 to Present	A.D. Marble Company	*Principal Investigator*
2007 to 2008	A.D. Marble Company	*Field Director*
2003-2007	McCormick Taylor Inc.	*Field Director*
2002	Richard Grubb and Associates	*Field Technician*
2000-2002	Kise, Straw & Kolodner	*Project Archaeologist*
1997-2000	Skelly and Loy Inc.	*Field Director/ Field Technician*
1996	Kittatinny Archaeological Research	*Field Technician*
1995	Ecoscience Inc.	*Field Technician*

Training

2006	OSHA Certification, Cocciardi and Assoc.
2006	Hazardous Waste Operations and Emergency Response Supervisor/Incident Command Training, Cocciardi and Assoc.
2004	“Section 106 Essentials,” Advisory Council on Historic Preservation

Professional Affiliations

Mid-Atlantic Archaeological Conference
Society for New Jersey Archaeology
Archaeological Society of Delaware

Appendix B:
Artifact Inventory

Artifact Inventory Table

Non-Site Phase I Supp

Area: Runway 33-R

Test Name: STP 1

Cat #: 0 Stratum: III Level: Feat. #: Feat. Lev: Depth: 16 - 24 cm bgs

Spec. #:	Qty.	Material:	Artifact Description:		Weight (g):
0	1	Glass	Bottle Amber Fragment		
0	1	Glass	Window glass Fragment		
0	2	Glass	Bottle Colorless Fragment		
0	1	Glass	Bottle Milk Fragment		
0	1	Ceramic	Electrical Fragment	red earthenware cylinder; most likely component of an electrical insulator or resistor	

Total # of artifacts for this Level/Feature: 6

Total # of artifacts for this Unit: 6

Test Name: STP 2

Cat #: 0 Stratum: iv Level: Feat. #: Feat. Lev: Depth: 21 - 34 cm bgs

Spec. #:	Qty.	Material:	Artifact Description:		Weight (g):
0	1	Glass	Bottle Milk Fragment		
0	2	Glass	Bottle Colorless Fragment		
0	3	Ceramic	Whiteware Undecorated Fragment		
0	2	Other syntheti	Macadam / Asphalt Fragment		6.9

Total # of artifacts for this Level/Feature: 8

Total # of artifacts for this Unit: 8

Test Name: STP 21

Cat #: 0 Stratum: II Level: Feat. #: Feat. Lev: Depth: 0 - 0

Spec. #:	Qty.	Material:	Artifact Description:		Weight (g):
0	1	Ceramic	Whiteware Undecorated Fragment		

Total # of artifacts for this Level/Feature: 1

Total # of artifacts for this Unit: 1

Test Name: STP 3

Cat #: 0 Stratum: II Level: Feat. #: Feat. Lev: Depth: 9 - 17 cm bgs

Spec. #:	Qty.	Material:	Artifact Description:		Weight (g):
0	3	Metal	Nail Wire Fragment		

Artifact Inventory Table

Area: Runway 33-R

Test Name: STP 3

Cat #: 0 Stratum: II Level: Feat. #: Feat. Lev: Depth: 9 - 17 cm bgs

Spec. #:	Qty.	Material:	Artifact Description:		Weight (g):
0	3	Ceramic	Whiteware Undecorated Fragment		
0	1	Ceramic	Semi-Porcelain Base	colorless glaze on internal surface, External surface white unglazed bisque	
0	5	Glass	Bottle Colorless Fragment		
0	2		Slag		7.7

Total # of artifacts for this Level/Feature: 14

Total # of artifacts for this Unit: 14

Area: Woods between Airport Road & Fence

Test Name: STP 21

Cat #: 0 Stratum: II Level: Feat. #: Feat. Lev: Depth: 10 - 31 cm bgs

Spec. #:	Qty.	Material:	Artifact Description:		Weight (g):
0	1	Architectural	Brick Fragment		2.4
0	7	Glass	Bottle Colorless Fragment		
0	2	Glass	Bottle Colorless Fragment	embossed; "…MARY…"	
0	1	Glass	Bottle Aqua Fragment		
0	2	Glass	Window glass Fragment		
0	1		Pit / Nut shell Fragment	peanut shell	
0	2		Coal		5
0	1		Slag		2.6

Total # of artifacts for this Level/Feature: 17

Total # of artifacts for this Unit: 17

Area: Runway

Test Name: STP 11

Cat #: 0 Stratum: I Level: 1 Feat. #: Feat. Lev: Depth: 0 - 18 cm bgs

Spec. #:	Qty.	Material:	Artifact Description:		Weight (g):
0	3	Glass	Vessel Milk Fragment	molded floral decoration. (most likely same vessel as in STP 3)	

Total # of artifacts for this Level/Feature: 3

Total # of artifacts for this Unit: 3

Artifact Inventory Table

Area: Runway

Test Name: STP 3

Cat #: 0 Stratum: I Level: 1 Feat. #: Feat. Lev: Depth: 0 - 13 cm bgs

Spec. #:	Qty.	Material:	Artifact Description:		Weight (g):
0	10	Glass	Bottle Colorless Fragment		
0	1	Glass	Bottle Amber Fragment		
0	2	Glass	Window glass Fragment		
0	1	Ceramic	Whiteware Undecorated Fragment		
0	1	Glass	Vessel Milk Fragment	molded floral decoration (most likely same vessel as in STP 11)	

Total # of artifacts for this Level/Feature: 15

Total # of artifacts for this Unit: 15

Appendix C:
MHT Approved Archeological Permit

Martin O'Malley
Governor

Anthony G. Brown
Lt. Governor

Maryland Department of Planning
Maryland Historical Trust

Richard Eberhart Hall
Secretary

Matthew J. Power
Deputy Secretary

February 7, 2011

Ms. Robin Bowie
Manager
Division of Environmental Planning
Maryland Aviation Administration
P.O. Box 8766
BWI Airport, MD 21240-0766

RECEIVED
FEB 10 2011
MD AVIATION ADMINISTRATION
PLANNING & ENVIRONMENTAL SERVICES

Dear Ms. Bowie:

Thank you for your application for a permit to conduct terrestrial archeological investigations on Maryland State Owned lands associated with the project entitled *Proposed Airport Improvement Projects at Baltimore/Washington International Thurgood Marshall Airport.* The research proposed is well designed and will constitute a contribution to Maryland archeology. The original approved and signed permit is enclosed.

Please keep me informed of your progress (clhall@mdp.state.md.us), and let me know if there is anything I can do to assist you.

Sincerely,

Charles L. Hall
State Terrestrial Archeologist

enclosure

cc: Beth Cole

Maryland Department of Planning

Maryland Historical Trust

APPLICATION FOR PERMIT UNDER MARYLAND ARCHEOLOGICAL HISTORIC PROPERTIES ACT: TERRESTRIAL ARCHEOLOGY

(Annotated Code of Maryland: SF § 5A-342)

1. **Name, title, position (if applicable), address, and telephone number of individual, firm, State agency, or institution applying for permit:**

   Ms. Robin Bowie, Manager
   Division of Environmental Planning
   Maryland Aviation Administration
   P.O. Box 8766
   BWI Airport, MD, 21240-0766
   (410) 859-7103

2. **If different from Item No. 1, list name and daytime telephone number of person to be contacted if questions arise about application or permit:**
   (☒ Same as Item No. 1 – check if applicable)

3. **Project title, if assigned:** Proposed Airport Improvement Projects at Baltimore/Washington International Thurgood Marshall Airport.

Location of lands for which permit is requested: Baltimore/Washington International Thurgood Marshall Airport

   a. **County**: Anne Arundel

Leave Blank if You Do Not Know How To Determine UTM Or Latitude/Longitude

   b. **UTM zone _____ ; Northing _____ ; Easting _____**

   c. **Attach written description and map, sketch, or plan showing specific sites or areas for which permit is desired. (Use Addendum Sheets as needed, and attach to application.)** Location map attached.

5. **Ownership of lands for which permit is requested:**
   a. **Name of State land unit and administering department *or*, if private land, name, address, and phone number of owner:** Maryland Aviation Administration.

   b. **Name, title/position (if applicable), and phone number of person designated by the State agency or landowner to serve as their principal contact/representative:** Robin Bowie, Manager, Division of Environmental Planning (410) 859-7103

6. **Detail the proposed work, including goals, techniques, and expected results. (Use Addendum Sheets as needed, and attach to application.):** Proposed work plan is attached.

7. **Discuss what the public benefits of the proposed project will be. (Use Addendum Sheets as needed, and attach to application.):** The proposed project will address needed improvements to BWI Thurgood Marshall Airport.

8. **Name, address, and qualifications of person(s) in charge of the archeological work.**
   a. **In overall charge of archeological work (attach vita including academic and professional experience):** Richard White (résumé attached)

   b. **If different from Item No. 8a, name, address, and qualifications of person(s) in charge who normally will be present at project site during fieldwork (attach vita including academic and professional experience):** Frank Dunsmore and/or Bryan Butina (résumé attached)

9. **Date fieldwork will begin:** January 2011

10. **Anticipated date fieldwork will conclude:** February 2011

11. **Expected date when the draft report will be submitted (a final report must be submitted within 90 days of receipt of comments on the draft report from the administering agency and/or the Maryland Historical Trust, unless a revised deadline has been approved by the Trust):** March 1, 2011

12. **Name and address of institution/organization where materials collected will be permanently curated:** The Maryland Archaeological Conservation Laboratory, St. Leonard, Maryland

13. **Provisions for publication/reporting and distribution of results of work:** These will be determined after the testing has been completed and the resulting data have been analyzed. This will likely be incorporated into any agreement document generated as a result of the archeological studies.

If this application is approved, the applicant agrees to carry out the proposed excavations in accordance with the special conditions listed on this form.

14. **Signature of applicant named in Item No. 1 above, and date of application:**

Robin M Bourie — Signature

1/24/11 — Date

15. **Concurrence by agency administering land or owner of the land for which permit is requested, if different from Applicant in Item No. 14 above:**

Signature	Title	Date

Signature	Agency (if applicable)

16. **Application approved:**

Director, Maryland Historical Trust	Chief, Office of Archeology	Date
	Maureen Kavanagh	1/28/11

[APPLICATION FOR PERMIT UNDER MARYLAND ARCHEOLOGICAL HISTORIC PROPERTIES ACT: TERRESTRIAL ARCHEOLOGY]

SPECIAL CONDITIONS

Special conditions for carrying out archeological excavations under this permit:

a. The permit is not exclusive in character, and, for State-owned or controlled lands, the State of Maryland reserves the right to use, lease, or permit the use of said land or any part thereof for any purpose.

b. Permittee indemnifies and holds harmless the State of Maryland, it's employees, agents, and servants from any claim arising out of or in connection with all matters connected with the permit, to the extent permitted by law.

c. Such guidance and protection as is consistent with the duties of the State official in charge of the area will be afforded the permit holder and his party.

d. All excavated areas must be restored by filling in the excavations and otherwise leaving the areas in as near original condition as is practicable.

e. The permittee shall conduct all operations in such a manner as to prevent the erosion of the land, pollution of the water resources, and damage to the watershed, and do all things necessary to prevent or reduce to the fullest extent the scarring of the lands.

f. The fieldwork, records made, and objects recovered are subject to inspection by the Chief of the Office of Archeology, or designee, at reasonable times.

g. A final report on work accomplished under this permit is required and must be provided to the Maryland Historical Trust (see Special Condition n, below). Final reports shall meet or exceed the Standards and Guidelines for Archeological Investigations in Maryland (Shaffer and Cole1994), and no report shall be considered final until Office of Archeology review determines that these standards and guidelines have been met. If submission of a final report is expected to take longer than six months after conclusion of the fieldwork, two copies of a brief preliminary report of work performed under this permit must be sent to the Office of Archeology, Maryland Historical Trust within one month of completing fieldwork.

h. This permit shall not relieve permittee from complying with all State, Federal, or Local laws, rules, and regulations.

i. When applicable, after the permit is approved, but before undertaking any work, the permittee must coordinate with the individual named in Item 5b.

j. A permit must be signed by the Director of the Maryland Historical Trust, the Chief of the Office of Archeology, and the landowner or a responsible official of the agency administering the land covered by the permit.

k. Permits are valid for one year from the date of approval unless otherwise specified.

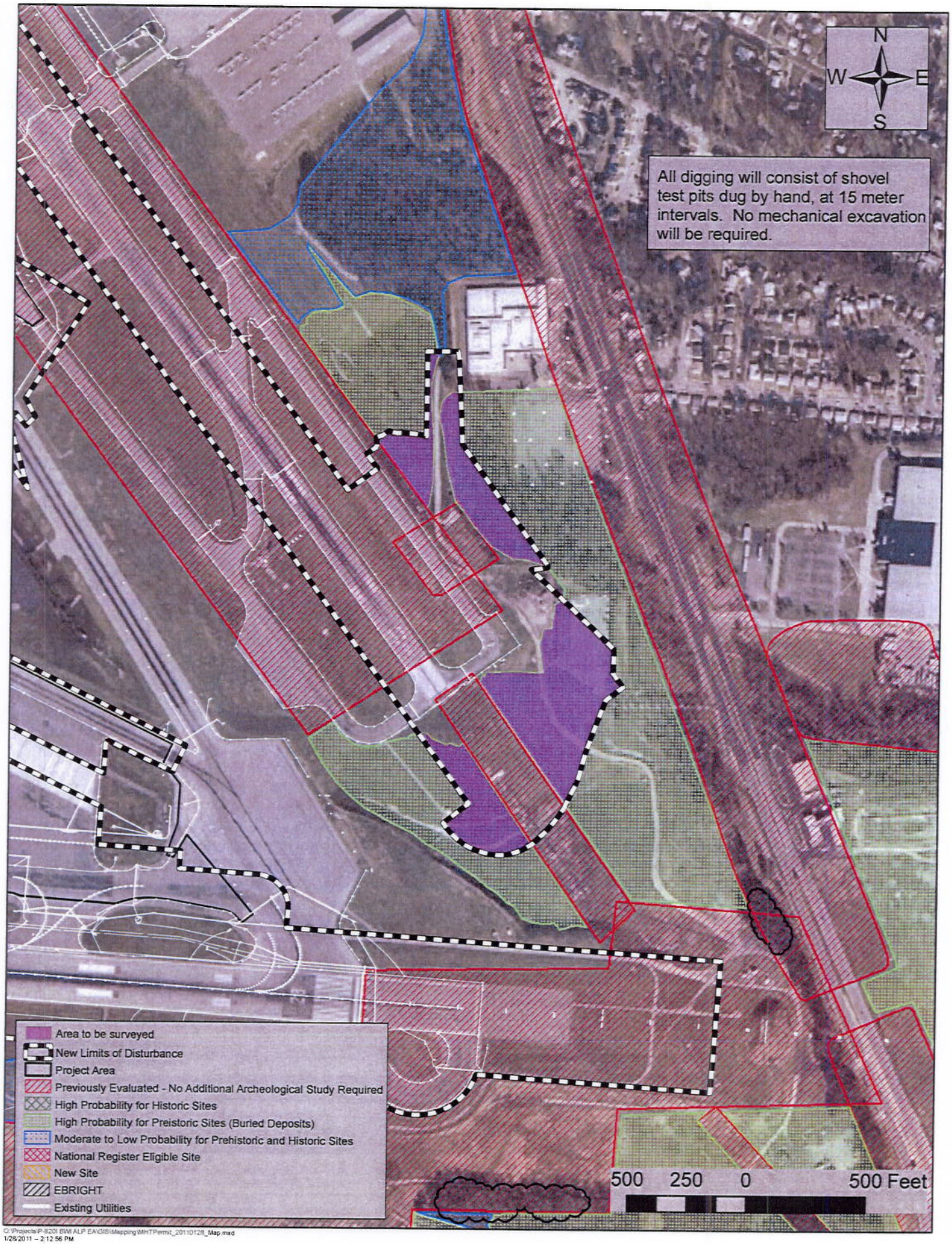
l. Renewal or extension of a terrestrial Archeology permit requires that a new application by submitted accompanied by a written report on the investigations covered by the previous permit.

m. All archeological specimens removed from State-owned or controlled land are State property (SF § 5A-339 of the Annotated Code of Maryland) and shall be conserved at the Maryland Archeological Conservation Laboratory at Jefferson Patterson Park and Museum in Calvert County (SF § 5-326(c)(3)), unless this requirement is specifically exempted by the Office of Archeology as part of this permit. All archeological specimens must be conserved, cleaned, and cataloged by methods consistent with Collections and Conservation Standards of the Maryland Historical Trust (*Technical Update No. 1 of the Standards and Guidelines for Archeological Investigations in Maryland,* revised July 1, 2005).

n. Three copies of all reports, published and unpublished, resulting from investigations made under the terms of this permit must be submitted to the Maryland Historical Trust's Office of Archeology. As appropriate, one copy of all reports must also be submitted to the head of the agency on whose land the work was performed, or the owner of the land.

o. Other special conditions (to be completed by the Maryland Historical Trust):

LOCATION MAP:


N
W
E
S
All digging will consist of shovel test pits dug by hand, at 15 meter intervals. No mechanical excavation will be required.
Area to be surveyed
New Limits of Disturbance
Project Area
Previously Evaluated - No Additional Archeological Study Required
High Probability for Historic Sites
High Probability for Preistoric Sites (Buried Deposits)
Moderate to Low Probability for Prehistoric and Historic Sites
National Register Eligible Site
New Site
EBRIGHT
Existing Utilities
500 250 0 500 Feet
O:\Projects\P-820I BWI ALP EA\GIS\Mapping\MHTPermit_20110128_Map.mxd
1/28/2011 – 2:12:56 PM

ARCHEOLOGICAL WORK PLAN:

ARCHEOLOGICAL WORKPLAN

The archeological work will consist of identifying below-ground known and potential archaeological resources. This analysis will be conducted in accordance with FAA Orders 1050.1E and 5050.4B, Section 106 of the National Historic Preservation Act of 1966, and 36 CFR Part 800, *Protection of Historic and Cultural Properties*, the procedures of the Advisory Council on Historic Preservation for implementing the Act.

The Maryland Aviation Administration's consultant, A.D. Marble & Company, will conduct a Phase IB archaeological field survey for the proposed airport improvements in areas that were previously identified as having high potential for prehistoric (buried) resources, but were not included in the previous Phase IB study completed for the Airport Layout Plan improvements (Phase IB report was approved by MHT on January 28, 2010). This includes a testable area of approximately 8.12 acres located at the end of Runway 33R. Since the entire 8.12 acre area has previously been determined to have a high sensitivity for prehistoric resources, it will be surveyed by shovel test pits placed at high probability intervals (15-meter intervals, or 16 per acre) based on the professional judgment of the Principal Investigator.

Previous sensitivity assessments coupled with the geomorphological study at the end of Runway 33R noted that archaeological deposits could reach one meter below surface. Shovel test excavation will need to extend that deep in order to address the concerns identified by the geomorphologist. Additional shovel test pits may be excavated to bracket positive tests to more clearly define the boundaries of any archaeological sites identified in the APE. It is possible but cannot be confirmed until the field survey, that some of the 8.12 acre area can be eliminated from testing due to prior disturbance. Therefore, the maximum required number of shovel tests needed to cover the project area is 130. It is assumed that 5%, or seven shovel tests, will be positive and require bracketing (i.e., four additional tests around each positive test). Therefore, it is assumed then that no more than 158 STPs will be excavated as part of this Phase IB survey.

All artifacts will be processed in the laboratory in accordance with MHT guidelines. Laboratory processing consists of cleaning and cataloging all artifacts. Any carbon collected or flotation samples taken during Phase IB testing will be prepared for their appropriate analysis, however, they will not be submitted to outside laboratory analysis as part of this contract. The catalog will contain a complete description of every artifact (form, function, material of manufacture) and its known cultural affiliation and dating. Photographs of diagnostic artifacts will be taken for use in the Phase IB Report.

Analysis of the field findings includes the use of numerical techniques and qualitative assessment of the artifacts to evaluate the nature of the artifact deposits identified during testing and their depositional contexts. The goal of the analyses is to determine the integrity of the deposits and to reconstruct the occupational history of the site to provide MHT any significant information on the history or prehistory of the locale and region. Any recommendation for avoidance and/or further archaeological investigations within the study area will be based on the results of these analyses.

A.D. Marble & Company will prepare an addendum to the Phase IB Archaeological Survey report prepared as part of the Interim ALP improvements that will include a complete description of the exact field methodologies employed during the survey together with field results, the interpretation of those results, and any recommendation for further archaeological investigations or the need to develop an avoidance plan for sensitive areas within the APE. The Phase IB report addendum will include mapping showing the location of all tests and a justification for any areas of the APE not tested during the investigation. A complete catalog of all artifacts found during the investigation will also be presented in an appendix to the Phase IB report addendum. This report addendum will be prepared in accordance with MHT guidelines and recommendations. Revisions to the draft report addendum requested by the MAA and/or the MHT will be incorporated by the Consultant into the final report.

All of the tasks will be performed by qualified professionals as defined by the Secretary of the Interior (36CFR §61). The analysis will be consistent with the principles and standards contained in *Archaeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines* (1983); *Consulting About Archaeology Under Section 106* (Advisory Council on Historic Preservation 1990) and *Standards and Guidelines for Archeological Investigations in Maryland* (Shaffer and Cole 1994).

QUALIFICATIONS:

Richard L. White
Archaeological Principal Investigator

Richard White is an Archaeological Principal Investigator with 14 years of experience in the excavation of archaeological sites and laboratory work. He has served in a supervisory role for more than eight years. His areas of expertise include OSHA standards, field excavations, and public outreach programs, in which he has extensive experience. He was in a supervisory field position for the Phase III Data Recovery excavations at the Independence Mall National Historic Park and the SugarHouse Casino Phase I/II Studies in Philadelphia. He has authored and coauthored more than 20 professional reports for submission to various state repositories including Pennsylvania, Virginia, Delaware, and New Jersey. At the request of individual clients, he has presented five papers at professional conferences throughout the Middle Atlantic States.

Education

2007	M.A., Archaeology and Heritage, University of Leicester
1995	B.A., Anthropology, Bloomsburg University, Pennsylvania

Professional Experience

2008 to Present	A.D. Marble Company	*Principal Investigator*
2007 to 2008	A.D. Marble Company	*Field Director*
2003-2007	McCormick Taylor Inc.	*Field Director*
2002	Richard Grubb and Associates	*Field Technician*
2000-2002	Kise, Straw & Kolodner	*Project Archaeologist*
1997-2000	Skelly and Loy Inc.	*Field Director/ Field Technician*
1996	Kittatinny Archaeological Research	*Field Technician*
1995	Ecoscience Inc.	*Field Technician*

Training

2006 OSHA Certification, Cocciardi and Assoc.

2006 Hazardous Waste Operations and Emergency Response Supervisor/Incident Command Training, Cocciardi and Assoc.

2004 "Section 106 Essentials," Advisory Council on Historic Preservation

Professional Affiliations

Mid-Atlantic Archaeological Conference
Society for New Jersey Archaeology
Archaeological Society of Delaware

Frank Dunsmore
Field Director

Frank Dunsmore is an experienced archaeologist and AutoCAD technician with 22 years of experience in conducting, documenting and managing cultural resource studies. He has conducted Phase IA assessment through data recovery-level field investigations throughout the Northeast and Middle-Atlantic regions pursuant to the National Environmental Policy Act (NEPA) and Section 106 of the National Historic Environmental Policy Act of 1966 (as amended). Mr. Dunsmore has conducted cultural resource investigations for historic and prehistoric period resources with specialties in cartography, the analysis of contact and historic period military sites and surveys for Departments of Transportation. The following are examples of projects that reflect Mr. Dunsmore's experience:

Education

2008 M.A., Military Studies, American Military University, Virginia

1988 B.A., Archaeology, Rutgers University, New Jersey

Professional Experience

2009 – Present	A.D. Marble & Company	*Field Director*
2001 – 2008	Hunter Research, Inc.	*Graphics Coordinator/CAD Manager/Archeologist*
2001 – 2001	Kise, Straw and Kolodner, Inc.	*CAD Analyst/Archeologist*
1998 – 2000	The Atlantic Publishing Group, Inc.	*Cartographer*
1987 – 1998	Hunter Research Inc.	*Senior Archaeologist*

Professional Training

OSHA HazWOPR Training – 2001
AutoCAD Certification

Bryan T. Butina
Archaeologist/Field Director

Mr. Butina is employed as a field director by A.D. Marble & Company to conduct Phase I archaeological surveys through Phase III archaeological data recoveries. With more than 17 years of experience as a Field Director, Mr. Butina has supervised or participated in numerous archaeological projects throughout the eastern United States. He has extensive experience in historic structure surveys, cultural resource constraint mapping, and excavation of deeply stratified sites. Mr. Butina has experience with GPS systems, Pentex Total Station and Adobe Illustrator. Mr. Butina earned a Batchelor's Degree in Secondary Education Social Sciences.

Education

1993 B.A., Secondary Education Social Sciences, California University of Pennsylvania

Professional Experience

2007 - Present	A.D. Marble & Company	*Field Director*
1992 - 2007	Michael Baker Jr., Inc.	*Field Director*

Professional Certifications

CPR Certified

First Aid/CPR Training

American Heart Association CPR and Automated External Defibrillator (AED) Certification, Pennsylvania

Liberty Mutual Transportation Safety and Driver Trainer Program

Railroad Safety Training

OSHA 40-hour HAZWOPER Certification

Maryland Department of Planning
Maryland Historical Trust

Martin O'Malley
Governor

Anthony G. Brown
Lt. Governor

Richard Eberhart Hall
Secretary

Matthew J. Power
Deputy Secretary

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APR 15 2011
MD AVIATION ADMINISTRATION
PLANNING & ENVIRONMENTAL SERVICES

April 12, 2011

Robin M. Bowie, Manager
Division of Environmental Planning
Maryland Aviation Administration
P.O. Box 8766
BWI Airport, MD 21240-0766

Re: Addendum to Phase IB Archeological Survey Report
BWI Thurgood Marshall Airport
Runway Safety Areas (RSA) and Related Airport Improvement Projects (AIP)
Anne Arundel County, Maryland

Dear Ms. Bowie: Robin

Thank you for your recent letter, dated March 28, 2011 and received by the Maryland Historical Trust (Trust) on March 29, 2011, regarding the above-referenced project. Your letter provided the Trust with two copies of the following addendum report, prepared by A.D. Marble & Company, for review and comment: *Addendum to the Phase IB Archeological Investigation for Proposed Airport Improvements at BWI Marshall Airport* (White 2011). We examined the submitted document pursuant to Section 106 of the National Historic Preservation Act of 1966 and the Maryland Historical Trust Act of 1985 and offer the following comments.

The report provides succinct documentation on the goals, methods, results and recommendations of additional Phase I archeological survey conducted within the expanded area of potential effects (APE) for this undertaking. The document is an addendum to the original Phase I survey report completed during earlier planning efforts for the airport improvement projects: *Phase IB Archeological Investigations of the Near-Term Improvement Projects (2008-2012) at Baltimore/Washington International Thurgood Marshall Airport, Anne Arundel County, Maryland* (Blades and White 2009). The supplemental survey did not identify any archeological sites within the expanded APE for the project. Thus, we agree that further archeological investigations are not warranted for the currently proposed work. We accept the addendum as the final report for our records and Library.

The archeological survey did recover a total of 64 artifacts from the shovel test pits. These items include clear and amber bottle glass, window glass, milk glass, an electrical insulator fragment, whiteware, macadam/asphalt, wire nails, coal and slag. The artifacts all came from disturbed fill contexts and are not associated with any identified archeological sites in this locale. Special condition "m" of the terrestrial archeology permit the Trust issued for this work specifies that all recovered artifacts shall be curated at the Trust's Maryland Archeological Conservation Laboratory (MAC Lab). I have discussed the appropriate disposition of these materials with the Trust's State Terrestrial Archeologist, Charlie Hall, and the Curator of State Collections, Becky Morehouse. Since the artifacts generated by the survey comprise late 19th - 20th c. and modern materials recovered from disturbed and non-site contexts, it is the Trust's consensus that it is not necessary for MAA to retain the materials and provide them to the MAC Lab for permanent curation. Thus, the consultant may dispose of the items recovered by the supplemental survey.

100 Community Place • Crownsville, Maryland 21032-2023
Telephone: 410.514.7600 • Fax: 410.987.4071 • Toll Free: 1.800.756.0119 • TTY Users: Maryland Relay
Internet: www.marylandhistoricaltrust.net

We appreciate MAA's cooperation in completing the necessary archeological investigations during project planning for the improvements. If you have questions or need further assistance, please contact me at 410-514-7631 or bcole@mdp.state.md.us. Thank you for providing us this opportunity to comment.

Sincerely,

Beth Cole

Beth Cole
Administrator, Project Review and Compliance

EJC/201101222
cc: Charlie Hall (MHT)
Becky Morehouse (MHT/JPPM)

Final Wetland Investigation and Delineation Report for the Aircraft Operations Area Baltimore/Washington International Airport Anne Arundel County, Maryland

Prepared for:

Maryland Aviation Administration

Prepared by:

STRAUGHAN ENVIRONMENTAL SERVICES, INC.

3905 National Drive, Suite 370
Burtonsville, Maryland 20866
Telephone: (301) 989-3265

April 2000

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1.0 INTRODUCTION

Straughan Environmental Services, Inc., (SES) investigated vegetated areas at Baltimore/Washington International (BWI) Airport to delineate jurisdictional wetlands and Waters of the U.S. Maryland Aviation Administration (MAA) requested this delineation to identify vegetated areas of BWI Airport that are within or near to jurisdictional wetlands that may be subject to routine maintenance activities. Specific areas investigated by SES include: the upper reaches of Kitten Branch, the Aircraft Operations Area (AOA), and areas where streams and wetlands pass beneath the security fence at the airport perimeter.

1.1 Site Location

BWI Airport is located on 3,158 acres in Anne Arundel County, Maryland, approximately 4 miles south of the City of Baltimore (see Exhibits 1 and 2). The airport is located in the Coastal Plain Physiographic Province. Ground elevation varies from 145 feet to 170 feet above mean sea level (MSL), and the soils are generally sandy. The headwaters of 14 streams occur on airport property and all eventually flow into the Chesapeake Bay at the City of Baltimore. Wetland areas are also located on BWI Airport property.

1.2 Purpose and Background

MAA is required to maintain airport grounds and obstacle-free areas to ensure the safety of the traveling public. These maintenance activities include: clearing all locations within 10 feet of the security fence of woody growth every 3 to 4 years, treating vines along the security fence with glyphosphate herbicide, and clearing and mowing vegetated areas to specified heights based on their proximity to runways and taxiways. Because some of these activities occur within jurisdictional wetlands, MAA must also comply with regulations set forth by the U.S. Army Corps of Engineers (COE) or the Maryland Department of the Environment (MDE), which require various authorizations and/or permits for routine maintenance activities that alter non-tidal wetlands or their 25-foot buffer areas. Based on the results of this investigation and regulatory coordination, MAA can:

- Identify jurisdictional non-tidal wetlands and Waters of the U.S. within secured areas of the Airport;
- Identify specific areas in which routine ground maintenance activities would require permits from MDE or COE; and
- Minimize and avoid potential impacts to sensitive areas while maintaining a safe environment for the traveling public.

2.0 INVESTIGATION AREAS

To identify the presence of potential non-tidal wetlands, investigations were performed in three distinct areas of the BWI property that are subject to routine maintenance: the upper reaches of Kitten Branch, the Aircraft Operations Area (AOA), and areas where streams or wetlands pass beneath the security fence at the airport perimeter.

2.1 Kitten Branch

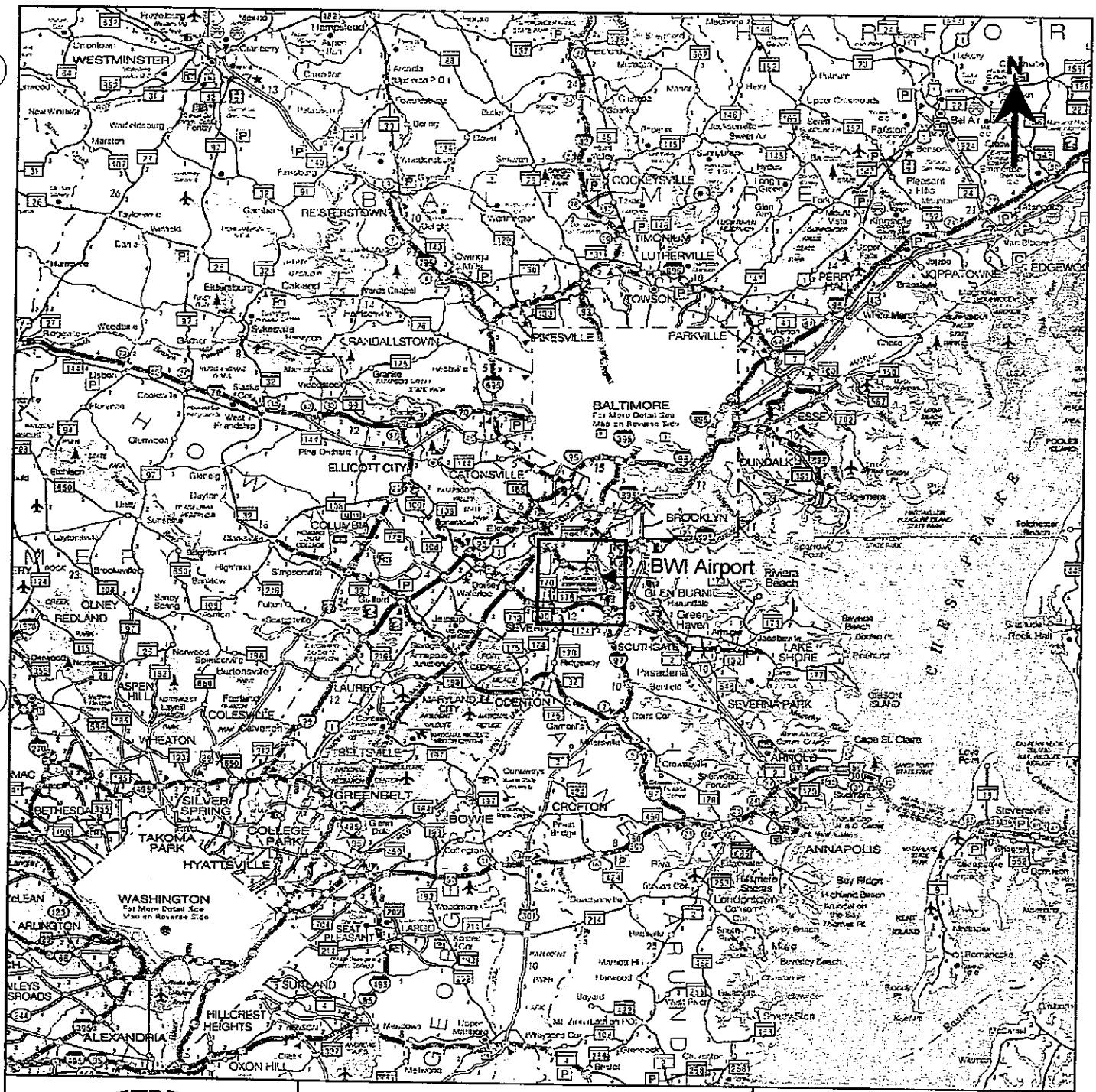
Kitten Branch is a perennial tributary of Stony Run that originates on BWI property. The upper reaches of Kitten Branch (upstream from MD Route 170) were investigated for the presence of potential non-tidal wetlands as well as reconstruction/mitigation purposes (see Exhibit 5 on page 10). The floodplain associated with the upper reaches of Kitten Branch consists of both emergent and forested palustrine wetlands. Consistent with USDA guidance, MAA proposes to convert this forest stand dominated by sycamore and red maple to a mono-typic scrub/shrub area to minimize attractiveness to wildlife and reduce the potential for aircraft/wildlife conflicts. This would also ensure compliance with FAA regulations regarding hazardous wildlife near runways, taxiways, and aircraft approach/departure zones.

2.2 Airport Operations Area

The AOA is defined as the portion of BWI used by aircraft for landing, takeoff, and surface maneuvers. Grass islands and vegetated areas, including drainage swales, are located between and adjacent to runways and taxiways. MAA must maintain these areas on a routine basis to maintain cleared areas according to FAA Advisory Circular 150/5300-13, Airport Design, to ensure the safety of the traveling public. As shown on Exhibit 6, SES visually inspected 32 areas within the AOA. Based on the vegetative community and topography, it was determined that seven areas required further investigation for the presence of potential non-tidal wetlands.

2.3 Stream Crossings

FAA Regulation (FAR) Part 107, Aviation Security, specifies that all airports maintain security fences with 10- to 20-foot clear zones to provide a clear view for inspection and security cameras. SES performed wetland investigations at ten locations where the following streams pass beneath the perimeter of the BWI Airport security fence: Muddy Bridge Branch, Phelps Branch, Fork Branch, Clark Branch, Hawkins Branch, Signal Branch, Bowden Branch, Bowden Branch tributary, an unknown tributary of Stony Run, and Kitten Branch (see Exhibit 5 on page 10). Each stream is considered to be "Waters of the U.S." and regulated by COE. SES investigated the areas within 20 feet of each stream and fence intersection for the presence of potential non-tidal wetlands. Although most areas associated with stream crossings of the perimeter security fence are vegetated by turf, some contain vegetation indicative of non-tidal wetlands.



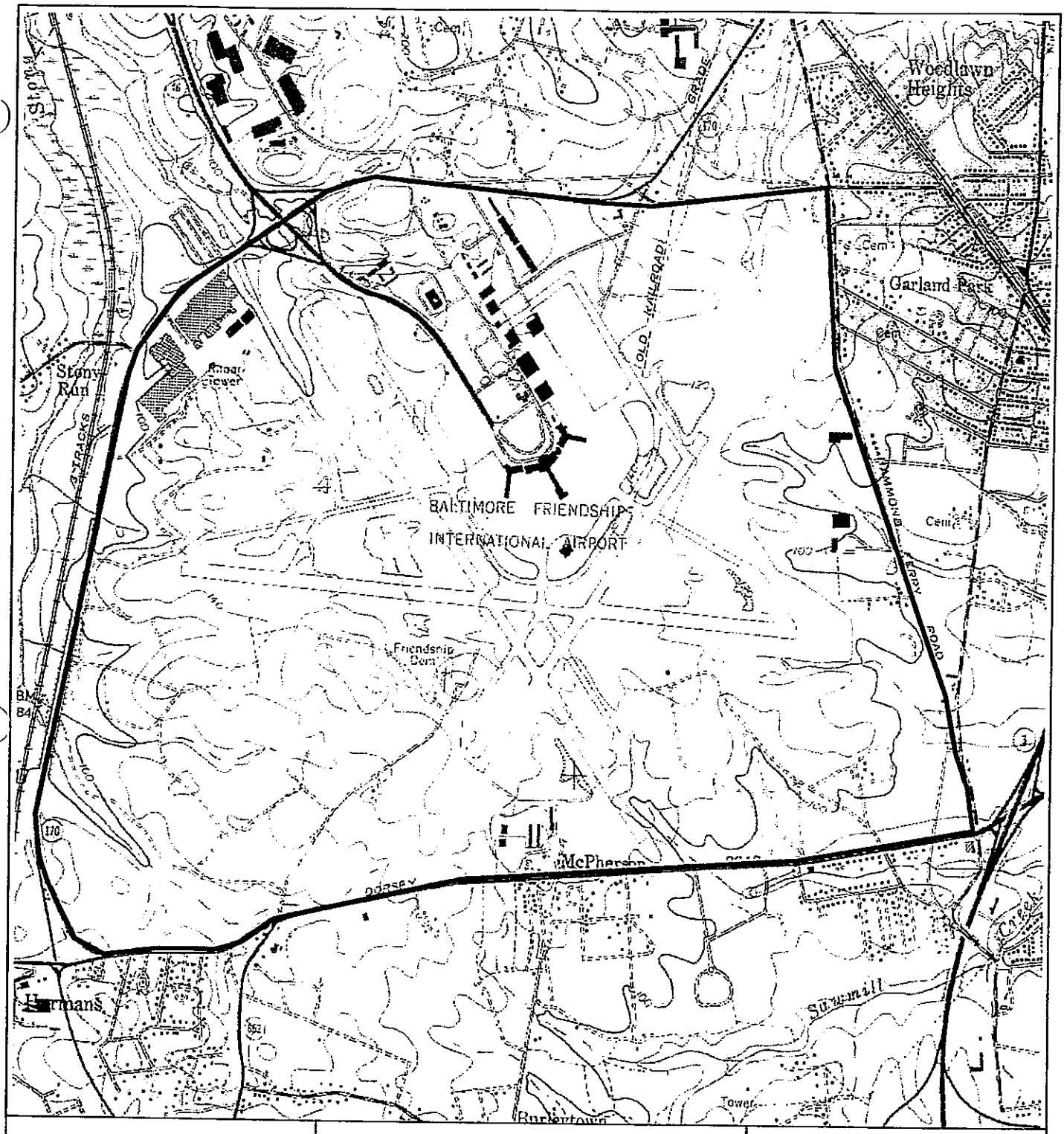
STRAUGHAN ENVIRONMENTAL SERVICES, INC.

Exhibit 1: Site Vicinity

Baltimore/Washington International Airport
Anne Arundel County, Maryland

Scale (approximate)
0 6 miles

Source: Maryland Department of Transportation, State Highway Administration, 1995, Baltimore, Maryland.



STRAUGHAN ENVIRONMENTAL SERVICES, INC.

Exhibit 2: Site Features

Baltimore/Washington International Airport
Anne Arundel County, Maryland

Legend

Approximate site boundary

Scale:
1 inch = 2,200 feet

Source: USGS Topographic Quadrangle for Relay, Maryland, 1957 (Photorevised 1974).

3.0 METHODS

SES performed a preliminary study to identify potential non-tidal wetlands and Waters of the U.S. in the investigation area by reviewing aerial photographs and the documents listed in Table 3-1.

Table 3-1
References for Identification of Waters and Wetlands

Document	Date	Reference
Soil Survey of Anne Arundel County, Maryland Soil Survey	1976	U.S. Department of Agriculture, Soil Conservation Service
National Wetland Inventory Map: Relay, Maryland	1981	U.S. Department of Interior, Fish and Wildlife Service
Wetlands Management Plan for Baltimore/Washington International Airport	1995	Greiner, Inc.

After reviewing the aerial photographs and documents listed above, SES identified sites requiring further investigation. SES performed visual inspections of these areas to confirm the need for routine on-site wetland investigations. Based on the visual inspection of Kitten Branch, SES determined that the entire floodplain would require formal delineation. SES identified 32 areas within the AOA requiring further investigation (see Exhibit 6). SES performed a visual inspection of the 32 areas on November 15, and identified seven areas that would require routine on-site wetland investigations. As noted on Exhibit 6, these areas include areas 6, 9, 10, 16, 29, 31, and the lower stormwater management pond.

SES conducted field investigations, which involved visual inspections and soil sampling of potential wetland sites in the investigation areas. The sites were sampled according to the Corps of Engineers Wetlands Delineation Manual (Environmental Laboratory, 1987) using the routine on-site method. The manual describes a three-parameter approach to delineating wetlands. All three parameters (hydrophytic vegetation, hydric soils, and hydrology) must be positive for the area to be considered a wetland, unless the site has been significantly disturbed (atypical) or is considered a problem area. In the case of disturbed or problem areas, only two of the three parameters must be evident for the area to be considered a wetland.

In accordance with the manual, SES used the routine on-site method for sites greater than 5 acres in Area 29. Using this delineation method, SES performed its field investigation along transects placed at 1,200-foot intervals. Transects were located perpendicular to the study area baseline, which is parallel to the taxiway for Runway 10-28. SES walked each transect and recorded data collected from sample plots at points of changing vegetative communities. Using this information, SES flagged the boundaries of any major wetland areas or Waters of the U.S. encountered on the site. If potential wetlands were encountered between

transects, SES collected and recorded data on transects that crossed the wetland-upland boundary (one wetland plot, one upland plot).

At each location where a stream crosses the perimeter security fence of BWI, SES flagged the crossing point as well as the boundary of either Waters of the U.S. or the wetland associated with the system. SES identified ten locations where streams crossed beneath the airport security fence and evaluated the areas that were 20 feet inside and outside of the fence.

Wetlands encountered during the field investigation were labeled alphabetically and characterized according to the U.S. Fish and Wild Service Cowardin System (Cowardin, et al., 1979). SES completed Routine Wetland Determination Data Forms for each sample plot and photographed each wetland.

4.0 FINDINGS

4.1 National Wetlands Inventory

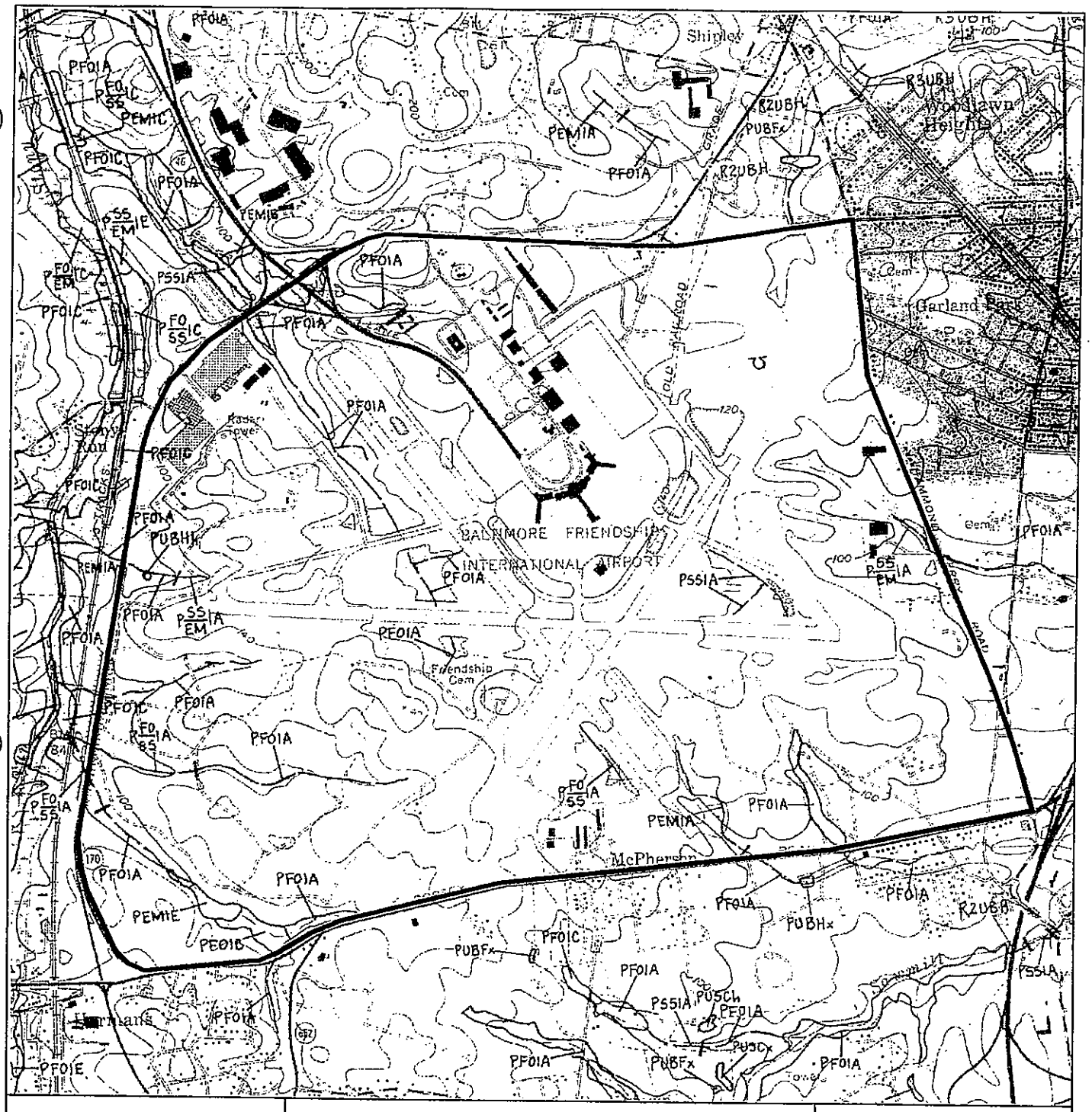
The NWI Map for Relay, Maryland, identifies several types of palustrine wetlands in the study area, including forested, scrub-shrub, emergent, and unconsolidated bottom (PFO, PSS, PEM, and PUB) wetlands (see Exhibit 3). These wetlands consist of temporarily, seasonally, and permanently flooded/saturated water regimes. SES reviewed *Wetlands Management Plan for Baltimore/Washington International Airport* (Greiner, 1995) to confirm the presence of these areas.

4.2 Description of Soils

The *Soil Survey for Anne Arundel County, Maryland* (USDA, 1976) indicates that seven soil series occur within the study area (see Exhibit 4):

- Bibb soils consist of poorly drained, silty soils that occur on floodplains of many of the major streams and drainage ways in Anne Arundel County. They formed recently from deposited material that was washed from silty and sandy uplands.
- Cut and fill land consists of miscellaneous land types in which the soil has been so severely disturbed or altered by machines that it cannot be identified by soil series.
- Evesboro soils consist of very deep, well drained to excessively drained, very sandy soils of the uplands. These soils formed primarily in old dunelike deposits of sand.
- Gravel and borrow pit soils consists chiefly of areas where soil material has been removed for use in industrial enterprises, highway construction, or landfills.
- Muirkirk soils consist of very deep, well drained to somewhat excessively drained soils that have a very thick, sandy surface layer and a red clay lower subsoil. These soils formed in a fairly thick mantle of loamy sand over deposits of very old clay.
- Rumford soils consist of deep, somewhat excessively drained soils. These soils formed in sandy material containing some clay but little silt. Rumford soils are nearly level to moderately steep and are on uplands of the Coastal Plain.
- Sassafras soils consist of deep, well drained soils on uplands that have a loamy surface layer and a yellowish-brown to strong-brown subsoil of dominantly sandy clay loam. These soils formed in beds of sandy sediments containing moderate amounts of silt and clay.

Typical soil profiles are shown in Table 4.2-1.



STRAUGHAN ENVIRONMENTAL SERVICES, INC.

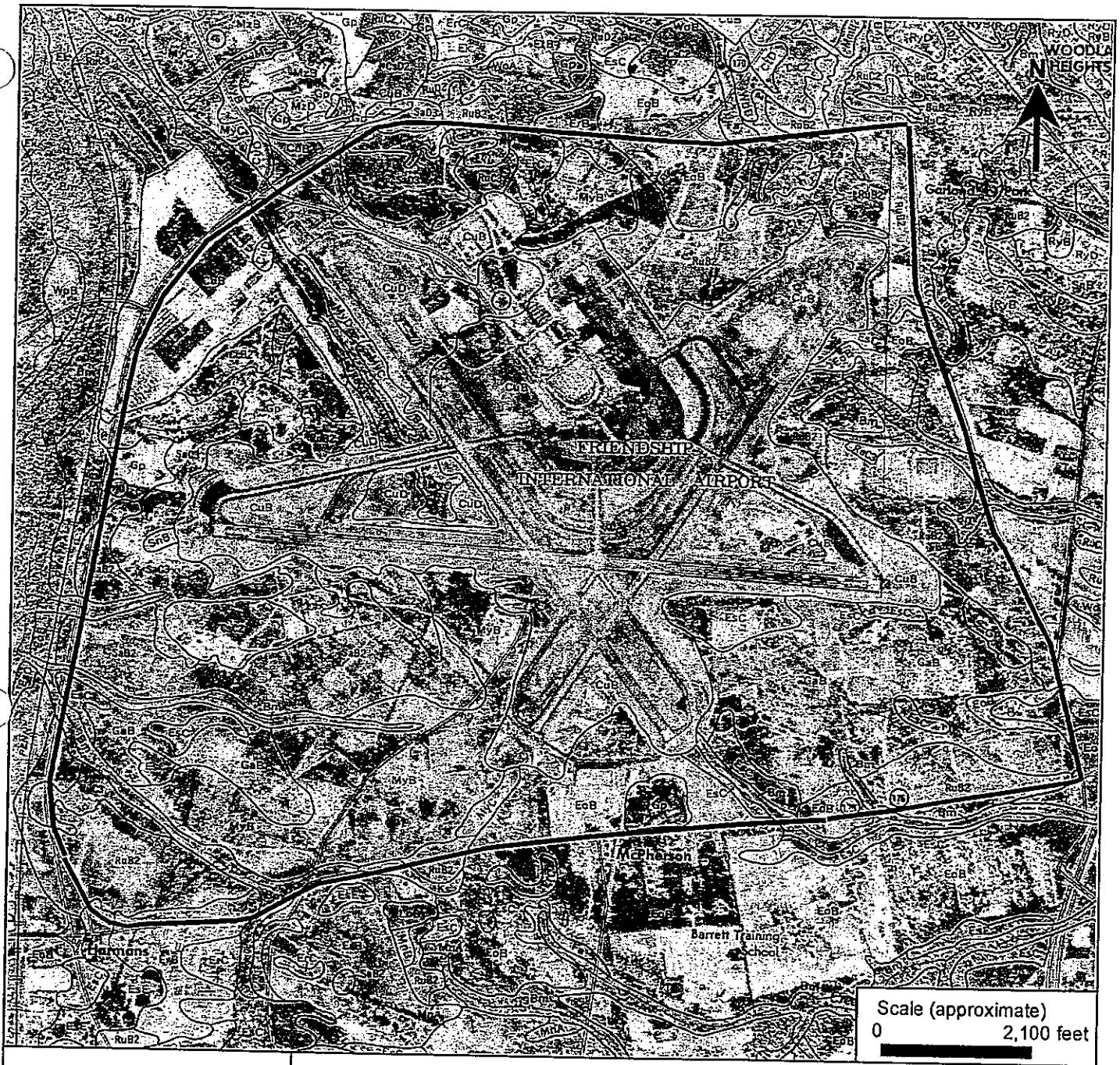
Exhibit 3: National Wetlands Inventory Map

Baltimore/Washington International Airport
Anne Arundel County, Maryland

Scale:

1 inch = 2,200 feet

Source: United States Department of the Interior, Fish and Wildlife Service, 1995. Relay, MD.



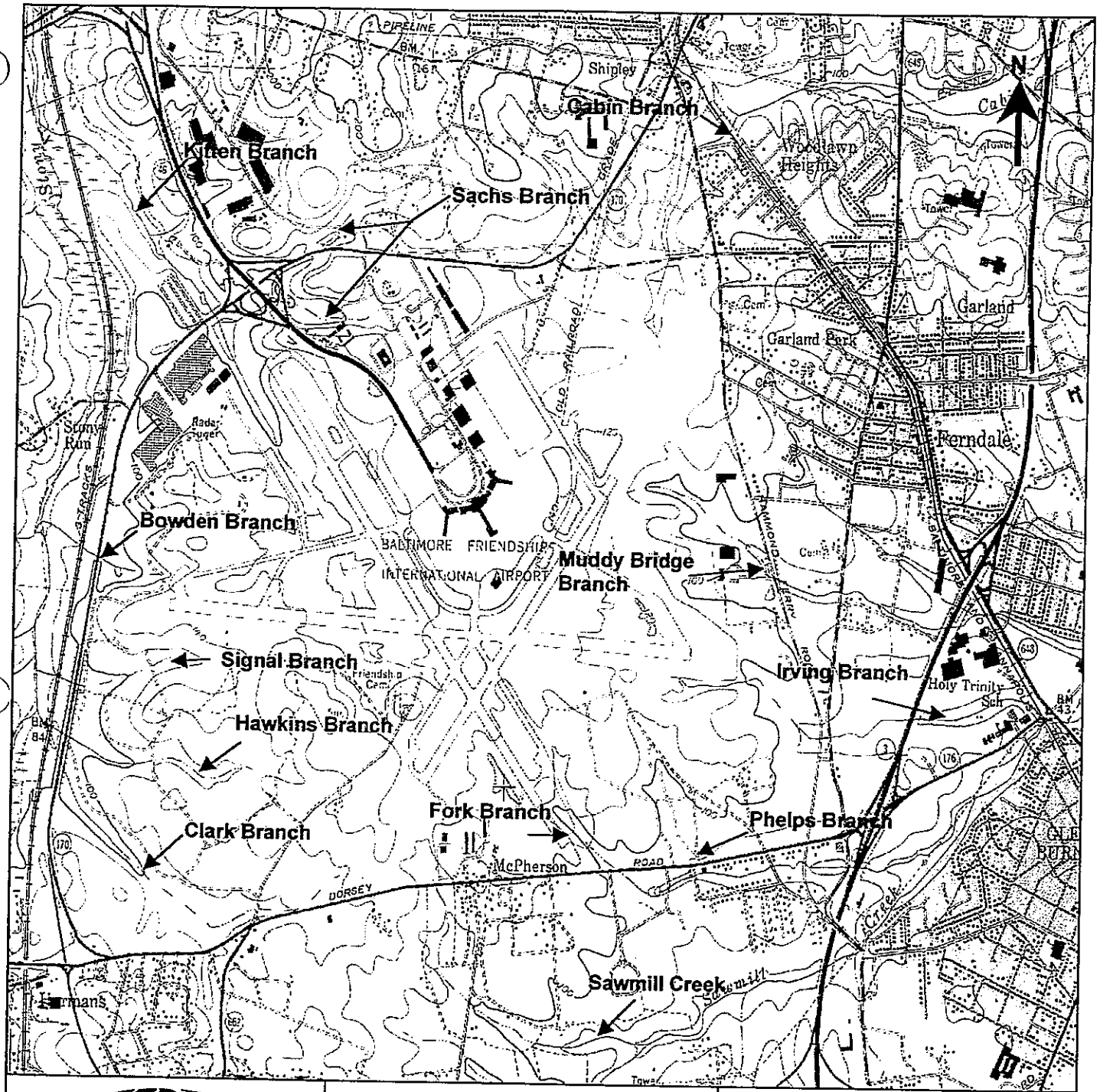
STRAUGHAN ENVIRONMENTAL SERVICES, INC.

Exhibit 4: Soil Survey Map

Baltimore/Washington International Airport
Anne Arundel County, Maryland

Legend:
Bm - Bibbs soils
CuB/CuD - Cut and Fill Land
ErC - Evesboro soils
Gp - Gravel and Borrow Pits
MyB/MyC - Muirkirk soils
RuB2/RuB3 -Rumford soils
SaB2/SaC2 - Sassafras soils

Source: USDA, 1973. Soil Survey of Anne Arundel County, Maryland.



STRAUGHAN ENVIRONMENTAL SERVICES, INC.

Exhibit 5: Stream Locations

Baltimore/Washington International Airport
Anne Arundel County, Maryland

Legend:

Stream or creek

Intermittent stream or creek

Scale (approximate)

0 2,700 feet

Source: U.S. Geological Survey, 1957 (photorevised 1966 and 1974). Relay, Maryland Quadrangle.

Table 4.2-1
Typical Soil Profiles

Soil Series	Depth (Inches)	Color	Texture
Bibb	0 to 3	Dark grayish-brown	Silt loam
	3 to 9	Dark grayish-brown	Silt loam
	9 to 27	Dark gray	Silt loam
	27 to 36	Gray	Loam
	36 to 50	Gray	Silty clay
Cut and Fill	Not available	Not available	Not available
Evesboro	0 to 2	Light brownish-gray	Loamy sand
	2 to 28	Yellowish-brown	Loamy sand
	28 to 43	Brownish-yellow	Loamy sand
	43 to 60	Pale-brown	Sand
Gravel and Borrow Pits	Not available	Not available	Not available
Muirkirk	0 to 10	Olive-brown	Loamy sand
	10 to 20	Yellowish-brown	Loamy sand
	20 to 28	Yellowish-brown	Loamy sand
	28 to 36	Red	Sandy loam
	36 to 60	Red	Clay
Rumford	0 to 10	Dark grayish-brown	Loamy sand
	10 to 14	Yellowish-brown	Loamy sand
	14 to 21	Strong brown	Light sandy loam
	21 to 32	Strong brown	Sandy loam
	32 to 50	Strong brown	Loamy sand
Sassafras	0 to 2	Very dark gray	Fine sandy loam
	2 to 11	Dark grayish-brown	Fine sandy loam
	11 to 17	Yellowish-brown	Fine sandy loam
	17 to 30	Strong brown	Sandy clay loam
	30 to 37	Strong brown	Sandy clay loam
	37 to 50	Yellowish-brown	Very coarse sand and small gravel

SES reviewed the *State of Maryland Hydric Soils List* (State of Maryland, 1990) and *Hydric Soils of the United States* (USDA, Soil Conservation Service, 1991). The Bibb soil series is listed as a hydric soil on both lists. The Sassafras series is listed as having hydric components in the *State of Maryland Hydric Soils List.*

4.3 Wetlands Field Determination

Exhibit 7 presents the locations of all wetlands and Waters of the U.S. identified in this investigation (see back pocket). Photographic documentation is presented as Appendix A. (Photographs are available for each area except Wetland J.)

In describing the vegetation for each wetland, certain abbreviations are used to represent the indicator status for each vegetative species. These indicators are presented in Table 4.3-1.

Table 4.3-1
Wetland Indicators Definitions

Indicator Status	Definition
OBL	Occurs with an estimated 99% probability in wetlands
FACW	Estimated 67% to 99% probability of occurrence in wetlands
FAC	Equally likely to occur in wetlands and non-wetlands (34% to 66% probability of occurrence)
FACU	Estimated 67% to 99% probability of occurrence in non-wetlands, 1% to 33% probability of occurrence in wetlands
UPL	Greater than 99% occurrence in non-wetlands in this region, may occur in wetlands in other regions
NI	Insufficient information available to determine an indicator status
NA	Not applicable
+	Frequency occurs in the higher end of a category
-	Frequency occurs in the lower end of a category

4.3.1 Kitten Branch

Kitten Branch is a perennial tributary of Stony Run that is approximately 1.5 miles long. The stream emerges from a culvert beneath Taxiway F, flows northwest and parallel to Runway 15R-33L, crosses beneath MD Route 170, and continues to its confluence with Stony Run west of the Amtrak station (refer back to Exhibit 5). Kitten Branch has an active floodplain that contains Wetland Areas A through E.

Five wetlands are associated with Kitten Branch (see Exhibit 7). Three are classified as palustrine emergent (PEM) wetlands, and two are classified as palustrine forested (PFO) wetlands. Kitten Branch is classified as Waters of the U.S., however, for the purposes of this report, Kitten Branch is described as a separate wetland (Wetland F). While some of these areas are significantly disturbed due to maintenance practices such as mowing, they are natural features located on hydric soils. Each is described in detail below.

WETLAND A

WETLAND A

Wetland A occupies approximately 0.2 acre within the eastern floodplain of Kitten Branch, approximately 400 feet north of Taxiway F. This area does not appear on the NWI map for Relay, Maryland.

Wetland A occurs in a narrow depression along the base of the slope associated with Runway 15R-33L, and it appears to receive hydrology in the form of overland sheet flow from the runway. At the time of the field visit, Wetland A contained standing water. Wetland A is a disturbed site; the vegetation has been mowed and some portions of the soil profile consist of fill material. Sample Plot 1-A was selected to characterize Wetland A, and Sample Plot 2-A was selected to represent the adjacent wetland.

Sample Plot 1-A

On December 16, 1999, SES examined soils, vegetation, and hydrology at Sample Plot 1-A. Table 4.3-2 summarizes the investigation results, Table 4.3-3 presents dominant vegetation, and Table 4.3-4 summarizes soil data.

Table 4.3-2
Sample Plot 1-A General Information

Classification	Wetland
Sample Coordinates	550733.0640 North; 1403710.0060 East
Hydrology Indicators	Inundation, saturated in upper 12 inches, and oxidized root channels in upper 12 inches
Percent Hydrophytic Vegetation	60% (see Table 4.3-3)
Hydric Soils	Yes (see Table 4.3-4)

Table 4.3-3
Sample Plot 1-A Dominant Vegetation

Common Name	Botanical Name	Indicator Status
Soft rush	*Juncus effusus*	FACW+
Deertongue witchgrass	*Dichanthelium clandestinum*	FAC+
Bushy bluestem	*Andropogon glomeratus*	FACW+
Spikerush[a]	*Eleocharis* spp.	NA
Grass spp.[a]	*Graminae* spp.	NA

[a] Not identifiable to the species level due to the absence of inflorescence.

Table 4.3-4
Sample Plot 1-A Soil Description

Depth (in.)	Color	Description	Mottles
0-8	Very dark gray (10YR 3/1)	Fine sandy loam, saturated	None
8-16	Very dark gray (10YR 3/1)	Loamy sand, moist	None
16-21	Grayish brown (10YR 5/2)	Coarse sand, moist	Few, small, faint, yellowish brown (10YR 5/6)

Conclusion: Sample Plot 1-A satisfies all three mandatory wetland technical criteria. The area was determined to be a palustrine emergent (PEM) wetland.

Sample Plot 2-A

On December 16, 1999, SES examined soils, vegetation, and hydrology at Sample Plot 2-A. Table 4.3-5 summarizes the investigation results, Table 4.3-6 presents dominant vegetation, and Table 4.3-7 summarizes soil data.

Table 4.3-5
Sample Plot 2-A General Information

Classification	Upland
Sample Coordinates	550797.9300 North; 1403724.8000 East
Hydrology Indicators	Oxidized root channels in the upper 12 inches of the soil profile
Percent Hydrophytic Vegetation	None (see Table 4.3-6)
Hydric Soils	No (see Table 4.3-7)

Table 4.3-6
Sample Plot 2-A Dominant Vegetation

Common Name	Botanical Name	Indicator Status
English plantain	*Plantago lanceolata*	UPL
Grass[a]	*Graminae* spp.	NA

[a] Not identifiable to the species level due to the absence of inflorescence.

Table 4.3-7
Sample Plot 2-A Soil Description

Depth (in.)	Color	Description	Mottles
0-1	Very dark grayish brown (10YR 3/2)	Sandy loam	None
1-12	Yellowish brown (10YR 5/6)	Sandy loam	Few, small, distinct, dark reddish-brown (5YR 3/4), and Common, coarse, distinct, very dark gray (7.5YR 3/1)
12-21	Yellowish brown (10YR 5/4)	Loamy sand, moist	Common, small, faint, yellowish brown (10YR 5/6)

Conclusion: Sample Plot 2-A does not satisfy any of the three mandatory wetland technical criteria. The area was classified as an upland.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Kitten Branch
Applicant: Maryland Aviation Administration
Investigator: Roger J. Windschitl/Jason McNees
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 16, 1999
County: Anne Arundel
State: Maryland
Community ID: Wetland
Transect ID: Wetland A
Plot ID: 1-A

VEGETATION

Dominant Plant Species	Stratum	Indicator
Juncus effusus	Herb	FACW+
Dichanthelium clandestinum	Herb	FAC+
Andropogon glomeratus	Herb	FACW+
Eleocharis spp.	Herb	NA
Graminae spp.	Herb	NA

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 60.00%

Remarks

The vegetation was mowed, and the grass and Eleocharis were not identifiable to the species level. Sample plot satisfies the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit None (in.)
Depth to saturated soil 0 (in.)

Primary Wetland Hydrology Indicators

☒ Inundated
☒ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☒ Oxidized Root Channels in Upper 12"
☐ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Sample plot satisfies the wetland hydrology criterion. Aerial photographs were reviewed to initially identify potential wetland areas.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Kitten Branch
Applicant: Maryland Aviation Administration
Investigator: Roger J. Windschitl/Jason McNees
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 16, 1999
County: Anne Arundel
State: Maryland
Community ID: Wetland
Transect ID: Wetland A
Plot ID: 1-A

SOILS

Soil Map Unit Name: Bibb silt loam
Drainage Class: Poorly drained
Soil Tax Subgroup: Typic Haplaquents
Confirm Map Type: ☐ Yes ☒ No

Soil Profile Description:

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-8	A	10YR 3/1	None	None	Fine sandy loam, saturated
8-16	B1	10YR 3/1	None	None	Loamy sand, moist
16-21	B2	10YR 5/2	10YR 5/6	Few, small, faint	Coarse sand, moist

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☒ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Sample plot satisfies the hydric soil criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No
Wetland Hydrology Present? ☒ Yes ☐ No
Hydric Soils Present? ☒ Yes ☐ No
Is this Sampling within a Wetland? ☒ Yes ☐ No

Remarks

Sample plot satisfies the three mandatory wetland technical criteria.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Kitten Branch
Applicant: Maryland Aviation Administration
Investigator: Roger J. Windschitl/Jason McNees
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 16, 1999
County: Anne Arundel
State: Maryland
Community ID: Upland
Transect ID: Wetland A
Plot ID: 2-A

VEGETATION

Dominant Plant Species	Stratum	Indicator
Plantago lanceolata	Herb	UPL
Graminae spp.	Herb	NA

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 0.00%

If the FAC-neutral test is used, this data does NOT provide a secondary indicator of wetland hydrology

Remarks

The vegetation was mowed, and the grass was not identifiable to the species level. Sample plot does not satisfy the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit None (in.)
Depth to saturated soil None (in.)

Primary Wetland Hydrology Indicators

☐ Inundated
☐ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☒ Oxidized Root Channels in Upper 12"
☐ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Sample plot does not satisfy the wetland hydrology criterion. Aerial photographs were reviewed to initially identify potential wetland areas.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Kitten Branch
Applicant: Maryland Aviation Administration
Investigator: Roger J. Windschitl/Jason McNees
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 16, 1999
County: Anne Arundel
State: Maryland
Community ID: Upland
Transect ID: Wetland A
Plot ID: 2-A

SOILS

Soil Map Unit Name: Muirkirk loamy sand
Drainage Class: Well to excessively drained
Soil Tax Subgroup: Arenic Paleudults
Confirm Map Type: ☒ Yes ☐ No

Soil Profile Description:

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-1	A	10YR 3/2	None	None	Sandy loam
1-12	B1	10YR 5/6	5YR 3/4	Few, small, distinct	Sandy loam
			7.5YR 3/1	Common, coarse, distinct	
12-21	B2	10YR 5/4	10YR 5/6	Common, small, faint	Loamy sand, moist

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☐ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Sample plot does not satisfy any of the hydric soils criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☐ Yes ☒ No
Wetland Hydrology Present? ☐ Yes ☒ No
Hydric Soils Present? ☐ Yes ☒ No
Is this Sampling within a Wetland? ☐ Yes ☒ No

Remarks

Sample plot does not satisfy the three mandatory wetland technical criteria.

WETLAND B

WETLAND B

Wetland B occupies approximately 1.4 acres within the eastern floodplain of Kitten Branch, approximately 700 feet northwest of Wetland A (see Exhibit 7). This wetland does not appear on the NWI map for Relay, Maryland.

Wetland B appears to receive hydrology as groundwater, overland sheet flow from Runway 15R-33L, and flooding from Kitten Branch. The area is disturbed, because the vegetation has been mowed, and some portions of the soil profile consist of fill material. Sample Plot 1-B was selected to characterize Wetland B, and Sample Plot 2-B was selected to represent the adjacent wetland.

Sample Plot 1-B

On December 17, 1999, SES examined soils, vegetation, and hydrology at Sample Plot 1-B. Table 4.3-8 summarizes the investigation results, Table 4.3-9 presents dominant vegetation, and Table 4.3-10 summarizes soil data.

Table 4.3-8
Sample Plot 1-B General Information

Classification	Wetland
Sample Coordinates	551688.0040 North; 1402814.7220 East
Hydrology Indicators	Saturation and oxidized rhizospheres in the upper 12 inches of the soil profile
Percent Hydrophytic Vegetation	67% (see Table 4.3-9)
Hydric Soils	Yes (see Table 4.3-10)

Table 4.3-9
Sample Plot 1-B Dominant Vegetation

Common Name	Botanical Name	Indicator Status
Soft rush	*Juncus effusus*	FACW+
Deertongue witchgrass	*Dichanthelium clandestinum*	FAC+
Grass[a]	*Graminae* spp.	NA

[a] Not identifiable to the species level due to the absence of inflorescence.

Table 4.3-10
Sample Plot 1-B Soil Description

Depth (in.)	Color	Description	Mottles
0-24	Very dark gray (10YR 3/1)	Clay loam, saturated	Common, small distinct, dark brown (7.5YR 3/4)

Conclusion: Sample plot 1-B satisfies all three mandatory wetland technical criteria. The area was determined to be a palustrine, emergent (PEM) wetland.

Sample Plot 2-B

On December 17, 1999, SES examined soils, vegetation, and hydrology at sample Plot 2-B. Table 4.3-11 summarizes the investigation results, Table 4.3-12 presents dominant vegetation, and Table 4.3-13 summarizes soil data.

Table 4.3-11
Sample Plot 2-B General Information

Classification	Upland
Sample Coordinates	551756.3460 North; 1402916.1060 East
Hydrology Indicators	None
Percent Hydrophytic Vegetation	33% (see Table 4.3-12)
Hydric Soils	No (see Table 4.3-13)

Table 4.3-12
Sample Plot 2-B Dominant Vegetation

Common Name	Botanical Name	Indicator Status
Deertongue Witchgrass	*Dichanthelium clandestinum*	FAC+
Black Cherry	*Prunus serotina*	FACU
Grass[a]	*Graminae* spp.	NA

[a] Not identifiable to the species level due to the absence of inflorescence.

Table 4.3-13
Sample Plot 2-B Soil Description

Depth (in.)	Color	Description	Mottles
0-12	Dark grayish brown (10YR 4/2)	Sandy loam, dry, friable	None
12-21	Yellowish brown (10YR 5/4)	Fine sand, dry, friable	Few, medium, faint, dark grayish brown (10YR 4/2)

Conclusion: Sample plot 2-B does not satisfy any of the three mandatory wetland technical criteria. This area is considered upland.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Kitten Branch
Applicant: Maryland Aviation Administration
Investigator: Roger J. Windschitl/Jason McNees
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 17, 1999
County: Anne Arundel
State: Maryland
Community ID: Wetland
Transect ID: Wetland B
Plot ID: 1-B

VEGETATION

Dominant Plant Species	Stratum	Indicator
Juncus effusus	Herb	FACW+
Graminae spp.	Herb	NA
Dichanthelium clandestinum	Herb	FAC+

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 66.67%

Remarks

The vegetation was mowed and the grass was not identifiable to the species level. Sample plot satisfies hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit 16.0 (in.)
Depth to saturated soil. 0 (in.)

Primary Wetland Hydrology Indicators

☐ Inundated
☒ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☒ Oxidized Root Channels in Upper 12"
☐ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Sample plot satisfies the wetland hydrology criterion. Aerial photographs were reviewed to initially identify potential wetland areas.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Kitten Branch	Date: December 17, 1999
Applicant: Maryland Aviation Administration	County: Anne Arundel
Investigator: Roger J. Windschitl/Jason McNees	State: Maryland
Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Community ID: Wetland
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No	Transect ID: Wetland B
Is the area a Problem Area? ☐ Yes ☒ No	Plot ID: 1-B

SOILS

Soil Map Unit Name: Bibb silt loam — Drainage Class: Poorly drained

Soil Tax Subgroup: Typic Haplaquents — Confirm Map Type: ☐ Yes ☒ No

Soil Profile Description:

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-24	A	10YR 3/1	7.5YR 3/4	Common, small, distinct	Clay loam, saturated

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☒ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Sample plot satisfies the hydric soils criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No

Wetland Hydrology Present? ☒ Yes ☐ No

Hydric Soils Present? ☒ Yes ☐ No

Is this Sampling within a Wetland? ☒ Yes ☐ No

Remarks

Sample plot satisfies the three mandatory wetland technical criteria.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Kitten Branch
Applicant: Maryland Aviation Administration
Investigator: Roger J. Windschitl/Jason McNees
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 17, 1999
County: Anne Arundel
State: Maryland
Community ID: Upland
Transect ID: Wetland B
Plot ID: 2-B

VEGETATION

Dominant Plant Species	Stratum	Indicator
Graminae spp.	Herb	NA
Dichanthelium clandestinum	Herb	FAC+
Prunus serotina	Herb	FACU

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 33.33%

If the FAC-neutral test is used, this data indicates a tie between hydrophytic and non-hydrophytic dominants. Nondominants must be used.

Remarks

The vegetation was mowed and the grass was not identifiable to the species level. Because only two of three dominants could be identified due to the disturbed state of the vegetation, the vegetation parameter cannot be used at this site to determine wetland or upland status.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit None (in.)
Depth to saturated soil None (in.)

Primary Wetland Hydrology Indicators

☐ Inundated
☐ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☐ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Indicators of hydrology absent; sample plot does not satisfy the wetland hydrology criterion. Aerial photographs were reviewed to initially identify potential wetland areas.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Kitten Branch
Applicant: Maryland Aviation Administration
Investigator: Roger J. Windschitl/Jason McNees
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 17, 1999
County: Anne Arundel
State: Maryland
Community ID: Upland
Transect ID: Wetland B
Plot ID: 2-B

SOILS

Soil Map Unit Name: Muirkirk loamy sand
Drainage Class: Well to excessively drained
Soil Tax Subgroup: Arenic Paleudults
Confirm Map Type: ☒ Yes ☐ No

Soil Profile Description:

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-12	A	10YR 4/2	None	None	Sandy loam, dry, friable
12-21	B1	10YR 5/4	10YR 4/2	Few, medium, faint	Fine sand, dry, friable

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☐ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Sample plot does not satisfy the hydric soils criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☐ Yes ☐ No
Wetland Hydrology Present? ☐ Yes ☒ No
Hydric Soils Present? ☐ Yes ☒ No
Is this Sampling within a Wetland? ☐ Yes ☒ No

Remarks

Despite the disturbed vegetative community, the sample plot does not satisfy the wetland hydrology or hydric soil criteria, and is considered upland.

WETLAND C

WETLAND C

Wetland C is occupies approximately 2.5 acres within the eastern floodplain of Kitten Branch, immediately southwest of the MD 170/I-195 interchange. It appears on the NWI map for Relay, MD as a palustrine forested broad-leaf deciduous wetland with a temporary water regime (PFO1A).

Sachs Branch flows into Wetland C from the east and assumes a braided pattern to its confluence with Kitten Branch. The wetland appears to receive hydrology from groundwater, overland sheet flow from Runway 15R-33L, and flooding from both Kitten Branch and Sachs Branch. The western edge of the wetland is disturbed by mowing and fill throughout portions of the soil profile. Field verification indicates that a large portion of the vegetative community is also dominated by herbaceous species. Based on the size of Wetland C and the different vegetative communities present, four sample plots were established to characterize the area: Sample Plots 1-C and 3-C were selected to represent Wetland C, and Sample Plots 2-C and 4-C were selected to represent the adjacent upland.

Sample Plot 1-C

On December 17, 1999, SES examined soils, vegetation, and hydrology at Sample Plot 1-C. Table 4.3-14 summarizes the investigation results, Table 4.3-15 presents dominant vegetation, and Table 4.3-16 summarizes soil data.

Table 4.3-14
Sample Plot 1-C General Information

Classification	Wetland
Sample Coordinates	553593.7250 North; 1401640.1880 East
Hydrology Indicators	Inundation, saturation, and oxidized rhizospheres in the upper 12 inches of the soil profile, drainage patterns, and water stained leaves
Percent Hydrophytic Vegetation	33% (see Table 4.3-15)
Hydric Soils	Yes (see Table 4.3-16)

Table 4.3-15
Sample Plot 1-C Dominant Vegetation

Common Name	Botanical Name	Indicator Status
Soft rush	*Juncus effusus*	FACW+
Spikerush[a,b]	*Eleocharis* spp.	FACW/OBL
Grass[a]	*Graminae* spp.	NA

[a] Not identifiable to the species level due to the absence of inflorescence.
[b] All species of *Eleocharis* have an indicator status of either FACW or OBL, therefore, the sample plot satisfies the hydrophytic vegetation criterion.

Table 4.3-16
Sample Plot 1-C Soil Description

Depth (in.)	Color	Description	Mottles
0-1	Very dark gray (10YR 3/1)	Silt loam, saturated	None
1-5	Light brownish gray (10YR 6/2)	Clay loam, moist	Common, medium, distinct, strong brown (7.5YR 5/8)
5-21	Dark grayish-brown (10YR 4/2)	Silty clay	Many, medium, distinct, dark brown (7.5YR 3/4) Common, coarse, distinct, black (7.5YR 2.5/1)

Conclusion: Sample Plot 1-C satisfies all three mandatory wetland technical criteria. The area was determined to be a palustrine emergent (PEM) wetland.

Sample Plot 2-C

On December 17, 1999, SES examined soils, vegetation, and hydrology at Sample Plot 2-C. Table 4.3-17 summarizes the investigation results, Table 4.3-18 presents dominant vegetation, and Table 4.3-19 summarizes soil data.

Table 4.3-17
Sample Plot 2-C General Information

Classification	Upland
Sample Coordinates	553613.9480 North; 1401675.7970 East
Hydrology Indicators	None
Percent Hydrophytic Vegetation	25% (see Table 4.3-18)
Hydric Soils	No (see Table 4.3-19)

Table 4.3-18
Sample Plot 2-C Dominant Vegetation

Common Name	Botanical Name	Indicator Status
Common Dandelion	*Taraxacum officinale*	FACU-
Japanese Honeysuckle	*Lonicera japonica*	FAC-
Yellow Bristle Grass	*Setaria glauca*	FAC
Grass[a]	*Graminae* spp.	NA

[a] Not identifiable to the species level due to the absence of inflorescence.

Table 4.3-19
Sample Plot 2-C Soil Description

Depth (in.)	Color	Description	Mottles
0-12	Very dark grayish-brown (10YR 3/2)	Sandy loam, moist	None
12-21	Yellowish-brown (10YR 5/4)	Sand, moist	Common, medium, faint, brownish-yellow (10YR 6/6) Few, medium, distinct, very dark gray (10YR 3/1)

Conclusion: Sample plot 2-C does not satisfy any of the three mandatory wetland technical criteria. The area was classified as an upland.

Sample Plot 3-C

On December 22, 1999, SES examined soils, vegetation, and hydrology at Sample Plot 3-C. Table 4.3-20 summarizes the investigation results, Table 4.3-21 presents dominant vegetation, and Table 4.3-22 summarizes soil data.

Table 4.3-20
Sample Plot 3-C General Information

Classification	Wetland
Sample Coordinates	553566.3150 North; 1401636.1080 East
Hydrology Indicators	Saturation in the upper 12 inches of the soil profile
Percent Hydrophytic Vegetation	60% (see Table 4.3-21)
Hydric Soils	Yes (see Table 4.3-22)

Table 4.3-21
Sample Plot 3-C Dominant Vegetation

Common Name	Botanical Name	Indicator Status
Black Willow	*Salix nigra*	FACW+
Common Reed	*Phragmites australis*	FACW
Japanese Honeysuckle	*Lonicera japonica*	FAC-
Fox Grape	*Vitis labrusca*	FACU
Common Greenbrier	*Smilax rotundifolia*	FAC

Table 4.3-22
Sample Plot 3-C Soil Description

Depth (in.)	Color	Description	Mottles
0-7	Dark gray (10YR 4/1)	Clay loam	None
7-15	Light yellowish brown (2.5Y 6/4)	Gravelly coarse sand, saturated	Common, coarse, distinct, strong brown (7.5YR 5/8)
15-23	Very dark gray (10YR 3/1)	Sandy clay loam, saturated	None

Conclusion: Sample Plot 3-C satisfies all three mandatory wetland technical criteria. The area was determined to be a palustrine emergent/palustrine scrub-shrub (PEM/PSS) wetland.

Sample Plot 4-C

On December 17, 1999, SES examined soils, vegetation, and hydrology at Sample Plot 4-C. Table 4.3-23 summarizes the investigation results, Table 4.3-24 presents dominant vegetation, and Table 4.3-25 summarizes soil data.

Table 4.3-23
Sample Plot 4-C General Information

Classification	Upland
Sample Coordinates	553904.7480 North; 1401666.4310 East
Hydrology Indicators	None
Percent Hydrophytic Vegetation	None (see Table 4.3-24)
Hydric Soils	No (see Table 4.3-25)

Table 4.3-24
Sample Plot 4-C Dominant Vegetation

Common Name	Botanical Name	Indicator Status
Grass spp.[a]	*Graminae* spp.	NA

[a] Not identifiable to the species level due to the absence of inflorescence.

Table 4.3-25
Sample Plot 4-C Soil Description

Depth (in.)	Color	Description	Mottles
0-6	Dark grayish-brown (10YR 4/2)	Clay loam	None
6-7	Brown (10YR 5/3)	Sandy clay loam	None
7-12	Yellowish-brown (10YR 5/6)	Coarse sand, gravelly, moist	None
12-21	Dark grayish-brown (10YR 4/2)	Clay loam	Common, medium, distinct, strong brown (7.5YR 4/6)

Conclusion: Sample plot 4-C does not satisfy any of the three mandatory wetland technical criteria. The area was classified as an upland.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Kitten Branch
Applicant: Maryland Aviation Administration
Investigator: Roger J. Windschitl/Jason McNees
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 17, 1999
County: Anne Arundel
State: Maryland
Community ID: Wetland
Transect ID: Wetland C
Plot ID: 1-C

VEGETATION

Dominant Plant Species	Stratum	Indicator
Juncus effusus	Herb	FACW+
Graminae spp.	Herb	NA
Eleocharis spp.	Herb	FACW/OB

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 33.33%

Remarks

The vegetation was mowed, and neither the grass nor Eleocharis were identifiable to the species level. All species of elocharis have an indicator status of either FACW or OBL, and Symplocarpus foetidus, which is OBL, was observed nearby. Therefore, the sample plot satisfies the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water 1.0-5.0 (in.)
Depth to free water in pit None (in.)
Depth to saturated soil 0 (in.)

Primary Wetland Hydrology Indicators

☒ Inundated
☒ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☒ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☒ Oxidized Root Channels in Upper 12"
☒ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Sample plot satisfies the wetland hydrology criterion. Aerial photographs were reviewed to initially identify potential wetland areas.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Kitten Branch	Date: December 17, 1999
Applicant: Maryland Aviation Administration	County: Anne Arundel
Investigator: Roger J. Windschitl/Jason McNees	State: Maryland
Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Community ID: Wetland
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No	Transect ID: Wetland C
Is the area a Problem Area? ☐ Yes ☒ No	Plot ID: 1-C

SOILS

Soil Map Unit Name: Bibb silt loam — Drainage Class: Poorly drained

Soil Tax Subgroup: Typic Haplaquents — Confirm Map Type: ☐ Yes ☒ No

Soil Profile Description:

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-1	A	10YR 3/1	None	None	Silt loam, saturated
1-5	B1	10YR 6/2	7.5YR 5/8	Common, med., distinct	Clay loam, moist
5-21	B2	10YR 4/2	7.5YR 3/4	Many, med., distinct	Silty clay
			7.5YR 2.5/1	Common, coarse, distinct	

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☒ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Sample plot satisfies the hydric soils criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No

Wetland Hydrology Present? ☒ Yes ☐ No

Hydric Soils Present? ☒ Yes ☐ No

Is this Sampling within a Wetland? ☒ Yes ☐ No

Remarks

Sample plot satisfies the three mandatory wetland technical criteria.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Kitten Branch
Applicant: Maryland Aviation Administration
Investigator: Roger J. Windschitl/Jason McNees
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 17, 1999
County: Anne Arundel
State: Maryland
Community ID: Upland
Transect ID: Wetland C
Plot ID: 2-C

VEGETATION

Dominant Plant Species	Stratum	Indicator
Graminae spp.	Herb	NA
Taraxacum officinale	Herb	FACU-
Lonicera japonica	Herb	FAC-
Setaria glauca	Herb	FAC

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 25.00%

If the FAC-neutral test is used, this data does NOT provide a secondary indicator of wetland hydrology

Remarks

Vegetation was mowed and the grass was not identifiable to the species level. Sample plot does not satisfy the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit None (in.)
Depth to saturated soil 18.0 (in.)

Primary Wetland Hydrology Indicators

☐ Inundated
☐ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☐ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Indicators of hydrology absent; sample plot does not satisfy the wetland hydrology criterion. Aerial photographs were reviewed to initially identify potential wetland areas.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Kitten Branch
Applicant: Maryland Aviation Administration
Investigator: Roger J. Windschitl/Jason McNees
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 17, 1999
County: Anne Arundel
State: Maryland
Community ID: Upland
Transect ID: Wetland C
Plot ID: 2-C

SOILS

Soil Map Unit Name: Cut and fill land
Soil Tax Subgroup: NA
Drainage Class: Variable
Confirm Map Type: ☒ Yes ☐ No

Soil Profile Description:

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-12	A	10YR 3/2	None	None	Sandy loam, moist
12-21	B1	10YR 5/4	10YR 6/6	Common, medium, faint	Sand, moist
			10YR 3/1	Few, medium, distinct	

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☐ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Sample plot does not satisfy any of the hydric soils criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☐ Yes ☒ No
Wetland Hydrology Present? ☐ Yes ☒ No
Hydric Soils Present? ☐ Yes ☒ No
Is this Sampling within a Wetland? ☐ Yes ☒ No

Remarks

Sample plot does not satisfy the three mandatory wetland technical criteria.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Kitten Branch
Applicant: Maryland Aviation Administration
Investigator: Roger J. Windschitl/Jason McNees
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 22, 1999
County: Anne Arundel
State: Maryland
Community ID: Wetland
Transect ID: Wetland C
Plot ID: 3-C

VEGETATION

Dominant Plant Species	Stratum	Indicator
Salix nigra	Tree	FACW+
Phragmites australis	Herb	FACW
Lonicera japonica	Vine	FAC-
Vitis labrusca	Vine	FACU
Smilax rotundifolia	Vine	FAC

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 60.00%

If the FAC-neutral test is used, this data indicates a tie between hydrophytic and non-hydrophytic dominants. Nondominants must be used.

Remarks

Sample plot satisfies the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit 9.0 (in.)
Depth to saturated soil 5.0 (in.)

Primary Wetland Hydrology Indicators

☐ Inundated
☒ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☐ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Sample plot satisfies hydrology criterion. Aerial photographs were reviewed to initially identify potential wetland areas.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Kitten Branch
Applicant: Maryland Aviation Administration
Investigator: Roger J. Windschitl/Jason McNees
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 22, 1999
County: Anne Arundel
State: Maryland
Community ID: Wetland
Transect ID: Wetland C
Plot ID: 3-C

SOILS

Soil Map Unit Name: Bibb silt loam
Drainage Class: Poorly drained
Soil Tax Subgroup: Typic Haplaquents
Confirm Map Type: ☐ Yes ☒ No

Soil Profile Description:

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-7	A	10YR 4/1	None	None	Clay loam
7-15	B1	2.5Y 6/4	7.5YR 5/8	Common, coarse, distinct	Gravelly coarse sand, saturated
15-23	B2	10YR 3/1	None	None	Sandy clay loam, saturated

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☒ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Area is part of the Kitten Branch floodplain, and the area contains braided tributaries.
Sample plot satisfies the hydric soil criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No
Wetland Hydrology Present? ☒ Yes ☐ No
Hydric Soils Present? ☒ Yes ☐ No
Is this Sampling within a Wetland? ☒ Yes ☐ No

Remarks

Sample plot satisfies all three mandatory wetland technical criteria.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Kitten Branch
Applicant: Maryland Aviation Administration
Investigator: Roger J. Windschitl/Jason McNees
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 17, 1999
County: Anne Arundel
State: Maryland
Community ID: Upland
Transect ID: Wetland C
Plot ID: 4-C

VEGETATION

Dominant Plant Species	Stratum	Indicator
Graminae spp.	Herb	NA

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 0.00%

Remarks

The vegetation was mowed, and the single dominant grass was not identifiable to the species level.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit None (in.)
Depth to saturated soil None (in.)

Primary Wetland Hydrology Indicators

☐ Inundated
☐ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☐ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Indicators of hydrology absent; sample plot does not satisfy the wetland hydrology criterion. Aerial photographs were reviewed to initially identify potential wetland areas.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Kitten Branch
Applicant: Maryland Aviation Administration
Investigator: Roger J. Windschitl/Jason McNees
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 17, 1999
County: Anne Arundel
State: Maryland
Community ID: Upland
Transect ID: Wetland C
Plot ID: 4-C

SOILS

Soil Map Unit Name: Cut and fill land
Drainage Class: Variable
Soil Tax Subgroup: NA
Confirm Map Type: ☒ Yes ☐ No

Soil Profile Description:

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-6	A	10YR 4/2	None	None	Clay loam
6-7	B1	10YR 5/3	None	None	Sandy clay loam
7-12	B2	10YR 5/6	None	None	Coarse sand, gravelly, moist
12-21	B3	10YR 4/2	7.5YR 4/6	Common, med. distinct	Clay loam

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☐ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Soil consists of fill material. Sample plot does not satisfy the hydric soil criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☐ Yes ☒ No
Wetland Hydrology Present? ☐ Yes ☒ No
Hydric Soils Present? ☐ Yes ☒ No
Is this Sampling within a Wetland? ☐ Yes ☒ No

Remarks

Sample plot does not satisfy any of the three mandatory wetland technical criteria.

WETLAND D

WETLAND D

Wetland D is within the western floodplain of Kitten Branch, immediately south of MD Route 170, and east of the Northrop Grumman facility. Wetland D appears on the NWI map for Relay, Maryland, as a palustrine forested, broad-leaved deciduous wetland with a temporary water regime (PFO1A).

Wetland D occupies approximately 0.33 acre and receives hydrology as groundwater, overland sheet flow from nearby impervious areas and flooding from Kitten Branch. Sample Plot 1-D was selected to characterize Wetland D, and Sample Plot 2-D was selected to represent the surrounding upland.

Sample Plot 1-D

On December 21, 1999, SES examined soils, vegetation, and hydrology at Sample Plot 1-D. Table 4.3-26 summarizes the investigation results, Table 4.3-27 presents dominant vegetation, and Table 4.3-28 summarizes soil data.

Table 4.3-26
Sample Plot 1-D General Information

Classification	Wetland
Sample Coordinates	553801.2770 North; 1401378.3130 East
Hydrology Indicators	Saturation and oxidized rhizospheres in the upper 12 inches of the soil profile, drift lines, sediment deposits, drainage patterns, and water-stained leaves
Percent Hydrophytic Vegetation	67% (see Table 4.3-27)
Hydric Soils	Yes (see Table 4.3-28)

Table 4.3-27
Sample Plot 1-D Dominant Vegetation

Common Name	Botanical Name	Indicator Status
Red Maple	*Acer rubrum*	FAC
Southern Arrowwood	*Viburnum dentatum*	FAC
Green Ash	*Fraxinus pensylvanica*	FACW
Japanese Honeysuckle	*Lonicera japonica*	FAC-
Fox Grape	*Vitis labrusca*	FACU
Common Greenbrier	*Smilax rotundifolia*	FAC

Table 4.3-28
Sample Plot 1-D Soil Description

Depth (in.)	Color	Description	Mottles
0-2	Very dark grayish-brown (10YR 3/2)	Sandy loam, saturated	Common, medium, distinct, dark red (2.5YR 3/6)
2-6	Very dark brown (10YR 2/2)	Sandy clay, saturated	Common, medium, distinct, dark reddish-brown (5YR 3/4) Few, small, faint, dark yellowish-brown (10YR 4/4)
6-11	Dark grayish-brown (10YR 4/2)	Sandy clay, saturated	Few, small, distinct, black (10YR 2/1) Few, medium, distinct, red (2.5YR 4/8)
11+	Auger refusal		

Conclusion: Sample Plot 1-D satisfies all three mandatory wetland technical criteria. The area was confirmed to be a palustrine, forested, broad-leaved deciduous (PF01) wetland as indicated by the NWI Wetland Map for Relay, Maryland

Sample Plot 2-D

On December 21, 1999, SES examined soils, vegetation, and hydrology at Sample Plot 2-D. Table 4.3-29 summarizes the investigation results, Table 4.3-30 presents dominant vegetation, and Table 4.3-31 summarizes soil data.

Table 4.3-29
Sample Plot 2-D General Information

Classification	Upland
Sample Coordinates	553734.0740 North; 1401377.1960 East
Hydrology Indicators	None
Percent Hydrophytic Vegetation	80% (see Table 4.3-30)
Hydric Soils	No (see Table 4.3-31)

Table 4.3-30
Sample Plot 2-D Dominant Vegetation

Common Name	Botanical Name	Indicator Status
Pin Oak	*Quercus palustris*	FACW
Red Maple	*Acer rubrum*	FAC
Box-Elder	*Acer negundo*	FAC+
Green Ash	*Fraxinus pennsylvanica*	FACW
Japanese Honeysuckle	*Lonicera japonica*	FAC-

Table 4.3-31
Sample Plot 2-D Soil Description

Depth (in.)	Color	Description	Mottles
0-3	Very dark grayish-brown (10YR 3/2)	Sandy silt	Common, medium, distinct, dark yellowish-brown (10YR 4/4)
3-7	Dark yellowish-brown (10YR 4/6)	Silty sand	Common, coarse, distinct, yellowish-red (5YR 5/8) Few, small, distinct, dark red (2.5YR 3/6)
7-11	Yellowish brown (10YR 5/4)	Sandy silt	Few, small, faint, brownish-yellow (10YR 6/6) Few, small, distinct, dark red (2.5YR 3/6)
11-26	Brown (10YR 4/3)	Sand	Few, medium, distinct, white (10YR 8/1) Few, medium, distinct, dark reddish-brown (2.5YR 2.5/4)

Conclusion: Sample plot 2-D does not satisfy two of the three mandatory wetland technical criteria. The area was classified as an upland.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Kitten Branch
Applicant: Maryland Aviation Administration
Investigator: Roger J. Windschitl/Leyla Lange
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 21, 1999
County: Anne Arundel
State: Maryland
Community ID: Wetland
Transect ID: Wetland D
Plot ID: 1-D

VEGETATION

Dominant Plant Species	Stratum	Indicator
Fraxinus pennsylvanica	Tree	FACW
Acer rubrum	Tree	FAC
Viburnum dentatum	Shrub	FAC
Lonicera japonica	Vine	FAC-
Smilax rotundifolia	Vine	FAC
Vitis labrusca	Vine	FACU

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 66.67%

If the FAC-neutral test is used, this data does NOT provide a secondary indicator of wetland hydrology

Remarks

Sample plot satisfies the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit 3.5 (in.)
Depth to saturated soil 1.0 (in.)

Primary Wetland Hydrology Indicators

☐ Inundated
☒ Saturated in Upper 12 Inches
☐ Water Marks
☒ Drift Lines
☒ Sediment Deposits
☒ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☒ Oxidized Root Channels in Upper 12"
☒ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Sample plot satisfies the wetland hydrology criterion. Aerial photographs were reviewed to initially identify potential wetland areas.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Kitten Branch
Applicant: Maryland Aviation Administration
Investigator: Roger J. Windschitl/Leyla Lange
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 21, 1999
County: Anne Arundel
State: Maryland
Community ID: Wetland
Transect ID: Wetland D
Plot ID: 1-D

SOILS

Soil Map Unit Name: Bibb silt loam
Drainage Class: Poorly drained
Soil Tax Subgroup: Typic Haplaquents
Confirm Map Type: ☐ Yes ☒ No

Soil Profile Description:

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-2	A	10YR 3/2	2.5YR 3/6	Common, med., distinct	Sandy loam, saturated
2-6	B1	10YR 2/2	5YR 3/4	Common, med., distinct	Sandy clay, saturated
			10YR 4/4	Few, small, faint	
6-11	B2	10YR 4/2	10YR 2/1	Few, small, distinct	Sandy clay, saturated
			2.5YR 4/8	Few, med., distinct	
11+					Refusal

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☐ Gleyed or Low-Chroma Colors
☒ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Sample plot satisfies hydric soils criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No
Wetland Hydrology Present? ☒ Yes ☐ No
Hydric Soils Present? ☒ Yes ☐ No
Is this Sampling within a Wetland? ☒ Yes ☐ No

Remarks

Sample plot satisfies the three mandatory wetland technical criteria.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Kitten Branch
Applicant: Maryland Aviation Administration
Investigator: Roger J. Windschitl/Leyla Lange
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 21, 1999
County: Anne Arundel
State: Maryland
Community ID: Upland
Transect ID: Wetland D
Plot ID: 2-D

VEGETATION

Dominant Plant Species	Stratum	Indicator
Quercus palustris	Tree	FACW
Acer rubrum	Tree	FAC
Acer negundo	Shrub	FAC+
Fraxinus pennsylvanica	Shrub	FACW
Lonicera japonica	Herb	FAC-

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 80.00%

If the FAC-neutral test is used, this data provides a secondary indicator of wetland hydrology

Remarks

Sample plot satisfies the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit None (in.)
Depth to saturated soil None (in.)

Primary Wetland Hydrology Indicators

☐ Inundated
☐ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☐ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Indicators of hydrology absent; sample plot does not satisfy the wetland hydrology criterion. Aerial photographs were reviewed to initially identify potential wetland areas.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Kitten Branch
Applicant: Maryland Aviation Administration
Investigator: Roger J. Windschitl/Leyla Lange
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 21, 1999
County: Anne Arundel
State: Maryland
Community ID: Upland
Transect ID: Wetland D
Plot ID: 2-D

SOILS

Soil Map Unit Name: Cut and fill land
Drainage Class: Variable
Soil Tax Subgroup: NA
Confirm Map Type: ☒ Yes ☐ No

Soil Profile Description:

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-3	A	10YR 3/2	10YR 4/4	Common, med., distinct	Sandy silt
3-7	B1	10YR 4/6	5YR 5/8	Common, coarse, prom.	Silty sand
			2.5YR 3/6	Few, small, distinct	
7-11	B2	10YR 5/4	10YR 6/6	Few, small, faint	Sandy silt
			2.5YR 3/6	Few, small, distinct	
11-26	B3	10YR 4/3	10YR 8/1	Few, med., distinct	Sand
			2.5YR 2.5/4	Few, med., distinct	

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☐ Gleyed or Low-Chroma Colors
☒ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Field invetigations indicate that the soil at this site may consist of fill material. Sample plot does not satisfy the hydric soils criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No
Wetland Hydrology Present? ☐ Yes ☒ No
Hydric Soils Present? ☐ Yes ☒ No
Is this Sampling within a Wetland? ☐ Yes ☒ No

Remarks

Sample plot does not satisfy two of the three mandatory wetland technical criteria.

WETLAND E

WETLAND E

Wetland E occupies approximately 1.3 acres within the eastern floodplain of Kitten Branch, immediately north of Taxiway F and east of Taxiway W (see Exhibit 7). Wetland E does not appear on the NWI map for Relay, Maryland.

Wetland E receives hydrology as groundwater, overland sheet flow, and flooding from Kitten Branch. Sample Plot 1-E was selected to characterize Wetland E, and Sample Plot 2-E was selected to represent the adjacent upland.

Sample Plot 1-E

On December 21, 1999, SES examined soils, vegetation, and hydrology at Sample Plot 1-E. Table 4.3-32 summarizes the investigation results, Table 4.3-33 presents dominant vegetation, and Table 4.3-34 summarizes soil data.

Table 4.3-32
Sample Plot 1-E General Information

Classification	Wetland
Sample Coordinates	550661.4510 North; 14034450.8490 East
Hydrology Indicators	Saturation and oxidized rhizospheres in the upper 12 inches of the soil profile, and water-stained leaves
Percent Hydrophytic Vegetation	83% (see Table 4.3-33)
Hydric Soils	Yes (see Table 4.3-34)

Table 4.3-33
Sample Plot 1-E Dominant Vegetation

Common Name	Botanical Name	Indicator Status
Black Cherry	*Prunus serotina*	FACU
Red Maple	*Acer rubrum*	FAC
Southern Arrowwood	*Viburnum dentatum*	FAC
Skunk-cabbage	*Symplocarpus foetidus*	OBL
Sensitive Fern	*Onoclea sensibilis*	FACW
Common greenbrier	*Smilax rotundifolia*	FAC

Table 4.3-34
Sample Plot 1-E Soil Description

Depth (in.)	Color	Description	Mottles
0-1	Very dark brown (10YR 2/2)	Organic-fibric layer	None
1-12	Very dark grayish brown (10YR 3/2)	Sandy clay, saturated at 8 inches	Common, large, distinct, very dark brown (7.5YR 2.5/2) Common, medium, distinct, dark brown (7.5YR 3/4)
12-26	Very dark gray (10YR 3/1)	Silty clay, saturated	Common, small, distinct, dark brown (7.5YR 3/3) Few, medium, distinct, yellowish-red (5YR 4/6) Common, medium, distinct, strong brown (7.5YR 4/6)

Conclusion: Sample Plot 1-E satisfies all three mandatory wetland technical criteria. The area was determined to be a palustrine, forested, broad-leaved deciduous (PFO1) wetland.

Sample Plot 2-E

On December 21, 1999, SES examined soils, vegetation, and hydrology at Sample Plot 2-E. Table 4.3-35 summarizes the investigation results, Table 4.3-36 presents dominant vegetation, and Table 4.3-37 summarizes soil data.

Table 4.3-35
Sample Plot 2-E General Information

Classification	Upland
Sample Coordinates	550718.3610 North; 1403180.6540 East
Hydrology Indicators	Oxidized root channels in the upper 12 inches of the soil profile
Percent Hydrophytic Vegetation	40% (see Table 4.3-36)
Hydric Soils	No (see Table 4.3-37)

Table 4.3-36
Sample Plot 2-E Dominant Vegetation

Common Name	Botanical Name	Indicator Status
Eastern Cottonwood	*Populus deltoides*	FAC
Red Maple	*Acer rubrum*	FAC
Common Persimmon	*Diospyros virginiana*	FAC-
Japanese Honeysuckle	*Lonicera japonica*	FAC-
Blackberry[a]	*Rubus* spp.	NA

[a] *Rubus* spp. was not identifiable to the species level due to the absence of inflorescence or fruit.

Table 4.3-37
Sample Plot 2-E Soil Description

Depth (in.)	Color	Description	Mottles
0-1	Dark reddish-brown (2.5YR 3/4)	Silty sand	None
1-6	Dark red (2.5YR 3/6)	Silty sand	Common, medium, faint, dusky red (2.5YR 3/2)
6-11	Red (2.5YR 4/6)	Silty sand	Common, medium, faint, dark red (2.5YR 3/6) Common, medium, faint, dark reddish-brown (2.5YR 3/4)
11-22	Red (2.5YR 4/6)	Silty sand	Common, medium, distinct, brown (7.5YR 5/2) Few, medium, distinct, white (7.5YR 8/1) Few, small, faint, weak red (10R 4/4)

Conclusion: Sample plot 2-E does not satisfy any of the three mandatory wetland technical criteria. The area was classified as an upland.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Kitten Branch
Applicant: Maryland Aviation Administration
Investigator: Roger J. Windschitl/Leyla Lange
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 21, 1999
County: Anne Arundel
State: Maryland
Community ID: Wetland
Transect ID: Wetland E
Plot ID: 1-E

VEGETATION

Dominant Plant Species	Stratum	Indicator
Prunus serotina	Tree	FACU
Acer rubrum	Tree	FAC
Viburnum dentatum	Shrub	FAC
Smilax rotundifolia	Shrub	FAC
Symplocarpus foetidus	Herb	OBL
Onoclea sensibilis	Herb	FACW

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 83.33%

If the FAC-neutral test is used, this data provides a secondary indicator of wetland hydrology

Remarks

Sample plot satisfies the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit None (in.)
Depth to saturated soil 8.0 (in.)

Primary Wetland Hydrology Indicators

☐ Inundated
☒ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☒ Oxidized Root Channels in Upper 12"
☒ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Sample plot satisfies the wetland hydrology criterion. Aerial photographs were reviewed to initially identify potential wetland areas.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Kitten Branch	Date: December 21, 1999
Applicant: Maryland Aviation Administration	County: Anne Arundel
Investigator: Roger J. Windschitl/Leyla Lange	State: Maryland
Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Community ID: Wetland
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No	Transect ID: Wetland E
Is the area a Problem Area? ☐ Yes ☒ No	Plot ID: 1-E

SOILS

Soil Map Unit Name: Muirkirk loamy sand — Drainage Class: Well to excessively drained

Soil Tax Subgroup: Arenic Paleudults — Confirm Map Type: ☐ Yes ☒ No

Soil Profile Description:

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-1	A	10YR 2/2	None	None	Organic-fibric
1-12	B1	10YR 3/2	7.5YR 2.5/2	Common, large, distinct	Sandy clay, saturated at 8"
			7.5YR 3/4	Common, med., distinct	
12-26	B2	10YR 3/1	7.5 YR 3/3	Common, small, distinct	Silty clay, saturated
			5YR 4/6	Few, med., distinct	
			7.5YR 4/6	Common, med., distinct	

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☒ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Sample plot satisfies hydric soils criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No

Wetland Hydrology Present? ☒ Yes ☐ No

Hydric Soils Present? ☒ Yes ☐ No

Is this Sampling within a Wetland? ☒ Yes ☐ No

Remarks

Sample plot satisfies all three mandatory wetland technical criteria.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Kitten Branch
Applicant: Maryland Aviation Administration
Investigator: Roger J. Windschitl/Leyla Lange
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 21, 1999
County: Anne Arundel
State: Maryland
Community ID: Upland
Transect ID: Wetland E
Plot ID: 2-E

VEGETATION

Dominant Plant Species	Stratum	Indicator
Populus deltoides	Tree	FAC
Acer rubrum	Tree	FAC
Diospyros virginiana	Shrub	FAC-
Lonicera japonica	Herb	FAC-
Rubus spp.	Herb	NA

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 40.00%

If the FAC-neutral test is used, this data does NOT provide a secondary indicator of wetland hydrology

Remarks

Rubus was not identifiable to the species level due to the absence of inflorescence or fruit. Sample plot does not satisfy the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit None (in.)
Depth to saturated soil None (in.)

Primary Wetland Hydrology Indicators

☐ Inundated
☐ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☒ Oxidized Root Channels in Upper 12"
☐ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Sample plot does not satisfy the wetland hydrology criterion. Aerial photographs were reviewed to initially identify potential wetland areas.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Kitten Branch
Applicant: Maryland Aviation Administration
Investigator: Roger J. Windschitl/Leyla Lange
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 21, 1999
County: Anne Arundel
State: Maryland
Community ID: Upland
Transect ID: Wetland E
Plot ID: 2-E

SOILS

Soil Map Unit Name: Cut and fill land
Drainage Class: Variable
Soil Tax Subgroup: NA
Confirm Map Type: ☒ Yes ☐ No

Soil Profile Description:

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-1	A	2.5YR 3/4	None	None	Silty sand
1-6	B1	2.5YR 3/6	2.5 YR 3/2	Common, med., faint	Silty sand
6-11	B2	2.5YR 4/6	2.5YR 3/6	Common, med., faint	Silty sand
			2.5YR 3/4	Common, med., faint	
11-22	B3	2.5YR 4/6	7.5YR 5/2	Common, med., distinct	Silty sand
			7.5YR 8/1	Few, med., distinct	
			10R 4/4	Few, small, faint	

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☐ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Soil appears to consist of fill material. Sample plot does not satisfy the hydric soils criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☐ Yes ☒ No
Wetland Hydrology Present? ☐ Yes ☒ No
Hydric Soils Present? ☐ Yes ☒ No
Is this Sampling within a Wetland? ☐ Yes ☒ No

Remarks

Sample plot does not satisfy any of the three mandatory wetland technical criteria.

WETLAND F

WETLAND F

Wetland F includes the portion of Kitten Branch between Taxiway F and MD Route 170 (approximately 4,000 feet), as well as two unnamed tributaries of Kitten Branch that emerge from culverts beneath Runway 15R-33L. The first unnamed tributary is approximately 100 feet north of Taxiway F, and the second is approximately 1,500 feet northwest of Taxiway F. Both tributaries are approximately 400 feet long.

The riparian zone of the unnamed tributaries consists primarily of maintained turf, and both channels are lined with rip-rap. The portion of the Kitten Branch channel immediately south of Taxiway F was lined with rip rap, and the downstream area had a streambed was composed of a variety of materials that ranged from gravel, cobbles, and pebbles, to unconsolidated silt, sand, and clay. Extensive sediment deposition was observed, and some sections of the streambanks were were, entrenched, scoured, and were not vegetated. However, the vegetation in the riparian zone of Kitten Branch ranged from forested wetlands and upland forests, to emergent wetlands and maintained turf. At the time of the field visit, Kitten Branch and both unnamed tributaries had base flow. Wetland F was classified as Waters of the United States.

4.3.2 AOA Wetlands

As discussed previously, SES performed a preliminary investigation of 32 vegetated areas within the AOA, and retained seven areas for further investigation: Areas 6, 9, 10, 16, 29, 31, and the lower stormwater management pond (see Exhibit 6). Results of the detailed investigation indicated that:

- Areas 9 and 16 do not contain wetlands;
- Areas 6, 10, and the lower stormwater management pond meet the technical criteria for wetland classification, but they are constructed stormwater management features on upland soils;
- Area 29 contains five wetland areas associated with Kitten Branch; and
- Area 31 contains wetlands and Waters of the U.S.

Area 29 is greater than 5 acres; therefore, SES established three transects to perform the investigation. Site investigation photographs are presented in Appendix A.

WETLAND G

WETLAND G

Wetland G includes an unnamed tributary of Kitten Branch in a forested area of the southeast corner of Area 29 (see Exhibits 6 and 7). Wetland G appears on the NWI map for Relay, Maryland, as a palustrine forested broad-leaf deciduous wetland with a temporary water regime (PFO1A).

The tributary in Wetland G is formed by the confluence of two smaller streams: One stream flows eastward from a service road and might have been constructed as a drainage ditch. It has a very straight channel and appears to have been contiguous with Wetland I before the service road was constructed. It flows eastward for approximately 200 feet before its confluence with another unnamed stream that flows northward from Taxiway F.

From the confluence of these streams, the unnamed tributary in Wetland G meanders approximately 300 feet east to a culvert beneath Taxiway W and then continues eastward to Kitten Branch. The streambed ranges in composition from unconsolidated silt, sand, and clay to gravel and pebbles. Sediment deposition, debris accumulation, entrenching, and souring were observed, which indicates that the channel is subject to a flash flow regime. The banks of the tributary are vegetated with red maple. At the time of the field visit, the stream channel contained pooled water, but it did not contain base flow. Because water from this unnamed tributary drains to Kitten Branch, this intermittent stream was classified as Waters of the U.S.

WETLAND H

WETLAND H

Wetland H is south of Wetland G and approximately 350 feet north of Taxiway F (see Exhibit 7). Wetland H is approximately 0.2 acre and appears to receive hydrology as groundwater. This wetland does not appear on the NWI map for Relay, Maryland. Sample Plot 1-H was selected to characterize Wetland H, and Sample Plot 2-H was selected to represent the adjacent upland.

Sample Plot 1-H

On February 7, 2000, SES examined soils, vegetation, and hydrology at Sample Plot 1-H. Table 4.3-38 summarizes the investigation results, Table 4.3-39 presents dominant vegetation, and Table 4.3-40 summarizes soil data.

Table 4.3-38
Sample Plot 1-H General Information

Classification	Wetland
Sample Coordinates	550556.1300 North; 1402701.7720 East
Hydrology Indicators	Water-stained leaves and trees with adventitious root systems and multiple trunks
Percent Hydrophytic Vegetation	71% (see Table 4.3-39)
Hydric Soils	Yes (see Table 4.3-40)

Table 4.3-39
Sample Plot 1-H Dominant Vegetation

Common Name	Botanical Name	Indicator Status
Red Maple (trees)	*Acer rubrum*	FAC
Red Maple (saplings)	*Acer rubrum*	FACW
Black Cherry	*Prunus serotina*	FACU
Sassafras	*Sassafras albidum*	UPL
Black Gum	*Nyssa sylvatica*	FAC
Highbush Blueberry	*Vaccinium corymbosum*	FACW-
Common Greenbrier	*Smilax rotundifolia*	FAC

Table 4.3-40
Sample Plot 1-H Soil Description

Depth (in.)	Color	Description	Mottles
0-1	Very dark brown (10YR 2/2)	Organic-fibric layer	None
1-8	Dark grayish brown (10YR 4/2)	Sandy loam	Few, small, faint, yellowish brown (10YR 5/6)
8-21	Dark grayish brown (2.5Y 4/2)	Sandy loam, saturated at 15 inches	Common, small, distinct, yellowish brown (10YR 5/6)

Conclusion: Sample Plot 1-H satisfies all three mandatory wetland technical criteria. The area was determined to be a palustrine forested broad-leaved deciduous (PFO1) wetland.

Sample Plot 2-H

On February 7, 2000, SES examined soils, vegetation, and hydrology at Sample Plot 2-H. Table 4.3-41 summarizes the investigation results, Table 4.3-42 presents dominant vegetation, and Table 4.3-43 summarizes soil data.

Table 4.3-41
Sample Plot 2-H General Information

Classification	Upland
Sample Coordinates	550449.9330 North; 1402697.2900 East
Hydrology Indicators	None
Percent Hydrophytic Vegetation	33% (see Table 4.3-42)
Hydric Soils	No (see Table 4.3-43)

Table 4.3-42
Sample Plot 2-H Dominant Vegetation

Common Name	Botanical Name	Indicator Status
Black Cherry	*Prunus serotina*	FACU
Sassafras	*Sassafras albidum*	UPL
Fox Grape	*Vitis labrusca*	FACU
Common Greenbrier	*Smilax rotundifolia*	FAC
Poison Ivy	*Toxicodendron radicans*	FAC
Japanese Honeysuckle	*Lonicera japonica*	FAC-

Table 4.3-43
Sample Plot 2-H Soil Description

Depth (in.)	Color	Description	Mottles
0-5	Dark grayish brown (10YR 4/2)	Loamy sand	None
5-15	Light olive brown (2.5Y 5/4)	Loamy sand, moist	Few, small, faint, brownish-yellow (10YR 6/6)
15-21	Olive (2.5Y 6/6)	Sandy clay, moist	Common, large, distinct, light olive brown (2.5Y 5/3)

Conclusion: Sample plot 2-H does not satisfy any of the three mandatory wetland technical criteria. The area was classified as an upland.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - AOA
Applicant: Maryland Aviation Administration
Investigator: Jason McNees and Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: February 7, 2000
County: Anne Arundel
State: Maryland
Community ID: Wetland
Transect ID: Wetland H
Plot ID: 1-H

VEGETATION

Dominant Plant Species	Stratum	Indicator
Acer rubrum	Tree	FAC
Prunus serotina	Tree	FACU
Sassafras albidum	Sapling	UPL
Nyssa sylvatica	Sapling	FAC
Acer rubrum	Sapling	FAC
Vaccinium corymbosum	Shrub	FACW-
Smilax rotundifolia	Vine	FAC

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 71.43%

If the FAC-neutral test is used, this data does NOT provide a secondary indicator of wetland hydrology

Remarks

Sample plot satisfies the hydrophytic vegetation criterion. Dominant species in the herbaceous layer could not be determined due to heavy snow cover.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit None (in.)
Depth to saturated soil 15 (in.)

Primary Wetland Hydrology Indicators

☐ Inundated
☐ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☒ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☒ Other (Explain in Remarks)

Remarks

Trees were observed to have adventitious root systems and multiple branching of the trunk. Sample plot satisfies the wetland hydrology criterion.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - AOA	Date: February 7, 2000
Applicant: Maryland Aviation Administration	County: Anne Arundel
Investigator: Jason McNees and Jennifer Bird	State: Maryland
Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Community ID: Wetland
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No	Transect ID: Wetland H
Is the area a Problem Area? ☐ Yes ☒ No	Plot ID: 1-H

SOILS

Soil Map Unit Name: Rumford loamy sand — Drainage Class: Somewhat excessively drained

Soil Tax Subgroup: Typic Hapludults — Confirm Map Type: ☐ Yes ☒ No

Soil Profile Description:

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-1	O	10YR 2/2	None	None	Organic-fibric layer
1-8	A	10YR 4/2	10YR 5/6	Few, small, faint	Sandy loam
8-21	B1	2.5Y 4/2	10YR 5/6	Common, small, distinct	Sandy loam, saturated at 15"

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☒ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☒ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Sample plot satisfies the hydric soils criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No

Wetland Hydrology Present? ☒ Yes ☐ No

Hydric Soils Present? ☒ Yes ☐ No

Is this Sampling within a Wetland? ☒ Yes ☐ No

Remarks

Sample plot satisfies all three mandatory wetland technical criteria. Sample area was covered with approximately 6 inches of snow.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - AOA
Applicant: Maryland Aviation Administration
Investigator: Jason McNees and Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: February 7, 2000
County: Anne Arundel
State: Maryland
Community ID: Upland
Transect ID: Wetland H
Plot ID: 2-H

VEGETATION

Dominant Plant Species	Stratum	Indicator
Prunus serotina	Tree	FACU
Sassafras albidum	Sapling	UPL
Vitis labrusca	Vine	FACU
Smilax rotundifolia	Vine	FAC
Toxicodendron radicans	Vine	FAC
Lonicera japonica	Herb	FAC-

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 33.33%

If the FAC-neutral test is used, this data does NOT provide a secondary indicator of wetland hydrology

Remarks

Sample plot does not satisfy the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit None (in.)
Depth to saturated soil None (in.)

Primary Wetland Hydrology Indicators

☐ Inundated
☐ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☐ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Indicators of hydrology absent; sample plot does not satisfy the wetland hydrology criterion. Aerial photographs were reviewed to initially identify potential wetland areas.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - AOA	Date: February 7, 2000
Applicant: Maryland Aviation Administration	County: Anne Arundel
Investigator: Jason McNees and Jennifer Bird	State: Maryland
Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Community ID: Upland
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No	Transect ID: Wetland H
Is the area a Problem Area? ☐ Yes ☒ No	Plot ID: 2-H

SOILS

Soil Map Unit Name: Rumford loamy sand — Drainage Class: Somewhat excessively drained

Soil Tax Subgroup: Typic Hapludults — Confirm Map Type: ☒ Yes ☐ No

Soil Profile Description:

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-5	A	10YR 4/2	None	None	Loamy sand
5-15	B1	2.5Y 5/4	10YR 6/6	Few, small, faint	Loamy sand, moist
15-21	B2	2.5Y 6/6	2.5Y 5/3	Common, large, distinct	Sandy clay, moist

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☐ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Sample plot does not satisfy the hydric soil criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☐ Yes ☒ No

Wetland Hydrology Present? ☐ Yes ☒ No

Hydric Soils Present? ☐ Yes ☒ No

Is this Sampling within a Wetland? ☐ Yes ☒ No

Remarks

Sample plot does not satisfy any of the three mandatory wetland technical criterion. Sample area was covered with approximately 6 inches of snow.

WETLAND I

WETLAND I

Wetland I is a narrow, approximately 0.1-acre area immediately west of Wetland G and approximately 350 feet north of Taxiway F (see Exhibit7). It does not appear on the NWI map for Relay, Maryland.

Wetland I appears to have been constructed as a drainage ditch. This wetland is bounded by a service road to the east and appears to have been connected to Wetland G prior to construction of the road. Wetland I receives hydrology as groundwater. Sample Plot 1-I was selected to characterize Wetland I, and Sample Plot 2-I was chosen to represent the upland.

Sample Plot 1-I

On February 7, 2000, SES examined soils, vegetation, and hydrology at Sample Plot 1-I. Table 4.3-44 summarizes the investigation results, Table 4.3-45 presents dominant vegetation, and Table 4.3-46 summarizes soil data.

Table 4.3-44
Sample Plot 1-I General Information

Classification	Wetland
Sample Coordinates	550575.4140 North; 1402144.7300 East
Hydrology Indicators	Drainage patterns
Percent Hydrophytic Vegetation	60% (see Table 4.3-45)
Hydric Soils	Yes (see Table 4.3-46)

Table 4.3-45
Sample Plot 1-I Dominant Vegetation

Common Name	Botanical Name	Indicator Status
Red Maple	*Acer rubrum*	FAC
Tulip Poplar	*Liriodendron tulipifera*	FACU
Sourwood	*Oxydendrum arboreum*	FACU
Black Gum	*Nyssa sylvatica*	FAC
Common Greenbrier	*Smilax rotundifolia*	FAC

Table 4.3-46
Sample Plot 1-I Soil Description

Depth (in.)	Color	Description	Mottles
0-18	Very dark grayish-brown (10YR 3/2)	Silt loam, moist	Common, small, distinct, very dark brown (7.5YR 2.5/2)
18-23	Gray (10YR 5/1)	Fine sandy loam, saturated	None

Conclusion: Sample Plot 1-I satisfies all three mandatory wetland technical criteria. The area was determined to be a palustrine forested broad-leaved deciduous (PFO1) wetland.

Sample Plot 2-I

On February 7, 2000, SES examined soils, vegetation, and hydrology at Sample Plot 2-I. Table 4.3-47 summarizes the investigation results, Table 4.3-48 presents dominant vegetation, and Table 4.3-49 summarizes soil data.

Table 4.3-47
Sample Plot 2-I General Information

Classification	Upland
Sample Coordinates	550589.5800 North; 1402112.3500 East
Hydrology Indicators	None
Percent Hydrophytic Vegetation	75% (see Table 4.3-48)
Hydric Soils	No (see Table 4.3-49)

Table 4.3-48
Sample Plot 2-I Dominant Vegetation

Common Name	Botanical Name	Indicator Status
Red Maple	*Acer rubrum*	FAC
Common Greenbrier	*Smilax rotundifolia*	FAC
Japanese Honeysuckle	*Lonicera japonica*	FAC-

Table 4.3-49
Sample Plot 2-I Soil Description

Depth (in.)	Color	Description	Mottles
0-3	Yellowish-brown (10YR 5/4)	Clayey loam	None
3-8	Brown (10YR 4/3)	Sandy loam	Common, small, faint, very dark brown (10YR 2/2)
8-21	Dark yellowish-brown (10YR 4/4)	Sandy loam	Few, medium, faint, dark grayish-brown (10YR 4/2)

Conclusion: Sample plot 2-I satisfies only one of the three mandatory wetland technical criteria. The area was classified as an upland.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - AOA
Applicant: Maryland Aviation Administration
Investigator: Jason McNees and Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: February 7, 2000
County: Anne Arundel
State: Maryland
Community ID: Wetland
Transect ID: Wetland I
Plot ID: 1-I

VEGETATION

Dominant Plant Species	Stratum	Indicator
Acer rubrum	Tree	FAC
Liriodendron tulipifera	Tree	FACU
Oxydendrum arboreum	Sapling	FACU
Nyssa sylvatica	Tree	FAC
Smilax rotundifolia	Vine	FAC

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 60.00%

If the FAC-neutral test is used, this data does NOT provide a secondary indicator of wetland hydrology

Remarks

Sample plot satisfies the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit None (in.)
Depth to saturated soil 18 (in.)

Primary Wetland Hydrology Indicators

☐ Inundated
☐ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☒ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☐ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Sample plot satisfies the wetland hydrology criterion. Aerial photographs were reviewed to initially identify potential wetland areas.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - AOA
Applicant: Maryland Aviation Administration
Investigator: Jason McNees and Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: February 7, 2000
County: Anne Arundel
State: Maryland
Community ID: Wetland
Transect ID: Wetland I
Plot ID: 1-I

SOILS

Soil Map Unit Name: Rumford loamy sand
Drainage Class: Somewhat excessively drained
Soil Tax Subgroup: Typic Hapludults
Confirm Map Type: ☐ Yes ☒ No

Soil Profile Description:

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-18	A	10YR 3/2	7.5YR 2.5/2	Common, small, distinct	Silt loam, moist
18-23	B1	10YR 5/1	None	None	Fine sandy loam, saturated

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☒ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Sample plot satisfies the hydric soil criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No
Wetland Hydrology Present? ☒ Yes ☐ No
Hydric Soils Present? ☒ Yes ☐ No
Is this Sampling within a Wetland? ☒ Yes ☐ No

Remarks

Sample plot satisfies all three mandatory wetland technical criteria. Sample area was covered with approximately 6 inches of snow.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - AOA
Applicant: Maryland Aviation Administration
Investigator: Jason McNees and Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: February 7, 2000
County: Anne Arundel
State: Maryland
Community ID: Upland
Transect ID: Wetland I
Plot ID: 2-I

VEGETATION

Dominant Plant Species	Stratum	Indicator
Acer rubrum	Tree	FAC
Acer rubrum	Sapling	FAC
Lonicera japonica	Herb	FAC-
Smilax rotundifolia	Vine	FAC

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 75.00%

If the FAC-neutral test is used, this data does NOT provide a secondary indicator of wetland hydrology

Remarks

Sample plot satisfies the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit None (in.)
Depth to saturated soil None (in.)

Primary Wetland Hydrology Indicators

☐ Inundated
☐ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☐ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Indicators of hydrology absent; sample plot does not satisfy the wetland hydrology criterion. Aerial photographs were reviewed to initially identify potential wetland areas.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - AOA
Applicant: Maryland Aviation Administration
Investigator: Jason McNees and Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: February 7, 2000
County: Anne Arundel
State: Maryland
Community ID: Upland
Transect ID: Wetland I
Plot ID: 2-I

SOILS

Soil Map Unit Name: Rumford loamy sand
Drainage Class: Somewhat excessively drained
Soil Tax Subgroup: Typic Hapludults
Confirm Map Type: ☒ Yes ☐ No

Soil Profile Description:

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-3	A	10YR 5/4	None	None	Clayey loam
3-8	B1	10YR 4/3	10YR 2/2	Common, small, faint	Sandy loam
8-21	B2	10YR 4/4	10YR 4/2	Few, medium, faint	Sandy loam

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☐ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Sample plot does not satisfy the hydric soils criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No
Wetland Hydrology Present? ☐ Yes ☒ No
Hydric Soils Present? ☐ Yes ☒ No
Is this Sampling within a Wetland? ☐ Yes ☒ No

Remarks

Sample plot satisfies only one of the three mandatory wetland technical criteria. Sample area was covered with approximately 6 inches of snow.

WETLAND J

WETLAND J

Wetland J is approximately 350 feet north of Wetland G and 100 feet west of the Taxiway W. It occupies approximately 0.4 acre and does not appear on the NWI map for Relay, Maryland.

Remnants of a dirt road were observed immediately north of the wetland boundary. Wetland J is located on an eastward slope, and its eastern edge forms a small channel that enters a culvert beneath the taxiway and drains to Kitten Branch. Wetland J receives hydrology as groundwater. Sample Plot 1-J was chosen to characterize Wetland J, and Transect Plot T-2 was chosen to represent the adjacent wetland.

Sample Plot 1-J

On February 10, 2000, SES examined soils, vegetation, and hydrology at Sample Plot 1-J. Table 4.3-50 summarizes the investigation results, Table 4.3-51 presents dominant vegetation, and Table 4.3-52 summarizes soil data.

Table 4.3-50
Sample Plot 1-J General Information

Classification	Wetland
Sample Coordinates	551274.5370 North; 1402556.3020 East
Hydrology Indicators	Saturation in the upper 12 inches of the soil profile
Percent Hydrophytic Vegetation	75% (see Table 4.3-52)
Hydric Soils	Yes (see Table 4.3-53)

Table 4.3-51
Sample Plot 1-J Dominant Vegetation

Common Name	Botanical Name	Indicator Status
Red Maple	*Acer rubrum*	FAC
Tulip Poplar	*Liriodendron tulipifera*	FACU
Common Greenbrier (vine)	*Smilax rotundifolia*	FAC
Common Greenbrier (herb)	*Smilax rotundifolia*	FAC

Table 4.3-52
Sample Plot 1-J Soil Description

Depth (in.)	Color	Description	Mottles
0-1	Black (10YR 2/1)	Organic-fibric layer, moist	None
1-18	Dark gray (10YR 4/1)	Sandy loam, saturated	None
18-21	Light gray (10YR 7/1)	Sand, saturated	None

Conclusion: Sample Plot 1-J satisfies all three mandatory wetland technical criteria. The area was determined to be a palustrine, forested, broad-leaved deciduous (PFO1) wetland.

Sample Plot T-2

Due to the proximity of Wetland J to Transect 1, Sample Plot T1-2 was chosen to represent the adjacent upland. On December 23, 1999, SES examined soils, vegetation, and hydrology at Sample Plot T1-2. Table 4.3-53 summarizes the investigation results, Table 4.3-54 presents dominant vegetation, and Table 4.3-55 summarizes soil data.

Table 4.3-53
Sample Plot T1-2 General Information

Classification	Upland
Sample Coordinates	551118.5080 North; 1402615.8590 East
Hydrology Indicators	None
Percent Hydrophytic Vegetation	75% (see Table 4.3-54)
Hydric Soils	No (see Table 4.3-55)

Table 4.3-54
Sample Plot T1-2 Dominant Vegetation

Common Name	Botanical Name	Indicator Status
Red Maple (tree)	*Acer rubrum*	FAC
Red Maple (shrub)	*Acer rubrum*	FAC
Red Maple (sapling)	*Acer rubrum*	FAC
Ground Pine	*Lycopodium flabelliforme*	UPL
Common Greenbrier	*Smilax rotundifolia*	FAC
Japanese Honeysuckle	*Lonicera japonica*	FAC-
English Ivy	*Hedera helix*	UPL

Table 4.3-55
Sample Plot T1-2 Soil Description

Depth (in.)	Color	Description	Mottles
0-2	Very dark brown (10YR 2/2)	Organic-fibric layer	None
2-18	Light olive brown (2.5Y 5/4)	Loamy sand	None
18-21	Brownish yellow (10YR 6/6)	Loamy sand	Common, medium, distinct, brown (10YR 4/3)

Conclusion: Sample plot T1-2 satisfies only one of the three mandatory wetland technical criteria. The area was classified as an upland.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - AOA
Applicant: Maryland Aviation Administration
Investigator: Jason McNees and Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: February 10, 2000
County: Anne Arundel
State: Maryland
Community ID: Wetland
Transect ID: Wetland J
Plot ID: 1-J

VEGETATION

Dominant Plant Species	Stratum	Indicator
Acer rubrum	Tree	FAC
Liriodendron tulipifera	Shrub	FACU
Smilax rotundifolia	Herb	FAC
Smilax rotundifolia	Vine	FAC

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-): 75.00%

If the FAC-neutral test is used, this data does NOT provide a secondary indicator of wetland hydrology

Remarks

Sample plot satisfies the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit 13 (in.)
Depth to saturated soil 1 (in.)

Primary Wetland Hydrology Indicators

☐ Inundated
☒ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☐ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Sample plot satisfies the wetland hydrology criterion. Aerial photographs were reviewed to initially identify potential wetland areas.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - AOA
Applicant: Maryland Aviation Administration
Investigator: Jason McNees and Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: February 10, 2000
County: Anne Arundel
State: Maryland
Community ID: Wetland
Transect ID: Wetland J
Plot ID: 1-J

SOILS

Soil Map Unit Name: Rumford loamy sand
Drainage Class: Somewhat excessively drained
Soil Tax Subgroup: Typic Hapludults
Confirm Map Type: ☐ Yes ☒ No

Soil Profile Description:

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-1	O	10YR 2/1	None	None	Organic-fibric layer, moist
1-18	A	10YR 4/1	None	None	Sandy loam, saturated
18-21	B1	10YR 7/1	None	None	Sand, saturated

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☒ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Sample plot satisfies the hydric soil criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No
Wetland Hydrology Present? ☒ Yes ☐ No
Hydric Soils Present? ☒ Yes ☐ No
Is this Sampling within a Wetland? ☒ Yes ☐ No

Remarks

Sample plot satisfies all three mandatory wetland technical criterion. Sample area was covered with approximately 6 inches of snow.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - AOA
Applicant: Maryland Aviation Administration
Investigator: Jason McNees/Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 23, 1999
County: Anne Arundel
State: Maryland
Community ID: Upland
Transect ID: Transect 1 (A29)
Plot ID: T1-2

VEGETATION

Dominant Plant Species	Stratum	Indicator
Acer rubrum	Tree	FAC
Acer rubrum	Sapling	FAC
Acer rubrum	Shrub	FAC
Lycopodium obscurum	Herb	FACU
Smilax rotundifolia	Herb	FAC
Lonicera japonica	Herb	FAC-
Hedera helix	Vine	NA
Smilax rotundifolia	Vine	FAC

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 62.50%

If the FAC-neutral test is used, this data does NOT provide a secondary indicator of wetland hydrology

Remarks

Sample plot satisfies the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit None (in.)
Depth to saturated soil None (in.)

Primary Wetland Hydrology Indicators

☐ Inundated
☐ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☐ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Indicators of hydrology absent; sample plot does not satisfy the wetland hydrology criterion. Aerial photographs were reviewed to initially identify potential wetland areas.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - AOA
Applicant: Maryland Aviation Administration
Investigator: Jason McNees/Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 23, 1999
County: Anne Arundel
State: Maryland
Community ID: Upland
Transect ID: Transect 1 (A29)
Plot ID: T1-2

SOILS

Soil Map Unit Name: Rumford loamy sand
Drainage Class: Somewhat excessively drained
Soil Tax Subgroup: Typic Hapludults
Confirm Map Type: ☒ Yes ☐ No

Soil Profile Description:

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-2	A	10YR 2/2	None	None	Organic-fibric
2-18	B1	2.5Y 5/4	None	None	Loamy sand
18-21	B2	10 YR 6/6	10YR 4/3	Common, med., distinct	Loamy sand

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☐ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Sample plot does not satisfy the hydric soils criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No
Wetland Hydrology Present? ☐ Yes ☒ No
Hydric Soils Present? ☐ Yes ☒ No
Is this Sampling within a Wetland? ☐ Yes ☒ No

Remarks

Sample plot satisfies only one of the three mandatory wetland technical criteria.

WETLAND K

Wetland K is in Area 29, approximately 600 feet north of Taxiway F, and occupies approximately 0.1 acre. The wetland appears to receive hydrology as groundwater and is not shown on the NWI map.

Wetland K originates approximately 200 feet west of Taxiway W and drains eastward to a ditch that flows south and adjacent to the taxiway. An old foundation was observed nearby, and it appears that the wetland may have served as a drainage ditch in the past. Sample Plot 1-K was chosen to characterize Wetland K, and Sample Plot 2-K was chosen to represent the adjacent wetland.

Sample Plot 1-K

On December 23, 1999, SES examined soils, vegetation, and hydrology at Sample Plot 1-K. Table 4.3-56 summarizes the investigation results, Table 4.3-57 presents dominant vegetation, and Table 4.3-58 summarizes soil data.

Table 4.3-56
Sample Plot 1-K General Information

Classification	Wetland
Sample Coordinates	550986.2030 North; 1402792.4050 East
Hydrology Indicators	Saturation in the upper 12 inches of the soil profile and drainage patterns
Percent Hydrophytic Vegetation	75% (see Table 4.3-57)
Hydric Soils	Yes (see Table 4.3-58)

Table 4.3-57
Sample Plot 1-K Dominant Vegetation

Common Name	Botanical Name	Indicator Status
Red Maple	*Acer rubrum*	FAC
Soft Rush	*Juncus effusus*	FACW+
Cat Greenbrier	*Smilax glauca*	FACU
Common Greenbrier	*Smilax rotundifolia*	FAC

Table 4.3-58
Sample Plot 1-K Soil Description

Depth (in.)	Color	Description	Mottles
0-2	Black (10YR 2/1)	Sandy loam, moist	None
2-12	Very dark gray (10YR 3/1)	Loamy sand, gravelly, saturated	None

WETLAND K

Table 4.3-58
Sample Plot 1-K Soil Description

Depth (in.)	Color	Description	Mottles
12+	Very dark gray (10YR 3/1)	Liquid texture; unable to get a profile below 12 inches	None

Conclusion: Sample plot 1-K satisfies the three mandatory wetland technical criteria. This area is classified as a palustrine, forested, broad-leaved deciduous wetland (PFO1).

Sample Plot 2-K

On February 10, 2000, SES examined soils, vegetation, and hydrology at Sample Plot 2-K. Table 4.3-59 summarizes the investigation results, Table 4.3-60 presents dominant vegetation, and Table 4.3-61 summarizes soil data.

Table 4.3-59
Sample Plot 2-K General Information

Classification	Upland
Sample Coordinates	550930.7420 North; 1402808.1780 East
Hydrology Indicators	None
Percent Hydrophytic Vegetation	57% (see Table 4.3-60)
Hydric Soils	No (see Table 4.3-61)

Table 4.3-60
Sample Plot 2-K Dominant Vegetation

Common Name	Botanical Name	Indicator Status
Red Maple (tree)	*Acer rubrum*	FAC
Red Maple (sapling)	*Acer rubrum*	FAC
Virginia Pine	*Pinus virginiana*	UPL
American Holly	*Ilex opaca*	FACU+
Highbush Blueberry	*Vaccinium corymbosum*	FACW-
Ground Pine	*Lycopodium flabelliforme*	UPL
Common Greenbrier	*Smilax rotundifolia*	FAC

Table 4.3-61
Sample Plot 2-K Soil Description

Depth (in.)	Color	Description	Mottles
0-1	Very dark brown (10YR 2/2)	Fine sandy loam	None

Table 4.3-61
Sample Plot 2-K Soil Description

Depth (in.)	Color	Description	Mottles
1-18	Light olive brown (2.5Y 5/4)	Fine sandy loam, moist	Few, small, distinct, strong brown (7.5YR 4/6) Few, medium, distinct, brownish yellow (10YR 6/8)
18-21	Brownish yellow (10YR 6/8)	Fine sandy loam, moist	Common, small, distinct, red (10R 4/8)

Conclusion: Sample Plot 2-K only satisfies one of the three mandatory wetland technical criteria. The area was classified as an upland.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - AOA
Applicant: Maryland Aviation Administration
Investigator: Jason McNees/Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 23, 1999
County: Anne Arundel
State: Maryland
Community ID: Wetland
Transect ID: Wetland K
Plot ID: 1-K

VEGETATION

Dominant Plant Species	Stratum	Indicator
Acer rubrum	Tree	FAC
Juncus effusus	Herb	FACW+
Smilax glauca	Herb	FACU
Smilax rotundifolia	Vine	FAC

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 75.00%

If the FAC-neutral test is used, this data indicates a tie between hydrophytic and non-hydrophytic dominants. Nondominants must be used.

Remarks

Sample plot satisfies the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit 10.0 (in.)
Depth to saturated soil 8.0 (in.)

Primary Wetland Hydrology Indicators

☐ Inundated
☒ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☒ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☐ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Sample plot satisfies the wetland hydrology criterion. Aerial photographs were reviewed to initially identify potential wetland areas.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - AOA
Applicant: Maryland Aviation Administration
Investigator: Jason McNees/Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 23, 1999
County: Anne Arundel
State: Maryland
Community ID: Wetland
Transect ID: Wetland K
Plot ID: 1-K

SOILS

Soil Map Unit Name: Rumford loamy sand
Drainage Class: Somewhat excessively drained
Soil Tax Subgroup: Typic Hapludults
Confirm Map Type: ☒ Yes ☐ No

Soil Profile Description:

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-2	A	10YR 2/1	None	None	Sandy loam, moist
2-12	B1	10YR 3/1	None	None	Loamy sand, gravel, saturated
12+	B2	10YR 3/1	None	None	Liquid soil

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☒ Reducing Conditions
☒ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Unable to obtain a soil profile below 12 inches. Sample plot satisfies the hydric soils criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No
Wetland Hydrology Present? ☒ Yes ☐ No
Hydric Soils Present? ☒ Yes ☐ No
Is this Sampling within a Wetland? ☒ Yes ☐ No

Remarks

Sample plot is located in a depression that indicates the location of a former drainage ditch. Sample plot satisfies all three mandatory wetland technical criteria.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - AOA
Applicant: Maryland Aviation Administration
Investigator: Jason McNees and Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: February 10, 2000
County: Anne Arundel
State: Maryland
Community ID: Upland
Transect ID: Wetland K
Plot ID: 2-K

VEGETATION

Dominant Plant Species	Stratum	Indicator
Acer rubrum	Tree	FAC
Pinus virginiana	Tree	UPL
Acer rubrum	Sapling	FAC
Ilex opaca	Sapling	FACU+
Vaccinium corymbosum	Shrub	FACW-
Lycopodium flabelliforme	Herb	UPL
Smilax rotundifolia	Vine	FAC

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 57.14%

If the FAC-neutral test is used, this data does NOT provide a secondary indicator of wetland hydrology

Remarks

Sample plot satisfies the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit None (in.)
Depth to saturated soil None (in.)

Primary Wetland Hydrology Indicators

☐ Inundated
☐ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☐ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Indicators of hydrology absent; sample plot does not satisfy the wetland hydrology criterion. Aerial photographs were reviewed to initially identify potential wetland areas.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - AOA
Applicant: Maryland Aviation Administration
Investigator: Jason McNees and Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: February 10, 2000
County: Anne Arundel
State: Maryland
Community ID: Upland
Transect ID: Wetland K
Plot ID: 2-K

SOILS

Soil Map Unit Name: Rumford loamy sand
Drainage Class: Somewhat excessively drained
Soil Tax Subgroup: Typic Hapludults
Confirm Map Type: ☒ Yes ☐ No

Soil Profile Description:

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-1	A	10YR 2/2	None	None	Fine sandy loam, roots
1-18	B1	2.5YR 5/4	7.5YR 4/6	Few, small, distinct	Fine sandy loam, moist
			10YR 6/8	Few, medium, distinct	
18-21	B2	10YR 6/8	10R 4/8	Common, small, distinct	Fine sandy loam, moist

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☐ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Sample plot does not meet the hydric soils criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No
Wetland Hydrology Present? ☐ Yes ☒ No
Hydric Soils Present? ☐ Yes ☒ No
Is this Sampling within a Wetland? ☐ Yes ☒ No

Remarks

Sample plot does not satisfy all three mandatory wetland technical criteria. Sample area was covered with approximately 6 inches of ow.

WETLAND L

WETLAND L

Wetland L is a 0.5-acre wetland associated with the headwater of Fork Branch in Area 31. It appears on the NWI map as a palustrine forested/palustrine scrub shrub, broad-leaved deciduous, temporarily flooded wetland. Contrary to the NWI map, the area has been significantly disturbed and no forests were observed during the field investigation. Evidence of the former forest was observed, such as some sprouted saplings from the stumps of previously cut trees.

Wetland L originates approximately 900 feet south of the intersection of Runway 15R-33L and Runway 4-22, flows to the southeast for approximately 600 feet, and enters a culvert beneath Runway 15R-33L. Wetland L receives hydrology as groundwater, overland sheet flow from the runways, and drainage from a stormwater culvert beneath the intersection of the two runways. Sample Plot 1-L was selected to characterize Wetland L, and Transect Plot 2-L was selected to represent the adjacent upland.

Sample Plot 1-L

On December 1, 1999, SES examined soils, vegetation, and hydrology at Sample Plot 1-L. Table 4.3-62 summarizes the investigation results, Table 4.3-63 presents dominant vegetation, and Table 4.3-64 summarizes soil data.

Table 4.3-62
Sample Plot 1-L General Information

Classification	Wetland
Sample Coordinates	546525.8742 North; 1406963.9494 East
Hydrology Indicators	Inundation, saturation in the upper 12 inches of the soil profile, drainage patterns, and water-stained leaves
Percent Hydrophytic Vegetation	57% (see Table 4.3-63)
Hydric Soils	Yes (see Table 4.3-64)

Table 4.3-63
Sample Plot 1-L Dominant Vegetation

Common Name	Botanical Name	Indicator Status
Black Willow	*Salix nigra*	FACW+
Black Cherry	*Prunus serotina*	FACU
Red Maple	*Acer rubrum*	FAC
Common Blackberry	*Rubus allegheniensis*	FACU-
Sensitive Fern	*Onoclea sensibilis*	FACW
Japanese Honeysuckle	*Lonicera Japonica*	FAC-

Table 4.3-63
Sample Plot 1-L Dominant Vegetation

Asiatic Tearthumb	*Polygonum perfoliatum*	FAC

Table 4.3-64
Sample Plot 1-L Soil Description

Depth (in.)	Color	Description	Mottles
0-4	Black (10YR 2/1)	Sandy loam	None
4-6	Very dark grayish-brown (10YR 3/2)	Silty sand, saturated	None
6-26	Brownish yellow (10YR 6/6)	Sand, concretions present, saturated	Common, medium, distinct, very dark gray (10YR 3/1) Common, medium, distinct, strong brown (7.5YR 5/8)

Conclusion: Sample plot 1-L satisfies the three mandatory wetland technical criteria. SES classified this area as a palustrine emergent/palustrine scrub-shrub, broad-leaved deciduous (PEM/PSS1) wetland.

Sample Plot 2-L

On December 1, 1999, SES examined soils, vegetation, and hydrology at Sample Plot 2-L. Table 4.3-65 summarizes the investigation results, Table 4.3-66 presents dominant vegetation, and Table 4.3-67 summarizes soil data.

Table 4.3-65
Sample Plot 2-L General Information

Classification	Upland
Sample Coordinates	546533.0158 North; 1406905.9764 East
Hydrology Indicators	None
Percent Hydrophytic Vegetation	29% (see Table 4.3-66)
Hydric Soils	No (see Table 4.3-67)

Table 4.3-66
Sample Plot 2-L Dominant Vegetation

Common Name	Botanical Name	Indicator Status
Black Cherry	*Prunus serotina*	FACU
Black Willow	*Salix nigra*	FACW+
Deertongue witchgrass	*Dichanthelium clandestinum*	FAC+
Common Blackberry	*Rubus allegheniensis*	FACU-
Japanese Honeysuckle (herb)	*Lonicera japonica*	FAC-

Table 4.3-66
Sample Plot 2-L Dominant Vegetation

Japanese Honeysuckle (vine)	*Lonicera japonica*	FAC-
Grass spp.[a]	*Graminae* spp.	NA

[a] Not identifiable to the species level due to the absence of inflorescence.

Table 4.3-67
Sample Plot 2-L Soil Description

Depth (in.)	Color	Description	Mottles
0-18	Very dark grayish-brown (10YR 3/2)	Sandy loam	None
18-27	Yellow (10YR 7/6)	Sand	None

Conclusion: Sample plot 2-L does not satisfy the three mandatory wetland technical criteria. The area was classified as an upland.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - AOA
Applicant: Maryland Aviation Administration
Investigator: Roger J. Windschitl/Leyla Lange
Do Normal Circumstances exist on the site? ☐ Yes ☒ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 1, 1999
County: Anne Arundel
State: Maryland
Community ID: Wetland
Transect ID: Wetland L
Plot ID: 1-L

VEGETATION

Dominant Plant Species	Stratum	Indicator
Salix nigra	Shrub	FACW+
Prunus serotina	Shrub	FACU
Acer rubrum	Shrub	FAC
Rubus allegheniensis	Herb	FACU-
Onoclea sensibilis	Herb	FACW
Lonicera japonica	Herb	FAC-
Polygonum perfoliatum	Vine	FAC

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 57.14%

If the FAC-neutral test is used, this data does NOT provide a secondary indicator of wetland hydrology

Remarks

Sample plot does satisfies the hydrophytic vegetation criteria.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water 2.0 (in.)
Depth to free water in pit 5.0 (in.)
Depth to saturated soil 5.0 (in.)

Primary Wetland Hydrology Indicators

☒ Inundated
☒ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☒ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☒ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Point taken upslope of standing water. Depth of surface water refers to area approximatley 10 feet downslope from sample point.
Sample plot satisfies the wetland hydrology criteria.
Aerial photographs were reviewed to initially identify potential wetland areas.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - AOA
Applicant: Maryland Aviation Administration
Investigator: Roger J. Windschitl/Leyla Lange
Do Normal Circumstances exist on the site? ☐ Yes ☒ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 1, 1999
County: Anne Arundel
State: Maryland
Community ID: Wetland
Transect ID: Wetland L
Plot ID: 1-L

SOILS

Soil Map Unit Name: Evesboro loamy sand
Drainage Class: Well to excessively drained
Soil Tax Subgroup: Typic Quartzipsamments
Confirm Map Type: ☐ Yes ☒ No

Soil Profile Description:

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-4	A	10YR 2/1	None	None	Sandy loam
4-6	B1	10YR 3/2	None	None	Silty sand, saturated
6-26	B2	10YR 6/6	10YR 3/1	Common, med., disinct	Sand, concretions, saturated
			7.5YR 5/8	Common, med., distinct	

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☒ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☐ Gleyed or Low-Chroma Colors
☒ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Sample plot satisfies hydric soils criterion. (Sandy layer contains low chroma mottles and is saturated.)

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No
Wetland Hydrology Present? ☒ Yes ☐ No
Hydric Soils Present? ☒ Yes ☐ No
Is this Sampling within a Wetland? ☒ Yes ☐ No

Remarks

Sample plot satisfies the three mandatory wetland technical criteria.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - AOA
Applicant: Maryland Aviation Administration
Investigator: Roger J. Windschitl/Leyla Lange
Do Normal Circumstances exist on the site? ☐ Yes ☒ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 1, 1999
County: Anne Arundel
State: Maryland
Community ID: Upland
Transect ID: Wetland L
Plot ID: 2-L

VEGETATION

Dominant Plant Species	Stratum	Indicator
Prunus serotina	Shrub	FACU
Salix nigra	Shrub	FACW+
Dichanthelium clandestinum	Herb	FAC+
Rubus allegheniensis	Herb	FACU-
Lonicera japonica	Herb	FAC-
Graminae spp.	Herb	NA
Lonicera japonica	Vine	FAC-

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 28.57%

If the FAC-neutral test is used, this data does NOT provide a secondary indicator of wetland hydrology

Remarks

Grass was not identifiable to the species level due to the absence of inflorescence. Sample plot does not satisfy the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit None (in.)
Depth to saturated soil None (in.)

Primary Wetland Hydrology Indicators

☐ Inundated
☐ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☐ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Indicators of hydrology absent; sample plot does not satisfy the wetland hydrology criterion. Aerial photographs were reviewed to initially identify potential wetland areas.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - AOA
Applicant: Maryland Aviation Administration
Investigator: Roger J. Windschitl/Leyla Lange
Do Normal Circumstances exist on the site? ☐ Yes ☒ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 1, 1999
County: Anne Arundel
State: Maryland
Community ID: Upland
Transect ID: Wetland L
Plot ID: 2-L

SOILS

Soil Map Unit Name: Evesboro loamy sand
Drainage Class: Well to excessively drained
Soil Tax Subgroup: Typic Quartzipsamments
Confirm Map Type: ☐ Yes ☒ No

Soil Profile Description:

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-18	A	10YR 3/2	None	None	Sandy loam
18-27	B1	10YR 7/6	None	None	Sand

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☐ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Upland area may consist of fill. Stormwater drainage field approximately 25 feet to the west of sample plot. Sample plot does not satisfy the hydric soils criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☐ Yes ☒ No
Wetland Hydrology Present? ☐ Yes ☒ No
Hydric Soils Present? ☐ Yes ☒ No
Is this Sampling within a Wetland? ☐ Yes ☒ No

Remarks

Sample plot does not satisfy any of the three mandatory wetland technical criteria.

4.3.3 Stream Crossings

BWI Airport is surrounded by a 10-foot-high security fence. According to FAA regulations, the area within 10 feet of the fence be maintained as turf to provide security cameras with a clear view of the fence and to provide easy visual inspection and maintenance by airport personnel. Eight streams originate on the airport property and flow off site by passing beneath the fence:

- Muddy Bridge Branch,
- Phelps Branch,
- Fork Branch,
- Clark Branch,
- Hawkins Branch,
- Signal Branch,
- Bowden Branch tributary,
- Bowden Branch, and
- unnamed tributary of Stony Run

SES investigated nine locations where one of these streams passes beneath the security fence. Although only the area within 10 feet of the fence was cleared, SES performed the wetland investigation in the areas adjacent to the streams within 20 feet of each side of the fence.

Wetland or Waters of the U.S. were identified in each of these areas. Although some of these areas have been significantly disturbed by maintenance practices, such as mowing, they are natural features that occur on hydric soils. These areas are described in the following pages. Appendix A presents wetland investigation photographs.

WETLAND M

WETLAND M

Wetland M contains a portion of Muddy Bridge Branch, a perennial tributary of Sawmill Creek. The Lower Detention Basin east of Runway 15L-33R is the headwater of the stream. From this basin, Muddy Bridge Branch enters a culvert and passes beneath the security fence, approximately 400 feet south of the Northrop Grumman property. Muddy Bridge Branch continues east to a palustrine emergent wetland (PEM), and a culvert conveys the stream beneath MD Route 170.

The stream bed at the fence crossing consisted of a cement culvert, and rip rap immediately east of the culvert. None of the channel is exposed on the inside of the fence. Muddy Bridge Branch appears on the NWI map as a palustrine scrub shrub broad-leaved deciduous/palustrine emergent temporarily flooded wetland (PEM/PSS1A). The stream contained base flow at the time of the field investigation, but no wetlands were observed. Therefore, SES classified this area as Waters of the U.S.

WETLAND N

WETLAND N

Wetland N forms the headwater of Phelps Branch. This wetland originates in a forested area approximately 700 feet north of the security fence and flows south. Wetland N crosses the security fence approximately 2,000 feet west of Aviation Boulevard (MD Route 162)/Dorsey Road intersection, then develops into a poorly defined channel that enters a culvert beneath Dorsey Road. The culvert empties into a well defined channel on the south side of Dorsey Road to become Phelps Branch. Wetland N appears to receive hydrology as groundwater and as overland sheet flow from Dorsey Road. The wetland appears on the NWI map as a palustrine forested, broad-leaved deciduous, temporarily flooded wetland (PFO1A); however, field investigations indicate that the wetland is not entirely forested. Only the area north of the security fence is forested. Sample Plot 1-N was chosen to characterize Wetland N, and Transect Plot 2-N was chosen to represent the adjacent wetland.

Sample Plot 1-N

On December 13, 1999, SES examined soils, vegetation, and hydrology at Sample Plot 1-N. Table 4.3-68 summarizes the investigation results, Table 4.3-69 presents dominant vegetation, and Table 4.3-70 summarizes soil data.

Table 4.3-68
Sample Plot 1-N General Information

Classification	Wetland
Sample Coordinates	545480.3310 North; 1410376.4500 East
Hydrology Indicators	Saturation and oxidized rhizospheres in the upper 12 inches of the soil profile, and the Anne Arundel County Soil Survey (USDA, 1973)
Percent Hydrophytic Vegetation	60% (see Table 4.3-69)
Hydric Soils	Yes (see Table 4.3-70)

Table 4.3-69
Sample Plot 1-N Dominant Vegetation

Common Name	Botanical Name	Indicator Status
Wool-grass	*Scirpus cyperinus*	FACW+
Common Reed	*Phragmites australis*	FACW
Soft Rush	*Juncus effusus*	FACW+
Grass spp.[a]	*Graminae* spp.	NA
Grass spp.[a]	*Graminae* spp.	NA

[a] Not identifiable to the species level due to the absence of inflorescence.

Table 4.3-70
Sample Plot 1-N Soil Description

Depth (in.)	Color	Description	Mottles
0-1	Dark grayish-brown (10YR 4/2)	Sandy loam, saturated	None
1-5	Light olive brown (2.5Y 5/3)	Loamy sand, saturated	Common, small, distinct, dark yellowish-brown (10YR 4/4) Common, coarse, prominent, black (10YR 2/1)
5-15	Black (5Y 2.5/1)	Loamy sand, saturated	Few, coarse, distinct, dark yellowish-brown (10YR 4/4)
15+	NA	Liquid soil	NA

Conclusion: Sample plot 1-N satisfies the three mandatory wetland technical criteria. SES classified the area within 20 feet of the security fence as a palustrine emergent wetland (PEM). The area north of the security fence is a palustrine, forested, broad-leaved deciduous wetland.

Sample Plot 2-N

On December 13, 1999, SES examined soils, vegetation, and hydrology at Sample Plot 2-N. Table 4.3-71 summarizes the investigation results, Table 4.3-72 presents dominant vegetation, and Table 4.3-73 summarizes soil data.

Table 4.3-71
Sample Plot 2-N General Information

Classification	Upland
Sample Coordinates	545483.9540 North; 1410414.7040 East
Hydrology Indicators	None
Percent Hydrophytic Vegetation	None (see Table 4.3-72)
Hydric Soils	No (see Table 4.3-73)

Table 4.3-72
Sample Plot 2-N Dominant Vegetation

Common Name	Scientific Name	Indicator Status
Common Dandelion	*Taraxacum officinale*	FACU-
English Plantain	*Plantago lanceolata*	UPL
Grass spp.[a]	*Graminae* spp.	NA
Clover spp.[a,b]	*Trifolium* spp.	FACU**

[a] Not identifiable to the species level due to the absence of inflorescence.
[b] *Trifolium* species have an indicator status of either FACU or UPL, and therefore, are not hydrophytic.

Table 4.3-73
Sample Plot 2-N Soil Description

Depth (in.)	Color	Description	Mottles
0-1	Dark grayish-brown (10YR 4/2)	Sandy loam, moist	None
1-10	Light olive brown (2.5Y 5/3)	Sandy loam, dry, friable	None
10-16	Light yellowish-brown (2.5Y 6/3)	Sand, moist	Common, coarse, distinct, grayish-brown (2.5Y 5/2) Common, coarse, faint, brownish-yellow (10YR 6/6)
16-21	Light yellowish-brown (10YR 6/4)	Sand	Common, medium, faint, grayish-brown (2.5Y 5/2)

Conclusion: Sample plot 2-N does not satisfy any of the three mandatory wetland technical criteria. The area was classified as an upland.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Security Fence
Applicant: Maryland Aviation Administration
Investigator: Jason McNees/Leyla Lange
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 13, 1999
County: Anne Arundel
State: Maryland
Community ID: Wetland
Transect ID: Phelps Branch
Plot ID: 1-N

VEGETATION

Dominant Plant Species	Stratum	Indicator
Scirpus cyperinus	Herb	FACW+
Phragmites australis	Herb	FACW
Juncus effusus	Herb	FACW+
Graminae spp.	Herb	NA
Graminae spp.	Herb	NA

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 60.00%

Remarks

Grasses not identifiable to the species level due to the absence of inflorescence. Sample plot satisfies the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit 5.0 (in.)
Depth to saturated soil 5.0 (in.)

Primary Wetland Hydrology Indicators

☐ Inundated
☒ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☒ Oxidized Root Channels in Upper 12"
☐ Water-Stained Leaves
☒ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Sample plot satisfies hydrology criterion. Aerial photographs were reviewed to initially identify potential wetland areas.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Security Fence
Applicant: Maryland Aviation Administration
Investigator: Jason McNees/Leyla Lange
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 13, 1999
County: Anne Arundel
State: Maryland
Community ID: Wetland
Transect ID: Phelps Branch
Plot ID: 1-N

SOILS

Soil Map Unit Name: Bibb silt loam
Drainage Class: Poorly drained
Soil Tax Subgroup: Typic Haplaquents
Confirm Map Type: ☒ Yes ☐ No

Soil Profile Description:

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-1	A	10YR 4/2	None	None	Sandy loam, saturated
1-5	B1	2.5Y 5/3	10YR 4/4	Common, small, distinct	Loamy sand
			10YR 2/1	Common, coarse, prom.	
5-15	B2	5Y 2.5/1	10YR 4/4	Few, coarse, distinct	Loamy sand, saturated
15+					Liquid soil texture

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☒ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☒ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Sample plot satisfies the hydric soils criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No
Wetland Hydrology Present? ☒ Yes ☐ No
Hydric Soils Present? ☒ Yes ☐ No
Is this Sampling within a Wetland? ☒ Yes ☐ No

Remarks

Sample plot satisfies the three mandatory wetland technical criteria.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Security Fence
Applicant: Maryland Aviation Administration
Investigator: Jason McNees/Leyla Lange
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 13, 1999
County: Anne Arundel
State: Maryland
Community ID: Upland
Transect ID: Phelps Branch
Plot ID: 2-N

VEGETATION

Dominant Plant Species	Stratum	Indicator
Taraxacum officinale	Herb	FACU-
Plantago lanceolata	Herb	UPL
Graminae spp.	Herb	NA
Trifolium spp.	Herb	NA

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 0.00%

If the FAC-neutral test is used, this data does NOT provide a secondary indicator of wetland hydrology

Remarks

Vegetation was mowed and the grass and Trifolium were not identifiable to the species level. Sample plot does not satisfy the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit None (in.)
Depth to saturated soil None (in.)

Primary Wetland Hydrology Indicators

☐ Inundated
☐ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☐ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Indicators of hydrology absent; sample plot does not satisfy the wetland hydrology criterion. Aerial photographs were reviewed to initially identify potential wetland areas.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Security Fence
Applicant: Maryland Aviation Administration
Investigator: Jason McNees/Leyla Lange
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 13, 1999
County: Anne Arundel
State: Maryland
Community ID: Upland
Transect ID: Phelps Branch
Plot ID: 2-N

SOILS

Soil Map Unit Name: Rumford loamy sand
Drainage Class: Somewhat excessively drained
Soil Tax Subgroup: Typic Hapludults
Confirm Map Type: ☒ Yes ☐ No

Soil Profile Description:

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-1	A	10YR 4/2	None	None	Sandy loam, moist
1-10	B1	2.5Y 5/3	None	None	Sandy loam, dry, friable
10-16	B2	2.5Y 6/3	2.5Y 5/2	Common, coarse, distinct	Sand, moist
			10YR 6/6	Common, coarse, faint	
16-21+	B3	10YR 6/4	2.5Y 5/2	Common, medium, faint	Sand

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☐ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Sample plot does not satisfy the hydric soils criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☐ Yes ☒ No
Wetland Hydrology Present? ☐ Yes ☒ No
Hydric Soils Present? ☐ Yes ☒ No
Is this Sampling within a Wetland? ☐ Yes ☒ No

Remarks

Sample plot does not satisfy the three mandatory wetland technical criteria.

WETLAND O

WETLAND O

Wetland O contains a portion of Fork Branch, which is an intermittent tributary of Sawmill Creek and wetland. This section of Fork Branch appears on the NWI map as a palustrine emergent temporarily flooded wetland, which was confirmed by the field investigation.

From its headwater (Wetland L), Fork Branch crosses beneath Runway 15R-33L and flows south along the west side of it for approximately 1,200 feet until reaching the security fence. The stream flows east for approximately 300 feet after crossing the fence, enters a culvert beneath Dorsey Road, and continues southeasterly to its confluence with Sawmill Creek. From approximately 50 feet north of the security fence to the culvert beneath Dorsey Road, the floodplain of Fork Branch consists of a palustrine emergent wetland. This wetland receives hydrology as groundwater, overland sheet flow from the nearby runways and roads, and flooding from Fork Branch. Sample Plot 1-O was selected to characterize Wetland O, and Transect Plot 2-O was selected to represent the adjacent wetland.

Sample Plot 1-O

On December 22, 1999, SES examined soils, vegetation, and hydrology at Sample Plot 1-O. Table 4.3-74 summarizes the investigation results, Table 4.3-75 presents dominant vegetation, and Table 4.3-76 summarizes soil data.

Table 4.3-74
Sample Plot 1-0 General Information

Classification	Wetland
Sample Coordinates	545365.9430 North; 1408814.8350 East
Hydrology Indicators	Saturation and oxidized rhizospheres in the upper 12 inches of the soil profile, and drainage patterns
Percent Hydrophytic Vegetation	80% (see Table 4.3-75)
Hydric Soils	Yes (see Table 4.3-76)

Table 4.3-75
Sample Plot 1-O Dominant Vegetation

Common Name	Scientific Name	Indicator Status
Soft Rush	*Juncus effusus*	FACW+
Bushy Seedbox	*Ludwigia alternifolia*	FACW+
Sensitive Fern	*Onoclea sensibilis*	FACW
Goldenrod spp.[a]	*Solidago* spp.	NA
Switchgrass	*Panicum virgatum*	FAC

Table 4.3-75
Sample Plot 1-O Dominant Vegetation

Common Name	Scientific Name	Indicator Status

[a] Not identifiable to the species level due to absence of inflorescence and deteriorated condition of specimens.

Table 4.3-76
Sample Plot 1-O Soil Description

Depth (in.)	Color	Description	Mottles
0-2	Black (10YR 2/1)	Silty loam, fibric, saturated	None
2-6	Dark grayish-brown (10YR 4/2)	Sandy silt, saturated	Many, medium, distinct, pale yellow (2.5Y 7/3) Common, medium, distinct, brownish-yellow (10YR 6/8)
6-10	Pale yellow (2.5Y 7/4)	Sandy silt, saturated	Few, small, distinct, strong brown (7.5YR 5/8)
10-24	Light brownish-gray (10YR 6/2)	Clayey silt, saturated	Common, small, prominent, yellowish red (5YR 5/8) Many, medium, distinct, black (10YR 2/1)

Conclusion: Sample plot 1-O satisfies the three mandatory wetland technical criteria. SES classified the area as a palustrine emergent (PEM) wetland. Wetland O also contains Fork Branch, which was classified as Waters of the U.S.

Sample Plot 2-O

On December 13, 1999, SES examined soils, vegetation, and hydrology at Sample Plot 2-O. Table 4.3-77 summarizes the investigation results, Table 4.3-78 presents dominant vegetation, and Table 4.3-79 summarizes soil data.

Table 4.3-77
Sample Plot 2-0 General Information

Classification	Upland
Sample Coordinates	545397.2150 North; 1408826.8130 East
Hydrology Indicators	None
Percent Hydrophytic Vegetation	20% (see Table 4.3-78)
Hydric Soils	No (see Table 4.3-79)

Table 4.3-78
Sample Plot 2-O Dominant Vegetation

Common Name	Scientific Name	Indicator Status
Partridge Pea	*Cassia fasciculata*	FACU

Table 4.3-78
Sample Plot 2-O Dominant Vegetation

Common Name	Scientific Name	Indicator Status
Common Dandelion	*Taraxacum officinale*	FACU-
Asparagus Fern	*Asparagus officinalis*	FACU
Switchgrass	*Panicum virgatum*	FAC
Grass spp.[a]	*Graminae* spp.	NA

[a] Not identifiable to the species level due to the absence of inflorescence.

Table 4.3-79
Sample Plot 2-O Soil Description

Depth (in.)	Color	Description	Mottles
0-2	Dark olive brown (2.5Y 3/3)	Sandy loam, fibrous	None
2-6	Very dark grayish-brown (10YR 3/2)	Silty sand	None
6-22	Light olive brown (2.5Y 5/3)	Sandy silt	Common, medium, faint brown (10YR 5/3)

Conclusion: Sample plot 2-O does not satisfy the three mandatory wetland technical criteria. The area was classified as an upland.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Security Fence
Applicant: Maryland Aviation Administration
Investigator: Leyla Lange/Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 22, 1999
County: Anne Arundel
State: Maryland
Community ID: Wetland
Transect ID: Fork Branch
Plot ID: 1-O

VEGETATION

Dominant Plant Species	Stratum	Indicator
Juncus effusus	Herb	FACW+
Ludwigia alternifolia	Herb	FACW+
Onoclea sensibilis	Herb	FACW
Panicum virgatum	Herb	FAC
Solidago spp.	Herb	NA

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 80.00%

Remarks

The grass and Solidago were not identifiable due to the absence of inflorescence and the deteriorated condition of the specimens. Sample plot satisfies the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit 4.0 (in.)
Depth to saturated soil 0 (in.)

Primary Wetland Hydrology Indicators

☐ Inundated
☒ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☒ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☒ Oxidized Root Channels in Upper 12"
☐ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Sample plot satisfies the wetland hydrology criterion. Aerial photographs were reviewed to initially identify potential wetland areas.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Security Fence
Applicant: Maryland Aviation Administration
Investigator: Leyla Lange/Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 22, 1999
County: Anne Arundel
State: Maryland
Community ID: Wetland
Transect ID: Fork Branch
Plot ID: 1-O

SOILS

Soil Map Unit Name: Bibb silt loam
Drainage Class: Poorly drained
Soil Tax Subgroup: Typic Haplaquents
Confirm Map Type: ☐ Yes ☒ No

Soil Profile Description:

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-2	A	10YR 2/1	None	None	Silty loam, fibric, saturated
2-6	B1	10YR 4/2	2.5Y 7/3	Many, med., distinct	Sandy silt, saturated
			10YR 6/8	Common, med., distinct	
6-10	B2	2.5Y 7/4	7.5YR 5/8	Few, small, distinct	Sandy silt, saturated
10-24	B3	10YR 6/2	5YR 5/8	Common, small, prom.	Clayey silt, saturated
			10YR 2/1	Many, med., distinct	

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☒ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Sample plot satisfies the hydric soils criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No
Wetland Hydrology Present? ☒ Yes ☐ No
Hydric Soils Present? ☒ Yes ☐ No
Is this Sampling within a Wetland? ☒ Yes ☐ No

Remarks

Sample plot satisfies the three mandatory wetland technical criteria.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Security Fence
Applicant: Maryland Aviation Administration
Investigator: Jason McNees/Leyla Lange
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 13, 1999
County: Anne Arundel
State: Maryland
Community ID: Upland
Transect ID: Fork Branch
Plot ID: 2-O

VEGETATION

Dominant Plant Species	Stratum	Indicator
Cassia fasciculata	Herb	FACU
Taraxacum officinale	Herb	FACU-
Asparagus officinalis	Herb	FACU
Panicum virgatum	Herb	FAC
Graminae spp.	Herb	NA

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 20.00%

If the FAC-neutral test is used, this data does NOT provide a secondary indicator of wetland hydrology

Remarks

The vegetation was mowed and the two grasses could not be identified to the species level. Sample plot does not satisfy the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit None (in.)
Depth to saturated soil None (in.)

Primary Wetland Hydrology Indicators

☐ Inundated
☐ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☐ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Indicators of hydrology absent; sample plot does not satisfy the wetland hydrology criterion. Aerial photographs were reviewed to initially identify potential wetland areas.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Security Fence	Date: December 13, 1999
Applicant: Maryland Aviation Administration	County: Anne Arundel
Investigator: Jason McNees/Leyla Lange	State: Maryland
Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Community ID: Upland
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No	Transect ID: Fork Branch
Is the area a Problem Area? ☐ Yes ☒ No	Plot ID: 2-O

SOILS

Soil Map Unit Name: Bibb silt loam — Drainage Class: Poorly drained

Soil Tax Subgroup: Typic Haplaquents — Confirm Map Type: ☐ Yes ☒ No

Soil Profile Description:

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-2	A	2.5Y 3/3	None	None	Sandy loam, fibrous
2-6	B1	10YR 3/2	None	None	Silty sand
6-22	B2	2.5Y 5/3	10YR 5/3	Common, med., faint	Silty sand, concretions

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☐ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Sample plot does not satisfy the hydric soils criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☐ Yes ☒ No

Wetland Hydrology Present? ☐ Yes ☒ No

Hydric Soils Present? ☐ Yes ☒ No

Is this Sampling within a Wetland? ☐ Yes ☒ No

Remarks

Sample plot does not satisfy any of the three mandatory wetland technical criteria.

WETLAND P

WETLAND P

Wetland P is part of the large palustrine forested (PFO) headwater wetland of Clark Branch. Wetland P crosses the security fence on the south side of the airport approximately 1,200 feet west of Post 11. Wetland P appears on the NWI map as a palustrine forested, broad-leaved deciduous, seasonally flooded (PFO1C) wetland; however, no trees were observed at the point of the fence crossing during the field investigation.

Wetland P receives hydrology as groundwater and overland sheet flow from Dorsey Road. Vegetation on the south side of the fence has been disturbed by mowing, and the vegetation on the north side of the fence is dominated by common reed. Sample Plot 1-P was selected to characterize Wetland P, and Transect Plot 2-P was selected to represent the adjacent wetland.

Sample Plot 1-P

On December 22, 1999, SES examined soils, vegetation, and hydrology at Sample Plot 1-P. Table 4.3-80 summarizes the investigation results, Table 4.3-81 presents dominant vegetation, and Table 4.3-82 summarizes soil data.

Table 4.3-80
Sample Plot 1-P General Information

Classification	Wetland
Sample Coordinates	543878.5350 North; 1401575.0320 East
Hydrology Indicators	Inundation, saturation in the upper 12 inches of the soil profile, drift lines, and water-stained leaves
Percent Hydrophytic Vegetation	33% (see Table 4.3-81)
Hydric Soils	Yes (see Table 4.3-82)

Table 4.3-81
Sample Plot 1-P Dominant Vegetation[a]

Common Name	Scientific Name	Indicator Status
Common Reed	*Phragmites australis*	FACW
English Plantain	*Plantago lanceolata*	UPL
Partridge Pea	*Cassia fasciculata*	FACU

[a] Area is disturbed by mowing.

Table 4.3-82
Sample Plot 1-P Soil Description

Depth (in.)	Color	Description	Mottles
0-2	Very dark grayish-brown (10YR 3/2)	Silty clay	None
2-10	Dark grayish-brown (2.5Y 4/2)	Silty clay, saturated, concretions	Common, large, prominent, strong brown (7.5YR 5/8) Common, medium, faint, dark gray (10YR 4/1)
10-23	Black (10YR 2/1)	Clayey sand, saturated	Many, medium, faint, dark gray (10YR 4/1) Common, small, prominent, yellowish-red (5YR 4/6) Common, medium, distinct, light yellowish-brown (2.5Y 6/4)

Conclusion: Because the vegetation is significantly disturbed, Sample Plot 1-P satisfies the wetland technical criteria based on two parameters. SES classified the area as a palustrine emergent (PEM) wetland.

Sample Plot 2-P

On December 22, 1999, SES examined soils, vegetation, and hydrology at Sample Plot 2-P. Table 4.3-83 summarizes the investigation results, Table 4.3-84 presents dominant vegetation, and Table 4.3-85 summarizes soil data.

Table 4.3-83
Sample Plot 2-P General Information

Classification	Upland
Sample Coordinates	543835.6560 North; 1401437.8770 East
Hydrology Indicators	None
Percent Hydrophytic Vegetation	None (see Table 4.3-84)
Hydric Soils	No (see Table 4.3-85)

Table 4.3-84
Sample Plot 2-P Dominant Vegetation[a]

Common Name	Scientific Name	Indicator Status
Partridge Pea	*Cassia fasciculata*	FACU
Grass	*Graminae* spp.	NA

[a] Area is disturbed by mowing.

Table 4.3-85
Sample Plot 2-P Soil Description

Depth (in.)	Color	Description	Mottles
0-1	Black (10YR 2/1)	Organic-fibric layer	None
1-3	Olive brown (2.5Y 4/4)	Clayey sand	Few small, faint, olive yellow (2.5Y 6/6) Few, medium, distinct, yellowish-red (5YR 5/8)
3-21	Light olive brown (2.5Y 5/6)	Silty sand	Common, large, distinct, red (2.5YR 5/8) Common, medium, faint, pale yellow (2.5Y 7/4) Few, small, faint, light yellowish-brown (2.5Y 6/3)

Conclusion: Sample plot 2-P does not satisfy the three mandatory wetland technical criteria. The area was classified as an upland.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Security Fence
Applicant: Maryland Aviation Administration
Investigator: Leyla Lange/Jennifer Bird
Do Normal Circumstances exist on the site? ☐ Yes ☒ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 22, 1999
County: Anne Arundel
State: Maryland
Community ID: Wetland
Transect ID: Clark Branch S
Plot ID: 1-P

VEGETATION

Dominant Plant Species	Stratum	Indicator
Plantago lanceolata	Herb	UPL
Phragmites australis	Herb	FACW
Cassia fasciculata	Herb	FACU

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 33.33%

If the FAC-neutral test is used, this data does NOT provide a secondary indicator of wetland hydrology

Remarks

The vegetation was mowed. Sample plot does not satisfy the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit None (in.)
Depth to saturated soil 2.0 (in.)

Primary Wetland Hydrology Indicators

☒ Inundated
☒ Saturated in Upper 12 Inches
☐ Water Marks
☒ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☒ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Areas of standing water were observed nearby. Area appears to serve as stormwater management for Dorsey Road. Sample plot satisfies the wetland hydrology criterion. Aerial photographs were reviewed to initially identify potential wetland areas.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Security Fence
Applicant: Maryland Aviation Administration
Investigator: Leyla Lange/Jennifer Bird
Do Normal Circumstances exist on the site? ☐ Yes ☒ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 22, 1999
County: Anne Arundel
State: Maryland
Community ID: Wetland
Transect ID: Clark Branch S
Plot ID: 1-P

SOILS

Soil Map Unit Name: Bibb silt loam
Drainage Class: Poorly drained
Soil Tax Subgroup: Typic Haplaquents
Confirm Map Type: ☐ Yes ☒ No

Soil Profile Description:

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-2	A	10YR 3/2	None	None	Silty clay
2-10	B1	2.5Y 4/2	7.5YR 5/8	Common, large, prom.	Silty clay, saturated
			10YR 4/1	Common, med., faint	
10-23	B2	10YR 2/1	10YR 4/1	Many, med., faint	Clayey sand, saturated
			5YR 4/6	Common, small, prom.	
			2.5 Y 6/4	Common, med., distinct	

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☐ Gleyed or Low-Chroma Colors
☒ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Sample plot satisfies the hydric soils criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☐ Yes ☒ No
Wetland Hydrology Present? ☒ Yes ☐ No
Hydric Soils Present? ☒ Yes ☐ No
Is this Sampling within a Wetland? ☒ Yes ☐ No

Remarks

Because the area is significantly disturbed, the sample plot is considered a wetland based on the presence of hydrology and hydric soil. This area receives stormwater through a culvert from Dorsey Road, but the wetland occurs in undistubred natural soils.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Security Fence
Applicant: Maryland Aviation Administration
Investigator: Leyla Lange/Jennifer Bird
Do Normal Circumstances exist on the site? ☐ Yes ☒ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 22, 1999
County: Anne Arundel
State: Maryland
Community ID: Upland
Transect ID: Clark Branch S
Plot ID: 2-P

SOILS

Soil Map Unit Name: Evesboro loamy sand
Drainage Class: Well to excessively drained
Soil Tax Subgroup: Typic Quartzipsamments
Confirm Map Type: ☒ Yes ☐ No

Soil Profile Description:

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-1	A	10YR 2/1	None	None	Fibric
1-3	B1	2.5Y 4/4	2.5Y 6/6	Few, small, faint	Clayey sand
			2.5Y 5/8	Few, medium, distinct	
3-21	B2	2.5Y 5/6	2.5Y 5/8	Common, large, distinct	Silty sand
			2.5Y 7/4	Common, medium, faint	
			2.5Y 6/3	Few, small, faint	

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☐ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Sample plot does not satisfy the hydric soils criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☐ Yes ☒ No
Wetland Hydrology Present? ☐ Yes ☒ No
Hydric Soils Present? ☐ Yes ☒ No
Is this Sampling within a Wetland? ☐ Yes ☒ No

Remarks

Sample plot does not satisfy the three mandatory wetland technical criteria.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Security Fence
Applicant: Maryland Aviation Administration
Investigator: Leyla Lange/Jennifer Bird
Do Normal Circumstances exist on the site? ☐ Yes ☒ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 22, 1999
County: Anne Arundel
State: Maryland
Community ID: Upland
Transect ID: Clark Branch S
Plot ID: 2-P

VEGETATION

Dominant Plant Species	Stratum	Indicator
Graminae spp.	Herb	NA
Cassia fasciculata	Herb	FACU

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 0.00%

If the FAC-neutral test is used, this data does NOT provide a secondary indicator of wetland hydrology

Remarks

The vegetation was mowed and the grass was not identifiable to the species level. Sample plot does not satisfy the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit None (in.)
Depth to saturated soil None (in.)

Primary Wetland Hydrology Indicators

☐ Inundated
☐ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☐ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Indicators of hydrology absent; sample plot does not satisfy the wetland hydrology criterion. Aerial photographs were reviewed to initially identify potential wetland areas.

WETLAND Q

WETLAND Q

Wetland Q is on the west side of the airport, adjacent to MD 170 and approximately 0.5 mile north of the Dorsey Road/MD Route 170 intersection. It includes portions of Hawkins Branch and Clark Branch, which are tributaries of Stony Run. Both streams appear as palustrine forested/palustrine scrub shrub, broad-leaved deciduous, temporarily flooded wetlands on the NWI map for Relay, Maryland, but the area between them does not appear as a wetland on the map.

Hawkins Branch flows west from the airport property, and Clark Branch flows the northwest. After crossing the fence, both streams enter culverts beneath MD Route 170 and converge immediately east of the railroad tracks. Both streams had were stable and had forested riparian zones. Their streambed composition that ranged from unconsolidated silt sand and clay to gravel and pebbles. The area between the streams and immediately west of where they cross the security fence contains a palustrine emergent (PEM) wetland. The wetland receives hydrology as groundwater, overland sheet flow from MD Route 170, and flooding from Hawkins and Clark branches. Due to the size of Wetland Q and the different vegetative communities present, four sample plots were established to characterize the area: Sample Plots 1-Q and 3-Q represent Wetland Q, and Sample Plots 2-Q and 4-Q represent the adjacent upland.

Sample Plot 1-Q

On December 23, 1999, SES examined soils, vegetation, and hydrology at Sample Plot 1-Q. Table 4.3-86 summarizes the investigation results, Table 4.3-87 presents dominant vegetation, and Table 4.3-88 summarizes soil data.

Table 4.3-86
Sample Plot 1-Q General Information

Classification	Wetland
Sample Coordinates	547154.6200 North; 1398898.9150 East
Hydrology Indicators	Saturation in the upper 12 inches of the soil profile, water marks, and the Anne Arundel County Soil Survey (USDA, 1973)
Percent Hydrophytic Vegetation	67% (see Table 4.3-87)
Hydric Soils	Yes (see Table 4.3-88)

Table 4.3-87
Sample Plot 1-Q Dominant Vegetation

Common Name	Scientific Name	Indicator Status
Red Maple	*Acer rubrum*	FAC
White Oak	*Quercus alba*	FACU
Smooth Alder	*Alnus serrulata*	OBL
Swamp Azalea	*Rhododendron viscosum*	OBL
Sweet Pepper Bush	*Clethra alnifolia*	FAC+
Fern spp.[a]	*NA*	NA

Table 4.3-87
Sample Plot 1-Q Dominant Vegetation

Common Name	Scientific Name	Indicator Status

[a] Not identifiable to the species level due to the absence of inflorescence.

Table 4.3-88
Sample Plot 1-Q Soil Description

Depth (in.)	Color	Description	Mottles
0-12	Black (10YR 2/1)	Fine silty sand, fibric, moist	None
12-21	Very dark gray (5Y 3/1)	Fine silty sand, saturated	Few, coarse, distinct, reddish-black (2.5YR 3/1)

Conclusion: Sample plot 1-Q satisfies the three mandatory wetland technical criteria. The area is classified as a palustrine emergent (PEM) wetland.

Sample Plot 2-Q

On December 23, 1999, SES examined soils, vegetation, and hydrology at Sample Plot 2-Q. Table 4.3-89 summarizes the investigation results, Table 4.3-90 presents dominant vegetation, and Table 4.3-91 summarizes soil data.

Table 4.3-89
Sample Plot 2-Q General Information

Classification	Upland
Sample Coordinates	547366.8220 North; 1398958.6490 East
Hydrology Indicators	Oxidized rhizospheres in the upper 12 inches of the soil profile
Percent Hydrophytic Vegetation	40% (see Table 4.3-90)
Hydric Soils	No (see Table 4.3-91)

Table 4.3-90
Sample Plot 2-Q Dominant Vegetation

Common Name	Scientific Name	Indicator Status
Switchgrass	*Panicum virgatum*	FAC
Japanese Honeysuckle	*Lonicera japonica*	FAC-
Deertongue Witchgrass	*Dichanthelium clandestinum*	FAC+
Common Dandelion	*Taraxacum officinale*	FACU-
English Plantain	*Platanus lanceolata*	UPL

Table 4.3-91
Sample Plot 2-Q Soil Description

Depth (in.)	Color	Description	Mottles
0-3	Very dark brown (7.5YR 2.5/2)	Fine sand, moist	None
3-11	Very dark brown (7.5YR 2.5/2)	Fine sand, moist	None
11-23	Light yellowish-brown (2.5Y 6/4)	Fine sand, moist	Few, small, distinct, strong brown (7.5YR 4/6)

Conclusion: Sample plot 2-Q does not satisfy the three mandatory wetland technical criteria. The area was classified as an upland.

Sample Plot 3-Q

On December 23, 1999, SES examined soils, vegetation, and hydrology at Sample Plot 1-Q. Table 4.3-86 summarizes the investigation results, Table 4.3-87 presents dominant vegetation, and Table 4.3-88 summarizes soil data.

Table 4.3-92
Sample Plot 3-Q General Information

Classification	Wetland
Sample Coordinates	546404.1280 North; 1398832.3273 East
Hydrology Indicators	Inundation, saturation and oxidized rhizospheres in the upper 12 inches of the soil profile, drift lines, drainage patterns, and water-stained leaves
Percent Hydrophytic Vegetation	80% (see Table 4.3-93)
Hydric Soils	Yes (see Table 4.3-94)

Table 4.3-93
Sample Plot 3-Q Dominant Vegetation

Common Name	Scientific Name	Indicator Status
Red Maple	*Acer rubrum*	FAC
Southern Arrowwood	*Viburnum dentatum*	FAC
Skunk Cabbage	*Symplocarpus foetidus*	OBL
Sensitive Fern	*Onoclea sensibilis*	FACW
Grass spp.[a]	*Graminae* spp.	NA

[a] Not identifiable to the species level due to the absence of inflorescence.

Table 4.3-94
Sample Plot 3-Q Soil Description

Depth (in.)	Color	Description	Mottles
0-5	Very dark brown (10YR 2/2)	Organic-fibric layer, moist	None
5+	Very dark brown (10YR 2/2)	Fine sandy silt, liquid soil texture	Unable to determine due to liquid texture of soil.

Conclusion: Sample plot 3-Q satisfies the three mandatory wetland technical criteria. The area was classified as a palustrine emergent (PEM) wetland. In addition, it contains Hawkins Branch and Clark Branch, which were classified as Waters of the U.S.

Sample Plot 4-Q

On December 23, 1999, SES examined soils, vegetation, and hydrology at Sample Plot 4-Q. Table 4.3-95 summarizes the investigation results, Table 4.3-96 presents dominant vegetation, and Table 4.3-97 summarizes soil data.

Table 4.3-95
Sample Plot 4-Q General Information

Classification	Upland
Sample Coordinates	546979.3570 North; 1398841.0740 East
Hydrology Indicators	None
Percent Hydrophytic Vegetation	20% (see Table 4.3-96)
Hydric Soils	No (see Table 4.3-97)

Table 4.3-96
Sample Plot 4-Q Dominant Vegetation

Common Name	Scientific Name	Indicator Status
Tulip Poplar	*Liriodendron tulipifera*	FACU
Black Oak	*Quercus velutina*	NA
Southern Red Oak	*Quercus falcata*	FACU-
Common Greenbrier	*Smilax rotundifolia*	FAC
Goldenrod spp.[a]	*Solidago* spp.	NA
Grass spp.[b]	*Graminae* spp.	NA

[a] Not identifiable to the species level due to the deteriorated condition of the specimens.
[b] Not identifiable to species level due to the absence of inflorescence.

Table 4.3-97
Sample Plot 4-Q Soil Description

Depth (in.)	Color	Description	Mottles
0-8	Olive brown (2.5Y 4/4)	Silty fine sand, moist	Few, medium, faint, brownish-yellow (10YR 6/8) Common, small, distinct, strong brown (7.5YR 5/8)
8-10	Black (10YR 2/1)	Fine sand, moist	None
10-21	Dark gray (7.5YR 4/1)	Medium sand, very moist	None

Conclusion: Sample plot 4-Q satisfies only one of the three mandatory wetland technical criteria. The area was classified as an upland.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Security Fence
Applicant: Maryland Aviation Administration
Investigator: Stephen Cohen/Leyla Lange
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 23, 1999
County: Anne Arundel
State: Maryland
Community ID: Wetland
Transect ID: Clark/Hawkins
Plot ID: 1-Q

VEGETATION

Dominant Plant Species	Stratum	Indicator
Acer rubrum	Tree	FAC
Quercus alba	Tree	FACU-
Alnus serrulata	Shrub	OBL
Rhododendron viscosum	Shrub	OBL
Clethra alnifolia	Shrub	FAC+
Fern spp.	Herb	NA

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 66.67%

If the FAC-neutral test is used, this data provides a secondary indicator of wetland hydrology

Remarks

Fern was not identifiable to the species level due to the deteriorated condition of the specimen. Sample plot satisfies the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit 8.0 (in.)
Depth to saturated soil 9.0 (in.)

Primary Wetland Hydrology Indicators

☐ Inundated
☒ Saturated in Upper 12 Inches
☒ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☐ Water-Stained Leaves
☒ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Sample plot satisfies the wetland hydrology criterion. Aerial photographs were reviewed to initially identify potential wetland areas.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Security Fence
Applicant: Maryland Aviation Administration
Investigator: Stephen Cohen/Leyla Lange
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 23, 1999
County: Anne Arundel
State: Maryland
Community ID: Wetland
Transect ID: Clark/Hawkins
Plot ID: 1-Q

SOILS

Soil Map Unit Name: Bibb silt loam
Drainage Class: Poorly drained
Soil Tax Subgroup: Typic Haplaquents
Confirm Map Type: ☒ Yes ☐ No

Soil Profile Description:

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-12	A	10YR 2/1	None	None	Fine silty sand, fibric, moist
12-21	B	5Y 3/1	2.5YR 3/1	Few, coarse, distinct	Fine silty sand, saturated

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☒ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☒ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Sample plot satisfies the hydric soils criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No
Wetland Hydrology Present? ☒ Yes ☐ No
Hydric Soils Present? ☒ Yes ☐ No
Is this Sampling within a Wetland? ☒ Yes ☐ No

Remarks

Sample plot satisfies the three mandatory wetland technical criteria.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Security Fence
Applicant: Maryland Aviation Administration
Investigator: Stephen Cohen/Leyla Lange
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 23, 1999
County: Anne Arundel
State: Maryland
Community ID: Upland
Transect ID: Clark/Hawkins
Plot ID: 2-Q

VEGETATION

Dominant Plant Species	Stratum	Indicator
Panicum virgatum	Herb	FAC
Lonicera japonica	Herb	FAC-
Dichanthelium clandestinum	Herb	FAC+
Taraxacum officinale	Herb	FACU-
Plantago lanceolata	Herb	UPL

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 40.00%

If the FAC-neutral test is used, this data does NOT provide a secondary indicator of wetland hydrology

Remarks

Sample plot does not satisfy the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit None (in.)
Depth to saturated soil None (in.)

Primary Wetland Hydrology Indicators

☐ Inundated
☐ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☒ Oxidized Root Channels in Upper 12"
☐ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Sample plot does not satisfy the wetland hydrology criterion. Aerial photographs were reviewed to initially identify potential wetland areas.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Security Fence
Applicant: Maryland Aviation Administration
Investigator: Stephen Cohen/Leyla Lange
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 23, 1999
County: Anne Arundel
State: Maryland
Community ID: Upland
Transect ID: Clark/Hawkins
Plot ID: 2-Q

SOILS

Soil Map Unit Name: Sassafras fine sandy loam
Drainage Class: Well drained
Soil Tax Subgroup: Typic Hapludults
Confirm Map Type: ☐ Yes ☒ No

Soil Profile Description:

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-3	A	7.5YR 2.5/2	None	None	Fine sand, moist
3-11	B1	7.5YR 2.5/2	None	None	Fine sand, moist
11-23	B2	2.5Y 6/4	7.5YR 4/6	Few, small, distinct	Fine sand, moist

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☒ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Sample plot does not satisfy the hydric soils criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☐ Yes ☒ No
Wetland Hydrology Present? ☐ Yes ☒ No
Hydric Soils Present? ☐ Yes ☒ No
Is this Sampling within a Wetland? ☐ Yes ☒ No

Remarks

Sample plot does not satisfy any of the three mandatory wetland technical criteria.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Security Fence
Applicant: Maryland Aviation Administration
Investigator: Layla Lange and Steve Cohen
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 23, 1999
County: Anne Arundel
State: Maryland
Community ID: Wetland
Transect ID: Wetland Q
Plot ID: 3-Q

VEGETATION

Dominant Plant Species	Stratum	Indicator
Acer rubrum	Tree	FAC
Viburnum dentatum	Shrub	FAC
Symplocarpus foetidus	Herb	OBL
Onoclea sensibilis	Herb	FACW
Graminae spp.	Herb	NA

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 80.00%

Remarks

Sample plot satisfies the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water 1.0 (in.)
Depth to free water in pit 0 (in.)
Depth to saturated soil 0 (in.)

Primary Wetland Hydrology Indicators

☒ Inundated
☒ Saturated in Upper 12 Inches
☐ Water Marks
☒ Drift Lines
☐ Sediment Deposits
☒ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☒ Oxidized Root Channels in Upper 12"
☒ Water-Stained Leaves
☒ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Sample plot satisfies the wetland hydrology criterion. Aerial photographs were reviewed to initially identify potential wetland areas.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Security Fence
Applicant: Maryland Aviation Administration
Investigator: Layla Lange and Steve Cohen
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 23, 1999
County: Anne Arundel
State: Maryland
Community ID: Wetland
Transect ID: Wetland Q
Plot ID: 3-Q

SOILS

Soil Map Unit Name: Bibb silt loam
Drainage Class: Poorly drained
Soil Tax Subgroup: Typic Haplaquents
Confirm Map Type: ☒ Yes ☐ No

Soil Profile Description:

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-5	O	10YR 2/2	None	None	Organic-fibric layer, moist
5+	A	10YR 2/2	---	---	Fine sandy silt; liquid soil

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☒ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☒ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☒ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

The soil exhibited a liquid texture below a depth of 5 inches, and the presence of mottles could not be determined. Sample plot satisfies the hydric soil criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No
Wetland Hydrology Present? ☒ Yes ☐ No
Hydric Soils Present? ☒ Yes ☐ No
Is this Sampling within a Wetland? ☒ Yes ☐ No

Remarks

Sample plot satisfies the three mandatory wetland technical criteria.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Security Fence
Applicant: Maryland Aviation Administration
Investigator: Layla Lange and Steve Cohen
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 23, 1999
County: Anne Arundel
State: Maryland
Community ID: Upland
Transect ID: Wetland Q
Plot ID: 4--Q

VEGETATION

Dominant Plant Species	Stratum	Indicator
Liriodendron tulipifera	Tree	FACU
Quercus velutina*	Tree	NA
Quercus falcata	Shrub	FACU-
Smilax rotundifolia	Herb	FAC
Graminae spp.	Herb	NA
Solidago spp.	Herb	NA

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 16.67%

If the FAC-neutral test is used, this data does NOT provide a secondary indicator of wetland hydrology

Remarks

*Insufficient information available to determine an indicator status for Quercus velutina in the northeast region. Grass spp. and Solidago spp. not identifiable to the species level due to the absence of inflorescence. Sample plot does not satisfy the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

- ☐ Stream, Lake or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other
- ☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit None (in.)
Depth to saturated soil 21 (in.)

Primary Wetland Hydrology Indicators

- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- ☐ Oxidized Root Channels in Upper 12"
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks

Indicators of hydrology absent; sample plot does not satisfy the wetland hydrology criterion. Aerial photographs were reviewed to initially identify potential wetland areas.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - Security Fence
Applicant: Maryland Aviation Administration
Investigator: Layla Lange and Steve Cohen
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: December 23, 1999
County: Anne Arundel
State: Maryland
Community ID: Upland
Transect ID: Wetland Q
Plot ID: 4--Q

SOILS

Soil Map Unit Name: Evesboro and Galestown loamy sands
Drainage Class: Well to excessively drained
Soil Tax Subgroup: Typic Quartzipsamments/Psammentic Hapludults
Confirm Map Type: ☒ Yes ☐ No

Soil Profile Description:

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-8	A	2.5Y 4/4	10YR 6/8	Few, medium, faint	Silty fine sand, moist
			7.5YR 5/8	Common, small, distinct	
8-10	B1	10YR 2/1	None	None	Fine sand, moist
10-21	B2	7.5YR 4/1	None	None	Medium sand, very moist

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☒ Gleyed or Low-Chroma Colors
☒ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Concretions were observed in the soil profile. Sample plot satisfies the hydric soil criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☐ Yes ☒ No
Wetland Hydrology Present? ☐ Yes ☒ No
Hydric Soils Present? ☒ Yes ☐ No
Is this Sampling within a Wetland? ☐ Yes ☒ No

Remarks

Sample plot does not satisfy all three mandatory wetland technical criterion.

WETLAND R

WETLAND R

Wetland R contains a portion of Signal Branch, which is an intermittent tributary of Stony Run. The headwaters of Signal Branch are located along the western edge of the Midfield Cargo Complex construction site. The stream flows approximately 900 feet west to the security fence, enters a culvert beneath MD Route 170, and continues west to its confluence with Stony Run. The channel was very straight, and portions of the banks were unvegetated, entrenched, and scoured. The stream bed was composed primarily unconsolidated silt and sand. Signal Branch crosses the security fence immediately north of the Midfield Cargo Complex construction site entrance road off of MD Route 170. The stream contained base flow at the time of the field investigation, and the area was classified as Waters of the U.S.

WETLAND S

WETLAND S

Wetland S consists of an unnamed intermittent tributary of Bowden Branch, which is an intermittent tributary of Stony Run. The tributary emerges from a culvert at the western end of Taxiway F, flows north for approximately 200 feet, and enters a culvert beneath Stoney Run Road where it converges with Bowden Branch. Wetland S crosses the security fence approximately 100 feet east of the Stoney Run Road entrance ramp off of MD Route 170 north, and is shown on the NWI map as a palustrine forested, broad-leaved deciduous, temporarily flooded (PFO1A) wetland. The NWI map indicates that Wetland S formerly contained the main channel of Bowden Branch, which was diverted to Wetland T following construction of the Stoney Run Road interchange off of MD Route 170.

The banks of Wetland S are lined with rip-rap and the riparian zone consists of maintained turf. The streambed consisted of silt, and some hydrophytic vegetation was observed within the channel including cattails and river birch. The soils within the channel were not hydric. This area was classified as Waters of the U.S. because the channel has an intermittent flow regime and is a tributary of Bowden Branch.

WETLAND T

WETLAND T

Wetland T contains a portion of Bowden Branch, which is an intermittent tributary of Stony Run. Wetland T does not appear on the NWI map, and it appears that the channel may have been constructed as part of the Stoney Run Road interchange project.

The headwaters of Bowden Branch are adjacent to the western end of Taxiway F. The stream flows west from Taxiway F for approximately 200 feet, passes through a palustrine emergent (PEM) wetland, and enters a culvert beneath a service road. It flows through another PEM wetland on the west side of the road, and continues west through the security fence and into a culvert beneath Stoney Run Road. Bowden Branch emerges from a culvert on the north side of Stoney Run Road and continues to flow west to its confluence with Stony Run. The channel crosses the security fence approximately 50 feet south of the Stoney Run Road entrance ramp off of MD Route 170 N (see Exhibit 7). The banks and channel of the stream are lined with rip-rap, and the riparian zone consists of maintained turf. The stream had base flow at the time of the field investigation, and the area was classified as Waters of the U.S.

WETLAND U

WETLAND U

Wetland U contains an unnamed intermittent tributary of Stony Run, and a series of small, palustrine forested/palustrine emergent (PFO/PEM) wetlands associated with the headwater and floodplain of the stream. The unnamed tributary is in an undeveloped forested parcel that does not appear on the Relay, MD NWI map. The headwater of the stream is approximately 600 feet east of the Stoney Run Road entrance ramp (see Exhibit 7), and flows west for approximately 500 feet before entering a culvert beneath a service road. It then flows for approximately 100 west, passes beneath the security fence, and enters a second culvert beneath the Stoney Run Road entrance ramp. The stream emerges from a culvert on the west side of the ramp and flows westward to its confluence with Stony Run. Baseflow was observed at the time of the field investigation, and the stream channel ranged in composition from unconsolidated silt, sand, and clay to gravel and pebbles. The portions of the channel at the security fence crossing and immediately west of the Stoney Run Road entrance ramp is lined with rip-rap. The riparian zone is forested, and the banks are well vegetated and stable.

A small, narrow, palustrine forested wetland (PFO) is located in the headwater of the stream, and occupies approximately 0.01 acres. This wetland receives hydrology as groundwater and overland sheet flow from the surrounding upland area. Three small palustrine forested/palustrine emergent (PFO/PEM) wetlands are within the floodplain of the stream: two are located immediately east of the service road and occupy approximately 0.04 acres, and one is located immediately west of the service road and occupies approximately 0.02 acres. These wetlands receive hydrology as groundwater, flooding from the unnamed tributary, and overland sheet flow from the surrounding upland area. Sample Plot 1-U represents the headwater wetland, Sample Plot 2-U represents the floodplain wetlands, and Sample Plot 3-U represents the surrounding upland area. All of the wetlands within Wetland U are beyond the 10-foot maintenance zone.

Sample Plot 1-U

On April 11, 2000, SES examined soils, vegetation, and hydrology at sample plot 1-U. Table 4.3-98 summarizes the investigation results, Table 4.3-99 presents dominant vegetation, and Table 4.3-100 summarizes soil data.

Table 4.3-98
Sample Plot 1-U General Information

Classification	Wetland
Sample Coordinates	1400631.4211 North; 550739.2227 East
Hydrology Indicators	Saturation in the upper 12-inches of the soil profile, and water-stained leaves.
Percent Hydrophytic Vegetation	80% (see Table 4.3-99)
Hydric Soils	Yes (see Table 4.3-100)

Table 4.3-99
Sample Plot 1-U Dominant Vegetation

Common Name	Scientific Name	Indicator Status
Red Maple	*Acer rubrum*	FAC
Virginia Pine	*Pinus virginiana*	UPL
Southern Arrowwood	*Viburnum dentatum*	FAC
Black Gum	*Nyssa sylvatica*	FAC
Common Greenbrier	*Smilax rotundifolia.*	FAC

Table 4.3-100
Sample Plot 1-U Soil Description

Depth (in.)	Color	Description	Mottles
0-2	Black (7.5YR 2.5/1)	Organic-fibric layer, saturated	None
2-5	Dark grayish-brown (2.5Y 4/2))	Silt loam, saturated	None
5-10	Brown (2.5Y 5/3)	Silt loam, moist	Common, small, distinct, strong-brown (7.5YR 5/8)
10+	Unable to determine due to liquid texture of soil.	Liquid soil texture	Unable to determine due to liquid texture of soil.

Conclusion: Sample plot 1-U satisfies the three mandatory wetland technical criteria. The area was classified as a palustrine forested broad-leaved deciduous (PFO1) wetland.

Sample Plot 2-U

On April 11, 2000, SES examined soils, vegetation, and hydrology at sample plot 2-U. Table 4.3-101 summarizes the investigation results, Table 4.3-102 presents dominant vegetation, and Table 4.3-103 summarizes soil data.

Table 4.3-101
Sample Plot 2-U General Information

Classification	Wetland
Sample Coordinates	1400352.6171 North; 550559.5371 East
Hydrology Indicators	Saturation in the upper 12-inches of the soil profile, and water-stained leaves.
Percent Hydrophytic Vegetation	80% (see Table 4.3-102)
Hydric Soils	Yes (see Table 4.3-103)

Table 4.3-102
Sample Plot 2-U Dominant Vegetation

Common Name	Scientific Name	Indicator Status
Red Maple	*Acer rubrum*	FAC
Southern Arrowwood	*Viburnum dentatum*	FAC
Turk's-Cap Lily	*Lilium superbum*	FACW+
Grass spp.[a]	Graminae spp.	NA
Common Greenbrier	*Smilax rotundifolia*	FAC

[a] Not identifiable to the species level due to the absence of inflorescence.

Table 4.3-103
Sample Plot 2-U Soil Description

Depth (in.)	Color	Description	Mottles
0-3	Dark grayish-brown (10YR 4/2)	Silt loam, saturated	None
3-18	Gray (2.5Y 5/1)	Silty fine sand, saturated	Common, medium, distinct, strong brown (7.5YR 5/6)
18+	Unable to determine due to liquid texture of soil.	Liquid soil texture	Unable to determine due to liquid texture of soil.

Conclusion: Sample plot 2-U satisfies the three mandatory wetland technical criteria. The area was classified as a palustrine forested broad-leaved deciduous/palustrine emergent (PFO1/PEM) wetland. In addition, it contains an intermittent unnamed tributary of Stony Run, which is classified as "Waters of the U.S."

Sample Plot 3-U

On April 11, 2000, SES examined soils, vegetation, and hydrology at sample plot 3-U. Table 4.3-104 summarizes the investigation results, Table 4.3-105 presents dominant vegetation, and Table 4.3-106 summarizes soil data.

Table 4.3-104
Sample Plot 3-U General Information

Classification	Upland
Sample Coordinates	1400342.6100 North; 550581.7594 East
Hydrology Indicators	None.
Percent Hydrophytic Vegetation	33% (see Table 4.3-105)
Hydric Soils	No (see Table 4.3-106)

Table 4.3-105
Sample Plot 3-U Dominant Vegetation

Common Name	Scientific Name	Indicator Status
Virginia Pine	*Pinus virginiana*	UPL
Black Cherry	*Prunus serotina*	FACU
Red Maple	*Acer rubrum*	FAC
Japanese Honeysuckle (herb)	*Lonicera japonica*	FAC-
Japanese Honeysuckle (vine)	*Lonicera japonica*	FAC-
Common Greenbriar	*Smilax rotundifolia*	FAC

Table 4.3-105
Sample Plot 3-U Soil Description

Depth (in.)	Color	Description	Mottles
0-2	Dark yellowish-brown (10YR 3/4)	Silty sand, dry, friable	None
2-18	Dark yellowish-brown (10YR 4/6)	Silty sand, dry, friable	Common, medium, distinct, yellowish-red (5YR 5/8)
18-21	Yellowish-brown (10YR 5/6)	Sand, dry, friable	None

Conclusion: Sample plot 3-U does not satisfy any of the three mandatory wetland technical criteria. The area was classified as an upland.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - AOA
Applicant: Maryland Aviation Administration
Investigator: Jason McNees and Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: April 11, 2000
County: Anne Arundel
State: Maryland
Community ID: Wetland
Transect ID: Wetland U
Plot ID: 1-U

VEGETATION

Dominant Plant Species	Stratum	Indicator
Acer rubrum	Tree	FAC
Pinus virginiana	Tree	UPL
Viburnum dentatum	Shrub	FAC
Nyssa sylvatica	Shrub	FAC
Smilax rotundifolia	Vine	FAC

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 80.00%

If the FAC-neutral test is used, this data does NOT provide a secondary indicator of wetland hydrology

Remarks

Sample plot satisfies the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit 5 (in.)
Depth to saturated soil 0 (in.)

Primary Wetland Hydrology Indicators

☐ Inundated
☒ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☒ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Sample plot satisfies the wetland hydrology criterion. Aerial photographs were reviewed to initially identify potential wetland areas.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - AOA	Date: April 11, 2000
Applicant: Maryland Aviation Administration	County: Anne Arundel
Investigator: Jason McNees and Jennifer Bird	State: Maryland
Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Community ID: Wetland
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No	Transect ID: Wetland U
Is the area a Problem Area? ☐ Yes ☒ No	Plot ID: 1-U

SOILS

Soil Map Unit Name: Sassafras fine sandy loam — Drainage Class: Well-drained

Soil Tax Subgroup: Typic Hapludults — Confirm Map Type: ☐ Yes ☒ No

Soil Profile Description:

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-2	O	7.5YR 2.5/1	None	None	Organic-fibric layer, saturated
2-5	A	2.5Y 4/2	None	None	Silt loam, saturated
5-10	B1	2.5Y 5/3	7.5YR 5/8	Common, small, distinct	Silt loam, moist
10+					Liquid soil texture

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☒ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☐ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Sample plot satisfies the hydric soil criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No

Wetland Hydrology Present? ☒ Yes ☐ No

Hydric Soils Present? ☒ Yes ☐ No

Is this Sampling within a Wetland? ☒ Yes ☐ No

Remarks

Sample plot satisfies all three mandatory wetland technical criteria.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - AOA
Applicant: Maryland Aviation Administration
Investigator: Jason McNees and Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: April 11, 2000
County: Anne Arundel
State: Maryland
Community ID: Wetland
Transect ID: Wetland U
Plot ID: 2-U

VEGETATION

Dominant Plant Species	Stratum	Indicator
Acer rubrum	Tree	FAC
Viburnum dentatum	Shrub	FAC
Lilium superbum	Herb	FACW+
Graminae spp.	Herb	NA
Smilax rotundifolia	Vine	FAC

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 80.00%

Remarks

Sample plot satisfies the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit 3 (in.)
Depth to saturated soil 0 (in.)

Primary Wetland Hydrology Indicators

☐ Inundated
☒ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☒ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Sample plot satisfies the wetland hydrology criterion. Aerial photographs were reviewed to initially identify potential wetland areas.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - AOA
Applicant: Maryland Aviation Administration
Investigator: Jason McNees and Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: April 11, 2000
County: Anne Arundel
State: Maryland
Community ID: Wetland
Transect ID: Wetland U
Plot ID: 2-U

SOILS

Soil Map Unit Name: Sassafras fine sandy loam
Drainage Class: Well-drained
Soil Tax Subgroup: Typic Hapludults
Confirm Map Type: ☐ Yes ☒ No

Soil Profile Description:

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-3	A	10YR 4/2	None	None	Silt loam, saturated
3-18	B1	2.5Y 5/1	7.5YR 5/6	Common, medium,	Silty fine sand, saturated
18+					Liquid soil texture

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☒ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Sample plot satisfies the hydric soil criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No
Wetland Hydrology Present? ☒ Yes ☐ No
Hydric Soils Present? ☒ Yes ☐ No
Is this Sampling within a Wetland? ☒ Yes ☐ No

Remarks

Sample plot satisfies all three mandatory wetland technical criteria.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - AOA
Applicant: Maryland Aviation Administration
Investigator: Jason McNees and Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: April 11, 2000
County: Anne Arundel
State: Maryland
Community ID: Upland
Transect ID: Wetland U
Plot ID: 3-U

VEGETATION

Dominant Plant Species	Stratum	Indicator
Pinus virginiana	Tree	UPL
Prunus serotina	Tree	FACU
Acer rubrum	Sapling	FAC
Lonicera japonica	Herb	FAC-
Lonicera japonica	Vine	FAC-
Smilax rotundifolia	Vine	FAC

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 33.33%

If the FAC-neutral test is used, this data does NOT provide a secondary indicator of wetland hydrology

Remarks

Sample plot does not satisfy the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit None (in.)
Depth to saturated soil None (in.)

Primary Wetland Hydrology Indicators

☐ Inundated
☐ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☐ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Indicators of hydrology absent; sample plot does not satisfy the wetland hydrology criterion. Aerial photographs were reviewed to initially identify potential wetland areas.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: BWI - AOA
Applicant: Maryland Aviation Administration
Investigator: Jason McNees and Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: April 11, 2000
County: Anne Arundel
State: Maryland
Community ID: Upland
Transect ID: Wetland U
Plot ID: 3-U

SOILS

Soil Map Unit Name: Sassafras fine sandy loam
Drainage Class: Well-drained
Soil Tax Subgroup: Typic Hapludults
Confirm Map Type: ☐ Yes ☒ No

Soil Profile Description:

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-2	A	10YR 3/4	None	None	Silty sand, dry, friable
2-18	B1	10YR 4/6	5YR 5/8	Common, medium,	Silty sand, dry, friable
18-21	B2	10YR 5/6	None	None	Sand, dry, friable

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☐ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Sample plot does not satisfy the hydric soil criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☐ Yes ☒ No
Wetland Hydrology Present? ☐ Yes ☒ No
Hydric Soils Present? ☐ Yes ☒ No
Is this Sampling within a Wetland? ☐ Yes ☒ No

Remarks

Sample plot does not satisfy any of the three mandatory wetland technical criterion.

5.0 SUMMARY

During November and December, 1999, SES performed wetland delineations for three areas on BWI property: Kitten Branch, the AOA, and areas where on-site streams passed beneath the security fence. Based on the results of the SES field investigation and the criteria set forth in the 1987 *Army Corps of Engineers Wetland Delineation Manual,* 21 areas containing wetlands or Waters of the U.S. were identified. The results of the investigation are summarized in Table 5-1.

Table 5-1
Summary of Investigation Results

Wetland	Type	Size	Jurisdiction
Kitten Branch			
Wetland A	PEM	0.2 acre	COE
Wetland B	PEM	1.4 acres	COE
Wetland C	PEM/PSS	2.5 acres	COE
Wetland D	PFO1	0.3 acre	COE
Wetland E	PFO1	1.3 acres	COE
Wetland F	Waters of the U.S. (Kitten Branch)	NA	COE
Airport Operations Area			
Wetland G	Waters of the U.S. (Kitten Branch Tributary)	NA	COE
Wetland H	PFO1	0.2 acre	COE
Wetland I[a]	PFO1	0.1 acre	MDE
Wetland J	PFO1	0.4 acre	COE
Wetland K	PFO1	0.1 acre	COE
Wetland L	Waters of the U.S./PEM/PSS1 (Fork Branch)	0.5 acre	COE
Stream/Fence Crossings			
Wetland M	Waters of the U.S. (Muddy Bridge Branch)	NA	COE
Wetland N	Waters of the U.S. (Phelps Branch)	NA	COE
Wetland O	Waters of the U.S./PEM (Fork Branch)	NA	COE
Wetland P	Waters of the U.S./PEM (Clark Branch)	NA	COE
Wetland Q	Waters of the U.S./PEM (Hawkins/Clark Branch)	NA	COE
Wetland R	Waters of the U.S. (Signal Branch)	NA	COE
Wetland S	Waters of the U.S. (Bowden Branch Tributary)	NA	COE

Table 5-1
Summary of Investigation Results

Wetland T	Waters of the U.S. (Bowden Branch)	NA	COE
Wetland U	Waters of the U.S./PFO1/PEM (Unnamed Tributary of Stony Run)	0.07 acre (PFO1/PEM)	**TBD**

[a] Wetland I is an isolated wetland and is not jurisdictional according to COE. MDE considers this area to be jurisdictional.

Key:
COE = U. S. Army Corps of Engineers
MDE = Maryland Department of the Environment
NA = Not applicable
PEM = Palustrine emergent wetland
PFO1 = Palustrine, forested, broad-leaved deciduous wetland
TBD = To be determined

6.0 REFERENCES

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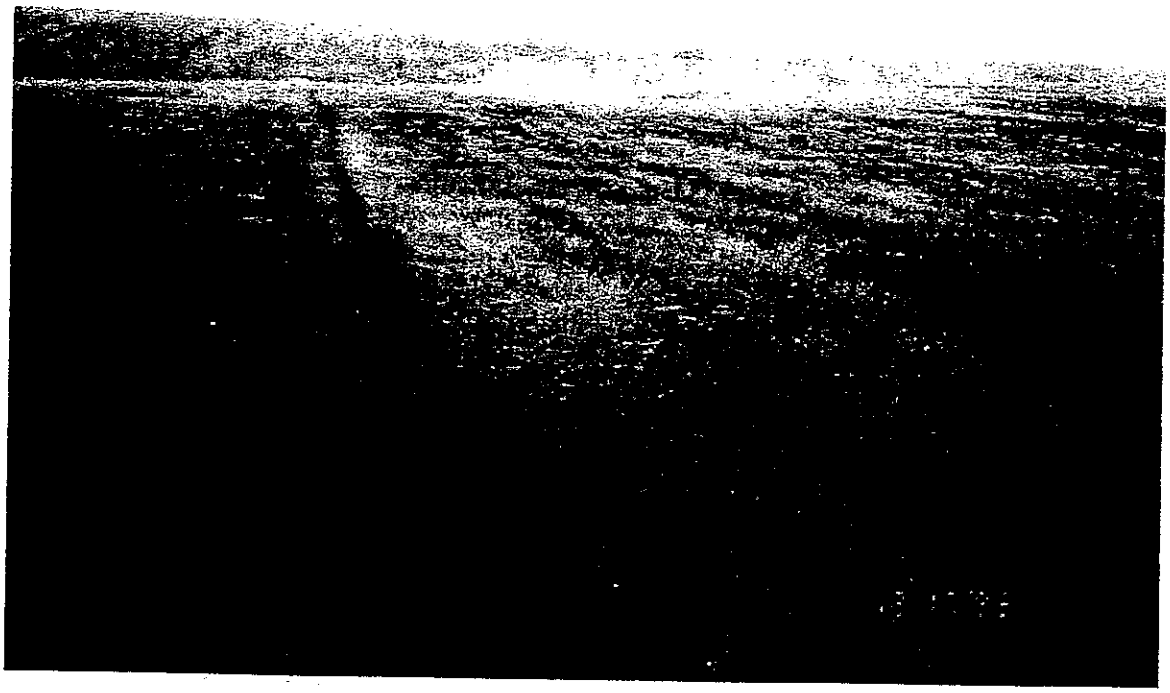
APPENDIX A

WETLAND INVESTIGATION PHOTOGRAPHS

Date: 12/17/99
JAM

Photograph 1: Wetland A
BWI Airport, Anne Arundel County, MD



Date: 12/17/99
JAM

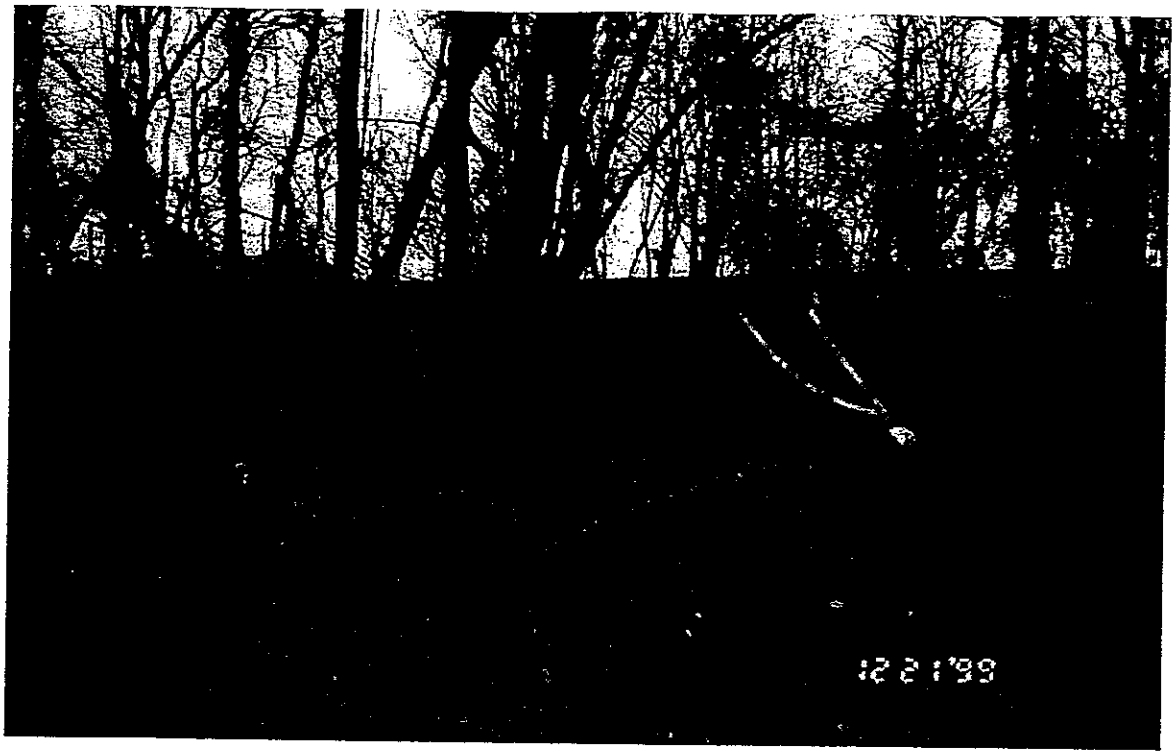
Photograph 2: Wetland B Facing East.
BWI Airport, Anne Arundel County, MD

Date: 12/17/99
RJW

Photograph 3: Wetland C Facing North
BWI Airport, Anne Arundel County, MD

Date: 12/17/99
RJW

Photograph 4: Wetland D Facing East.
BWI Airport, Anne Arundel County, MD



Date: 12/21/99
LEL

Photograph 5: Wetland E Facing South.
BWI Airport, Anne Arundel County, MD

Date: 12/21/99
RJW

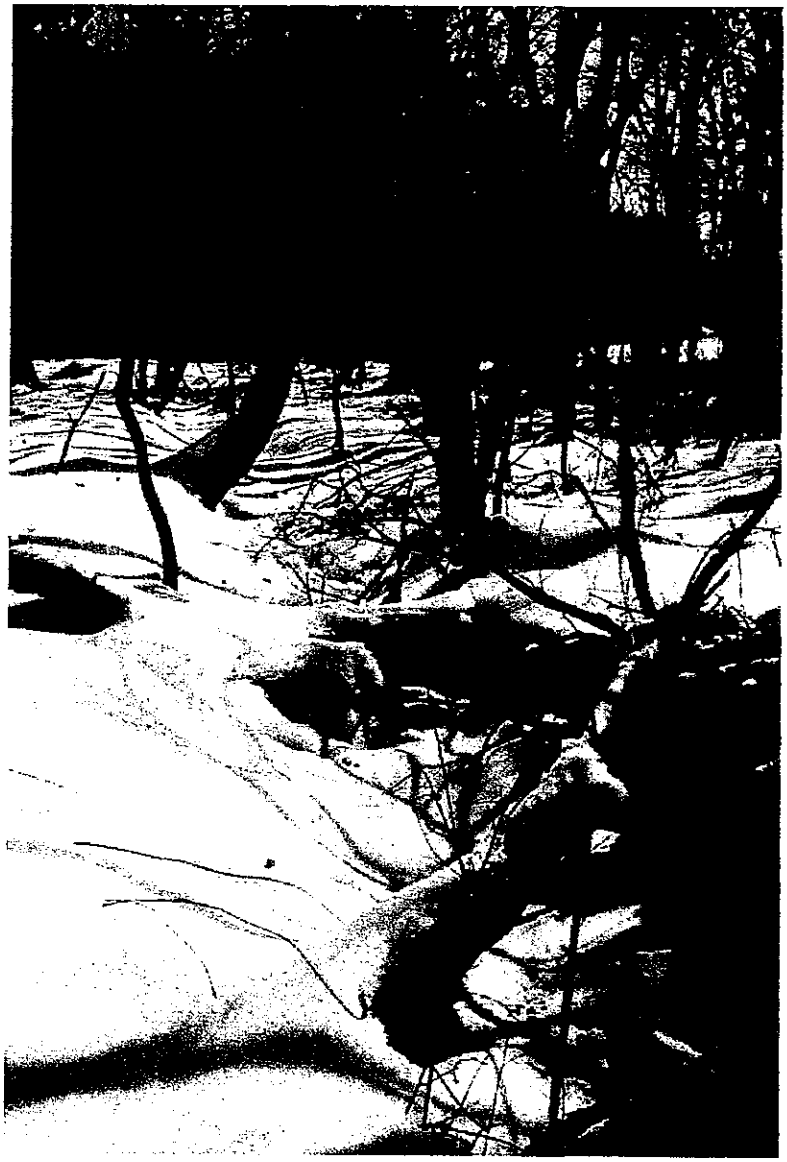
Photograph 6: Wetland F at Security Fence Crossing, Facing North.
BWI Airport, Anne Arundel County, MD

Date: 12/17/99
RJW

Photograph 7: Wetland G Facing East.
BWI Airport, Anne Arundel County, MD

Date: 12/17/99
RJW

Photograph 8: Wetland G Facing South Toward Taxiway F.
BWI Airport, Anne Arundel County, MD



Date: 2/7/00
JB

Photograph 10: Wetland I Facing East.
BWI Airport, Anne Arundel County, MD

Date: 2/7/00
JB

Photograph 9: Wetland H Facing North.
BWI Airport, Anne Arundel County, MD

Date: 12/23/99
JB

Photograph 11: Wetland K Facing West.
BWI Airport, Anne Arundel County, MD

Date: 12/1/99
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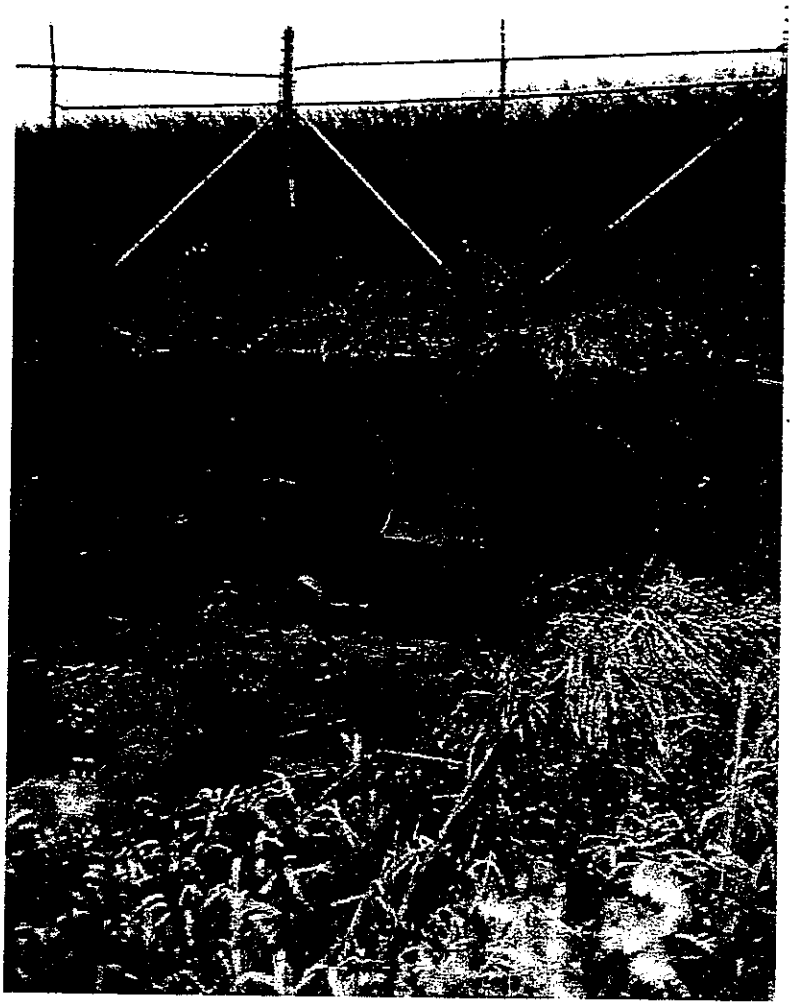
Photograph 12: Wetland L Facing North.
BWI Airport, Anne Arundel County, MD



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Photograph 13: Wetland M Security Fence Crossing, Facing West.
BWI Airport, Anne Arundel County, MD

Date: 12/13/99
JB

Photograph 14: Wetland N Security Fence Crossing, Facing West.
BWI Airport, Anne Arundel County, MD

Date: 12/13/99
JB

Photograph 15: Wetland O Security Fence Crossing, Facing South.
BWI Airport, Anne Arundel County, MD

Date: 12/22/99
JB

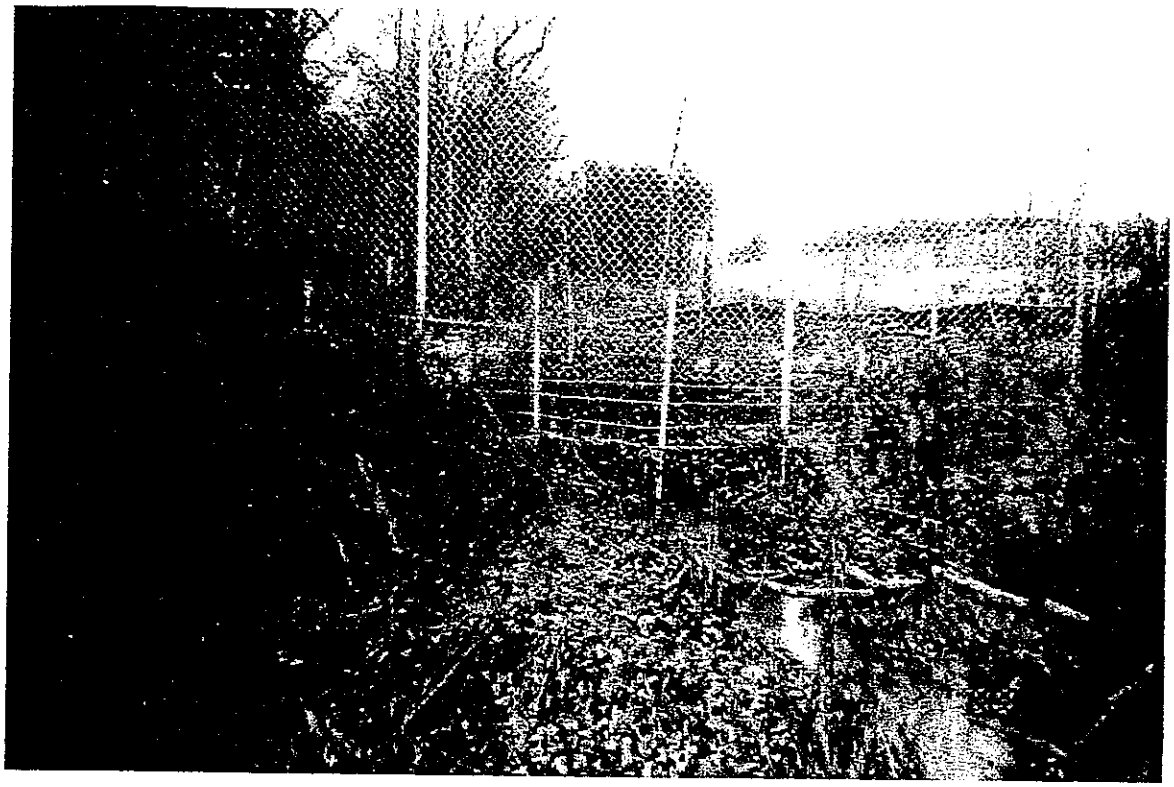
Photograph 16: Wetland P Security Fence Crossing, Facing East.
BWI Airport, Anne Arundel County, MD

Date: 12/22/99
JB

Photograph 17: Wetland P Security Fence Crossing, Facing East.
BWI Airport, Anne Arundel County, MD

Date: 12/23/99
LL

Photograph 18: Wetland Q Facing East From Inside Security Fence.
BWI Airport, Anne Arundel County, MD



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LEL

Photograph 19: Wetland R Security Fence Crossing, Facing East.
BWI Airport, Anne Arundel County, MD

Date: 12/23/99
JB

Photograph 20: Wetland S Security Fence Crossing, Facing South.
BWI Airport, Anne Arundel County, MD

Date: 12/23/99
LEL

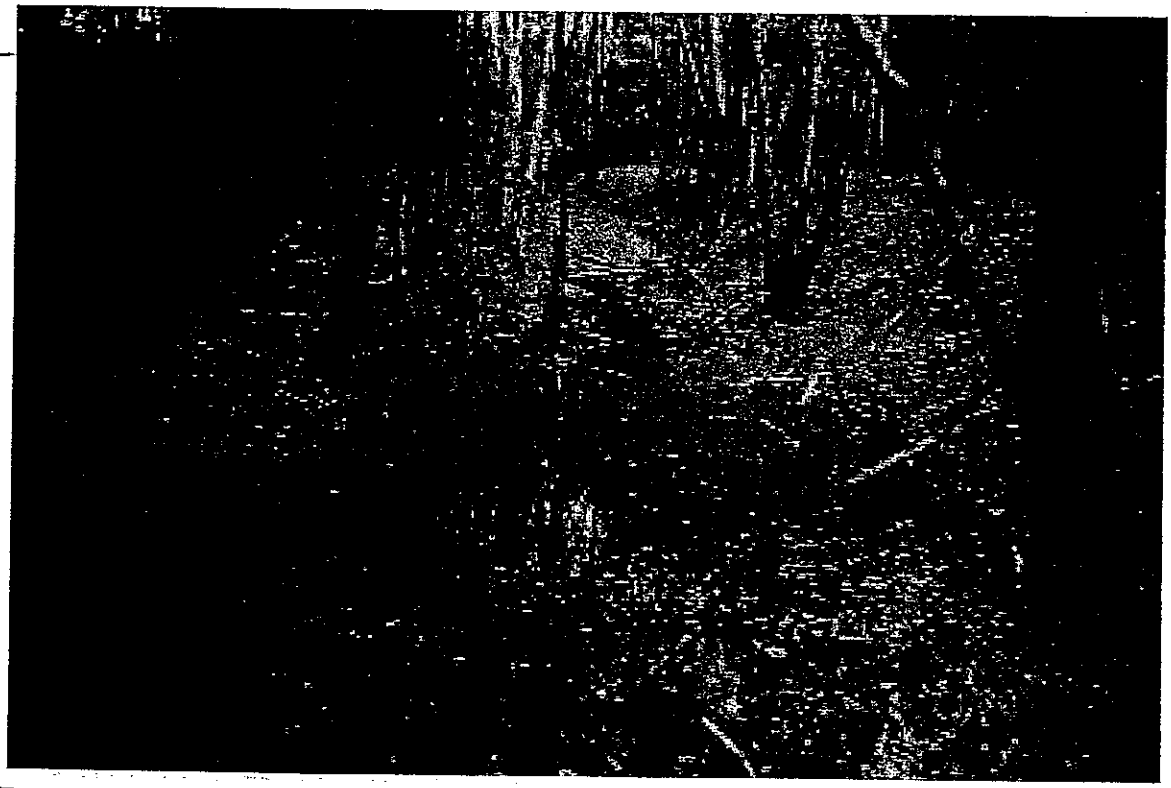
Photograph 21: Wetland T Security Fence Crossing, Facing Southeast.
BWI Airport, Anne Arundel County, MD

Date: 4/11/00
JB

Photograph 22: Forested Wetland at Headwater of Wetland U, Facing East.
BWI Airport, Anne Arundel County, MD

Date: 4/11/00
JB

Photograph 23: Wetland U Near Headwater, Facing West.
BWI Airport, Anne Arundel County, MD



Date: 4/11/00
JAM

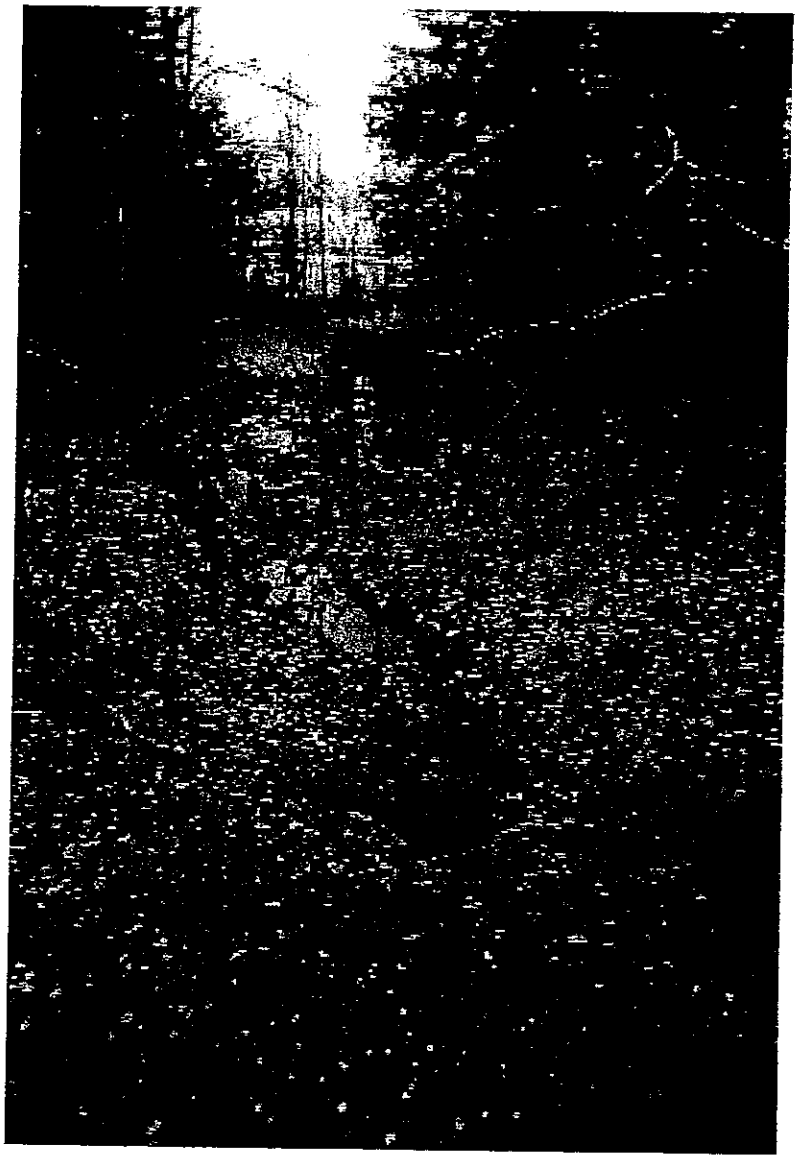
Photograph 24: First Emergent Wetland Within Wetland U, East of Service Road, Facing East
BWI Airport, Anne Arundel County, MD

Date: 4/11/00
JAM

Photograph 25: Second Emergent Wetland Within Wetland U, Facing West Toward Service Road
BWI Airport, Anne Arundel County, MD

Date: 4/11/00
JAM

Photograph 26: Wetland U at Fence Crossing, Facing West
BWI Airport, Anne Arundel County, MD



Date: 4/11/00
JAM

Photograph 27: Third Emergent Wetland Within Wetland U, Facing West From Service Road Toward Culvert
BWI Airport, Anne Arundel County, MD

Comprehensive Wetland Inventory
Baltimore/Washington International Airport
Anne Arundel County, Maryland

Prepared for:

Maryland Aviation Administration
P.O. Box 8766
BWI Airport, Maryland 21240

Prepared by:

STRAUGHAN
ENVIRONMENTAL
SERVICES, INC.

3905 National Drive, Suite 370
Burtonsville, Maryland 20866

Under Contract to:
Roy F. Weston, Inc.

July 2001

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1 INTRODUCTION AND BACKGROUND

The Maryland Aviation Administration (MAA) owns more than 3,200 acres of property in northern Anne Arundel County, Maryland, which are used to support operations at the Baltimore/Washington International (BWI) Airport. Many parcels contain jurisdictional, nontidal wetlands and waterways that are regulated by State or Federal agencies. As landowner of these properties, MAA must ensure that activities within wetlands and waterways are in compliance with all State and Federal regulations.

The U.S. Army Corps of Engineers (COE) has jurisdiction over all activities performed in "waters of the U.S." and adjacent wetlands. In practice, COE takes jurisdiction over wetland areas that have a direct surface connection to ephemeral, intermittent, and perennial waterways. The Maryland Department of the Environment (MDE) has jurisdiction over all activities that affect vegetated wetlands and their buffers, regardless of their connection to surface water. (For more information on the regulatory framework in which MAA operates, refer to Section 5, "Regulatory Framework and Permitted Activities.")

MAA identifies wetlands and "waters of the U.S." as part of its environmental planning process, as they are encountered during project planning activities. MAA obtains jurisdictional determinations for these resources as necessary on a case-by-case basis to gain project approval or appropriate permits from Federal, State, and local agencies. Straughan Environmental Services, Inc. (SES), under contract to Roy F. Weston, Inc. (WESTON), compiled this *Comprehensive Wetland Inventory* to document the known wetlands and "waters of the U.S." on MAA property associated with BWI Airport. SES also reviewed MAA files to determine the regulatory status of each known resource and to identify whether Federal and State agencies had determined its jurisdictional status or issued permits for perform specified activities within jurisdictional areas.

1.1 PROJECT PURPOSE

MAA prepares resource management plans for the known resources located on its properties, such as forests, historic properties, etc. The resource management plans allow MAA to identify and maintain a record of the known environmental resources on its property, and they help MAA to determine whether proposed development or maintenance activities would cause potential environmental impacts to known resources. This inventory of known wetlands and "waters of the U.S." will serve as a tool to help MAA:

- Track the status of permits and jurisdictional determinations associated with its wetlands and waterways;
- Maintain an ongoing record of impacts and mitigation requirements;
- Comply with permits issued from MDE or COE;
- Avoid duplication of permitting activities for previously identified and delineated wetlands and waterways;

- Minimize and avoid potential impacts to sensitive wetland areas from proposed development projects; and
- Maintain a safe environment for the traveling public.

To maintain this inventory, MAA will update its maps to include new wetlands or changes to wetland boundaries. Using the permit files (see Appendix A) and tracking sheets presented as tables in this report (see Tables 4-1 and 5-1), MAA will be able to track the status of permit applications, and permit expiration dates. Using this data, MAA will meet with COE and MDE annually to review the status of its known resources, permits, and authorized activities.

2 METHODOLOGY

2.1 RESOURCE IDENTIFICATION

SES prepared this wetland inventory to identify known wetlands and "waters of the U.S." on BWI Airport and associated MAA property. To describe these resources, SES first identified the general characteristics associated with MAA property, such as major drainage and subdrainage areas.

SES compiled and reviewed correspondence among COE, MDE , and MAA regarding the presence of wetlands and waterways on MAA property on and near BWI Airport. SES reviewed this data and other MAA documents to compile a list of the known wetlands and waterways that had been previously identified on or near BWI Airport. Using this data, SES compiled the data in tabular and graphic formats to depict the following data about each known wetland and waterway:

- associated watershed,
- size,
- resource description (type of wetland or waterway),
- date of Jurisdictional Determination (JD), and
- location on or near BWI Airport

SES created maps to illustrate the locations and boundaries of wetlands, "waters of the U.S.", and their features. The maps present each feature and its relation to runways, terminals, and stormwater management facilities associated with BWI Airport.

2.2 AUTHORIZED ACTIVITIES

SES also compiled data and identified areas within the airport that must be maintained according to regulations set forth by the Federal Aviation Administration (FAA) to provide a safe environment for the traveling public. SES summarized this data tabular and graphic formats to depict the following data about each known wetland and waterway:

- Authorized activities,
- Permit status,
- Delineation date, and
- Jurisdictional determination date.

SES also the identified the appropriate regulations and guidance associated with performing these activities (e.g., permitting agency, Best Management Practices, etc.).

2.3 ONGOING EFFORT

SES acknowledges that this inventory presents only known wetlands and water resources based on available data from MAA files. Other wetland and water resources may be present on MAA property that are not included in this report. MAA must document these resources as they are encountered, regardless of their jurisdictional status, in order to track potential impacts and mitigation requirements associated with ongoing operations and development activities.

3 GENERAL DESCRIPTION

BWI Airport and its associated facilities comprise approximately 3,200 acres in Anne Arundel County, Maryland, approximately 4 miles south of the City of Baltimore (see Figure 1). The airport is within the Gunpowder/Patapsco River subwatershed of the Chesapeake Bay watershed. Fourteen streams within four drainage areas originate on or flow through BWI Airport property (see Figure 2):

- Cabin Branch Drainage Area

  The Cabin Branch drainage area includes approximately 257 acres on or adjacent to the northeast portion of BWI Airport. The headwaters of Cabin Branch and the entire length of the stream on airport property are channeled and piped, and flow south to north. Two stormwater management ponds on BWI Airport occur within the Cabin Branch drainage area. No known on-site wetlands are associated with Cabin Branch.

- Sawmill Creek Drainage Area

  Approximately 826 acres in the east and southeast sections of BWI Airport contribute to the Sawmill Creek drainage area. Four perennial streams originate in this region of the airport: Muddy Bridge Branch, Irving Branch, Phelps Branch and Fork Branch. Wetlands associated with Phelps Branch and Fork Branch have been identified at BWI Airport.

- Stony Run Drainage Area

  Stony Run originates approximately 2 miles south of BWI Airport and receives hydrology from numerous tributaries. Stony Run, its floodplain, and its tributaries comprise a vast wetland system that has been designated by MDE as a wetland system of Special State Concern. This wetland provides habitat for several rare, threatened, and endangered species.

  The headwaters of eight perennial streams and associated wetlands are located on the airport facility: Clark Branch, Hawkins Branch, Signal Branch, Bowden Branch, King Branch, Kitten Branch, Sachs Branch, and the tributary of Sachs Branch. Wetlands associated with each of these streams have been identified at BWI Airport.

- Piny Run Drainage Area

  Piny Run originates more than 2 miles south of the Stoney Run Road Development Area and flows north to its confluence with Deep Run, northwest of BWI Airport. Approximately 100 acres of MAA property are within the Piny Run drainage area. One unnamed tributary of Piny Run, and two wetlands associated with the Piny Run Tributary are within the Stoney Run Road Development Area, west of Ridge Road.

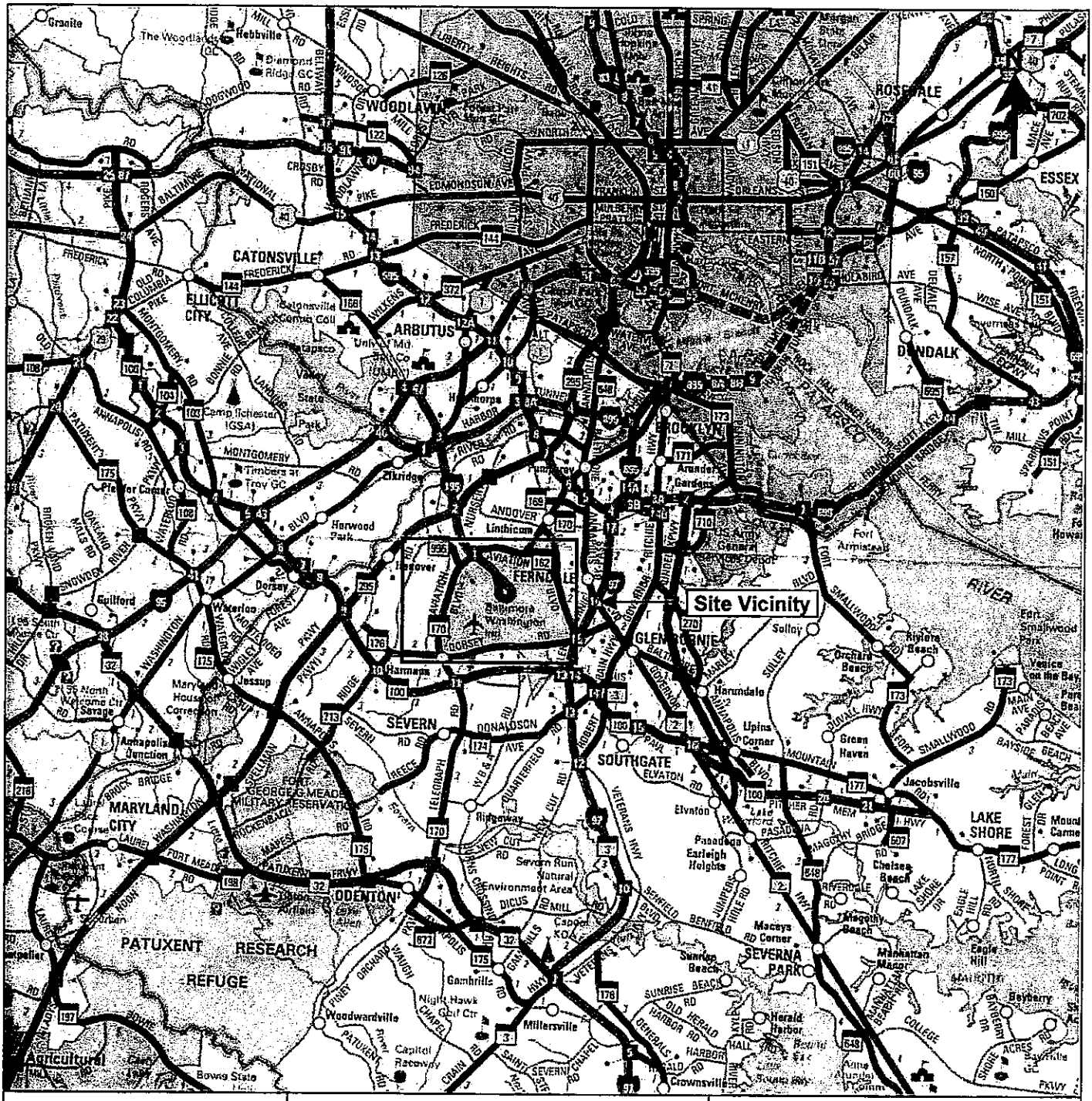

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Figure 1
Site Vicinity

Baltimore/Washington International Airport
and Stoney Run Road Development Area
Anne Arundel County, Maryland

Scale (approximate)
0 4 miles

Source: Alexandria Drafting Company, 2000. Maryland and Delaware map.

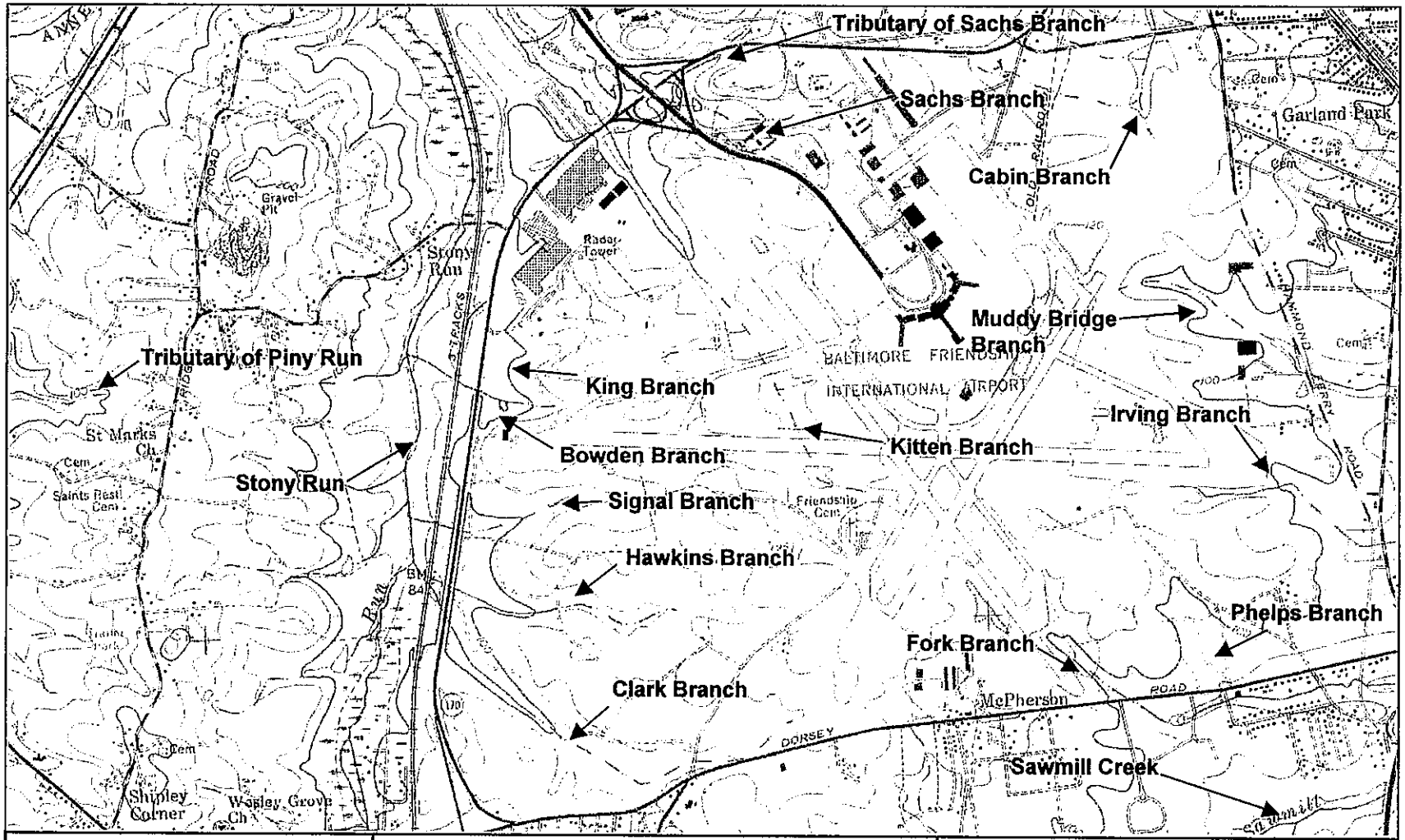

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Figure 2
Stream Locations

Baltimore/Washington International Airport
Anne Arundel County, Maryland

Legend:

Stream or creek
Intermittent stream or creek

Scale (approximate)
0 2,000 feet

Source: U.S. Geological Survey, 1957 (photorevised 1966 and 1974). 7.5-minute Topographic Quadrangle for Relay, Maryland.

4 WETLANDS AND "WATERS OF THE U.S."

The following inventory of wetlands and "waters of the U.S." are described according to the four main drainage areas on BWI Airport and its associated property. Figure 3 illustrates the wetlands and "waters of the U.S." on BWI Airport and the Stoney Run Road Development Area, drainage areas, stormwater management facilities, and significant features. Table 4-1 summarizes this data.

4.1 CABIN BRANCH DRAINAGE AREA

The headwaters of Cabin Branch originate north of MD 170 on MAA property. No wetlands associated with Cabin Branch occur within BWI Airport boundaries.

4.1.1 Cabin Branch

Cabin Branch drains approximately 257 acres, most of which are on MAA-owned property on or adjacent to BWI Airport. The Cabin Branch drainage area within the airport is composed of primarily developed land and paved surfaces. The entire length of Cabin Branch on BWI Airport flows south to north through a series of channels and pipes. Cabin Branch flows northeast from the airport for approximately 3 miles to Curtis Bay.

4.2 SAWMILL CREEK DRAINAGE AREA

The headwaters of four perennial streams originate in the Sawmill Creek drainage area, within BWI Airport: Muddy Bridge Branch, Irving Branch, Phelps Branch and Fork Branch. Wetlands are associated with Fork Branch and Phelps Branch.
Four ephemeral channels also originate on BWI Airport: Southwest Branch and three unnamed tributaries of Sawmill Creek.

4.2.1 Muddy Bridge Branch

Muddy Bridge Branch is perennial tributary of Sawmill Creek that originates 800 feet northeast of the Runway 15L-33R deicing facility. The stream flows southeast, passes beneath the airport security fence, and continues to flow eastward off of airport property. Muddy Bridge Branch drains approximately 211 acres of BWI Airport property. Two stormwater management ponds, the 3.14-acre upper detention pond, and the 3.55-acre lower detention pond, are within the drainage area. Land use in the drainage area consists of the Runway 10-28 and Runway 15L-33R deicing facilities, the MAC facility, which is scheduled to be replaced with a maintenance facility, impervious, paved land, and forested land. No wetlands are associated with Muddy Bridge Branch on BWI Airport; however, the riparian buffer zone at the security fence crossing is regularly maintained by clearing and grubbing.

The headwaters of the channel originate within a drainage swale in the AOA. Intermittent flow drains through this swale into the lower detention basin east of Runway 15L-33R. From this basin, Muddy Bridge Branch enters a culvert and passes beneath the security fence on the eastern airport boundary, approximately 400 feet south of the MAC building. Muddy Bridge Branch continues east to a culvert that conveys the stream beneath MD 170. Muddy Bridge Branch appears on the National Wetlands Inventory (NWI) map as a palustrine, scrub-shrub, broad-leaved deciduous/palustrine, emergent, temporarily flooded wetland (PEM/PSS1A). The stream contains base flow, but no wetlands are present.

COE determined that Muddy Bridge Branch is a jurisdictional "waters of the U.S." on March 11, 2000. Portions of the stream buffer are mowed as part of fence crossing maintenance activities; however, no permits are necessary for this routine maintenance.

4.2.2 Irving Branch

Irving Branch originates approximately 300 feet southeast of the terminus of Runway 10-28, flows southeast for approximately 1,610 feet, and passes beneath the security fence. Irving Branch is then conveyed through a culvert beneath MD 170 and continues approximately 4,200 feet east to its confluence with Sawmill Creek off of airport property. One stormwater management pond is within the Irving Branch drainage area northwest of the security fence crossing. No wetlands are associated with Irving Branch on BWI Airport.

Irving Branch drains approximately 124 acres of BWI Airport property. Runway 10-28 and its associated safety areas, which are maintained as turf, dominate land use within the drainage area. Other land uses include roadways, parking lots, and the hiker/biker trail. The stream receives runoff from these areas by overland flow and through a series of catch basins and storm drains.

A jurisdictional determination has not been conducted on Irving Branch and no permits have been issued for activities in this stream.

4.2.3 Phelps Branch

Phelps Branch originates in a forested area in the southeastern section of BWI Airport, north of the security fence. It flows south-southeast for approximately 1,050 feet, passes beneath the security fence, and flows off of airport property. Phelps Branch passes beneath the security fence approximately 2,300 feet west of the Maryland Route 162 (MD Route 162)/Dorsey Road intersection, then develops into a poorly defined channel that enters a culvert beneath Dorsey Road. The culvert empties into a well defined channel on the south side of Dorsey Road.

Phelps Branch drains approximately 105 acres of BWI Airport. Land use in the drainage area includes primarily forested land. One palustrine forested/palustrine emergent wetland is associated with Phelps Branch on BWI Airport, and maintenance is required at the security fence crossing.

COE determined Phelps Branch to be a jurisdictional "waters of the U.S." on March 11, 2000. Portions of the stream buffer are mowed as part of fence crossing maintenance activities; however, no permits are necessary for this routine maintenance.

Wetland PB-1. Wetland PB-1 appears on the NWI map as a palustrine, broad-leaved deciduous, forested, temporarily flooded wetland (PFO1A); however, field investigations indicate that only the area north of the security fence is forested. Wetland PB-1 occupies approximately 2,100 square feet and portions of this wetland were classified as palustrine, emergent wetland (PEM) while portions of this wetland were classified as palustrine, forested wetland (PFO). Wetland PB-1 appears to receive hydrology from surface runoff within the drainage area, groundwater, and surface runoff from Dorsey Road.

COE determined Wetland PB-1 to be a jurisdictional wetland on March 11, 2000. Portions of the wetland are mowed as part of fence crossing maintenance activities; however, no permits are necessary for this routine maintenance.

4.2.4 Fork Branch

The headwaters of Fork Branch are approximately 800 feet south of the intersection of Runways 4-22 and 15R-33L and 1,800 feet north of Dorsey Road. From its headwaters, Fork Branch flows aboveground for approximately 680 feet and then is conveyed east and beneath Runway 15R-33L through pipes. From its emergence east of Runway 15R-33L, Fork Branch meanders approximately 1,510 feet southward, passes beneath the security fence, and then flows southward off of airport property to its confluence with Sawmill Creek.

Fork Branch drains approximately 112 acres of BWI Airport, and land use in this drainage area includes runways, paved areas, and cleared land maintained as turf. Two wetlands, FB-1 and FB-2, are associated with Fork Branch.

COE determined Fork Branch to be a jurisdictional "waters of the U.S." on March 11, 2000. Portions of the stream buffer are mowed as part of fence crossing maintenance activities; however, no permits are necessary for this routine maintenance.

Wetland FB-1. Wetland FB-1 is a 0.5-acre palustrine emergent/broad-leaved deciduous, scrub-shrub (PEM/SS1) wetland associated with the headwaters of Fork Branch near the intersection of Runway 15R-33L and Runway 4-22. It appears on the NWI map as a palustrine forested/palustrine scrub-shrub, broad-leaved deciduous, temporarily flooded wetland. Contrary to the NWI map, no forests were observed during the field

investigation. Evidence of the former forest was observed, such as sprouted saplings from the stumps of previously cut trees.

Wetland FB-1 receives hydrology as groundwater, surface runoff from the runways, and drainage from a stormwater culvert beneath the intersection of the two runways.

COE determined Wetland FB-1 to be a jurisdictional wetland on March 11, 2000. Portions of this wetland are mowed as part of maintenance activities for the Aircraft Operations Area (AOA); however, no permits are necessary for this routine maintenance.

Wetland FB-2. From approximately 50 feet north of the security fence to the culvert beneath Dorsey Road, the floodplain of Fork Branch consists of a 1,977-square foot palustrine emergent wetland (PEM), Wetland FB-2. This wetland also contains a segment of Fork Branch, which is an intermittent tributary of Sawmill Creek. This segment of Fork Branch appears on the NWI map as a palustrine, emergent, temporarily flooded wetland (PEMA). Wetland FB-2 receives hydrology as groundwater, surface runoff from the nearby runways and roads, and flooding from Fork Branch.

COE determined Wetland FB-2 to be a jurisdictional wetland on March 11, 2000. Portions of this wetland are mowed as part of fence crossing maintenance activities; however, no permits are required for this routine maintenance.

4.3 STONY RUN DRAINAGE AREA

Stony Run is immediately west of BWI Airport, between MD 170 and the Stoney Run Road Development Area. The headwaters of eight perennial streams within the Stony Run subdrainage area and associated wetlands are on BWI Airport: Clark Branch, Hawkins Branch, Signal Branch, Bowden Branch, King Branch, Kitten Branch, Sachs Branch, and the Tributary of Sachs Branch. Ephemeral channels, intermittent streams, jurisdictional wetlands, potentially jurisdictional wetlands, and non-jurisdictional wetlands are also located in this drainage area on MAA-owned properties west of BWI Airport. MAA has delineated only isolated portions of the extensive wetland system associated with the watershed.

The western half of the BWI Airport facility comprises 1,575 acres of the Stony Run subdrainage area of the Gunpowder/Patapsco River watershed. One hundred and fourteen acres of the eastern half of the Stoney Run Road Development Area, west of the airport facility, are within the Stony Run drainage area. The Stoney Run Road Development Area is 1.9 miles west of BWI Airport in Hanover, Maryland, south of the intersection of Stoney Run and Ridge Roads.

4.3.1 Clark Branch

Clark Branch is a tributary of Stony Run that originates in the southwestern section of BWI Airport. Its headwaters originate from a forested wetland approximately 2,000 feet southwest of the southern boundary of Runway 4-22, near the security fence on the southern edge of airport property. From its headwaters, Clark Branch flows southwest for approximately 2,400 feet and then changes its course to flow 4,000 feet northwest to Wetland HB-1, which is associated with both Hawkins and Clark Branches, at the security fence. From the security fence, Clark Branch enters a culvert that conveys it below MD 170. From the culvert, the stream flows approximately 700 feet northwest to its confluence with Hawkins Branch, passes through another culvert beneath the Amtrak railroad line, and continues northwest to its confluence with Stony Run.

Clark Branch drains approximately 298 acres of BWI Airport, and land use in this drainage area is primarily forested land. A portion of a construction-related soil stockpile is also within this drainage area. Two temporary stormwater management ponds are associated with Clark Branch.

Clark Branch is a stable stream and has forested riparian zones. The streambed composition ranges from unconsolidated silt, sand, and clay to gravel and pebbles. One wetland is associated with Clark Branch on BWI Airport and requires mowing and limited clearing and grubbing at the security fence crossings.

COE determined Clark Branch to be a jurisdictional "waters of the U.S." on March 11, 2000.

Wetland CLB-1. Wetland CLB-1 is part of the large palustrine forested (PFO) wetland associated with the headwaters of Clark Branch. Wetland CLB-1 crosses the security fence on the south side of the airport approximately 2,600 feet east of the intersection of MD 170 and Dorsey Road. Wetland CLB-1 appears on the NWI map as a palustrine, broad-leaved deciduous, forested, seasonally flooded (PFO1C) wetland; however, no trees were observed at the point of the fence crossing during the SES field investigation.

Wetland CLB-1 receives hydrology as groundwater and surface runoff from Dorsey Road. Vegetation on the south side of the fence has been disturbed by mowing, and the vegetation on the north side of the fence is dominated by common reed. This area was classified as a palustrine, emergent wetland (PEM) with a palustrine, forested wetland (PFO) at the headwaters of Clark Branch.

COE determined Wetland CLB-1 to be a jurisdictional on March 11, 2000. Portions of this wetland are mowed as part of fence crossing maintenance activities; however, no permits are necessary for this routine maintenance.

4.3.2 Hawkins Branch

Hawkins Branch is a tributary of Stony Run that originates immediately south of the Midfield Cargo Complex and approximately 2,400 feet south of Runway 10-28. From its headwaters, Hawkins Branch flows west for approximately 3,000 feet to Wetland HB-1 at the security fence. From the security fence, Hawkins Branch enters a culvert that conveys it below MD 170. From the culvert, the stream flows approximately 700 feet northwest to its confluence with Clark Branch, passes through another culvert beneath the Amtrak railroad line, and continues northwest to its confluence with Stony Run.

Hawkins Branch drains approximately 191 acres of BWI Airport, and land use in this drainage area is primarily forested land. A portion of the construction-related soil stockpile is also within this drainage area. Four temporary stormwater ponds are within the Hawkins Branch drainage area.

Hawkins Branch is a stable stream and has forested riparian zones. The streambed composition ranges from unconsolidated silt, sand, and clay to gravel and pebbles. One wetland is associated with Hawkins Branch on BWI Airport and it requires mowing and limited clearing and grubbing at the security fence crossing.

COE determined Hawkins Branch to be a jurisdictional "waters of the U.S." on March 11, 2000.

Wetland HB-1. Wetland HB-1 is a palustrine, emergent wetland (PEM) adjacent to the security fence on the west side of the airport. This wetland is adjacent to MD 170 and approximately 0.5 mile north of the Dorsey Road/MD 170 intersection. Wetland HB-1 includes portions of Hawkins Branch and Clark Branch. Although both streams appear as palustrine forested/palustrine, scrub-shrub, broad-leaved deciduous, temporarily flooded wetlands on the NWI map for Relay, Maryland, the area between them does not appear as a wetland on the map. Field investigations confirm that wetlands occur in this area.

The wetland receives hydrology as groundwater, surface runoff from MD 170, and flooding from Hawkins and Clark branches.

COE determined Wetland HB-1 to be a jurisdictional wetland on March 11, 2000. Portions of this wetland are mowed and clearing and grubbing occurs in the scrub-shrub areas as part of fence crossing maintenance activities, and therefore MAA is in the process of obtaining a permit for disturbance of the area.

4.3.3 Signal Branch

The headwaters of Signal Branch originate in the western section of BWI Airport approximately 800 feet southwest of the terminus of Runway 10-28, along the western edge of the Midfield Cargo Complex. Detention Basin 3 provides hydrology to Signal Branch. Signal Branch flows west, where it passes beneath the security fence, and continues off BWI Airport property to its confluence with Stony Run.

The channel of Signal Branch has been straightened, and portions of the banks are unvegetated, entrenched, and scoured. The streambed is composed of primarily unconsolidated silt and sand. Wetlands are associated with Signal Branch west of MD 170.

Signal Branch drains approximately 128 acres of BWI Airport and land use in this drainage area is dominated by the Midfield Cargo Complex, Mathison Way, and forested land.

COE determined the portion of Signal Branch at the security fence crossing to be a jurisdictional "waters of the U.S." on March 11, 2000. Portions of the stream buffer are mowed as part of fence crossing maintenance activities; however, no permits are necessary for this routine maintenance.

Wetland SB-1. Wetland SB-1 is a palustrine, forested, broad-leaved deciduous, temporarily flooded (PFO1A) wetland west of the MD 170/Mathison Way intersection, and 1,600 feet south of the Runway 10-28 light line. Wetland SB-1 receives hydrology as groundwater and overbank flooding from Signal Branch. The wetland is bounded by MD 170 to the east and Signal Branch to the north. The southern and western boundaries of this wetland have not yet been delineated. This wetland is not identified on the NWI map for Relay, MD.

COE has not yet conducted a jurisdictional determination on Wetland SB-1. The Maryland State Highway Administration (SHA) plans to widen MD 170 in the vicinity of Wetland SB-1, and impacts to the wetland are expected.

Wetland SB-2. Wetland SB-2 is a palustrine, forested, broad-leaved deciduous, temporarily flooded (PFO1A) wetland northwest of the MD 170/Mathison Way intersection and 1,100 feet south of the Runway 10-28 light line. The wetland is bounded by MD 170 to the east, forested land to the north, and Signal Branch to the south. The western boundary of this wetland has not yet been delineated. This wetland is not identified on the NWI map for Relay, MD. Wetland SB-2 receives hydrology as groundwater, runoff from MD 170 and overbank flooding from Signal Branch.

COE has not yet conducted a jurisdictional determination on Wetland SB-2. SHA plans to widen MD 170 in the vicinity of Wetland SB-2, and impacts to the wetland are expected.

4.3.4 Bowden Branch

Bowden Branch originates in the western portion of BWI Airport, approximately 480 feet north of Runway 10-28 and adjacent to the western end of Taxiway F. Bowden Branch flows west 1,340 feet, passes beneath the security fence approximately 50 feet south of the Stoney Run Road entrance ramp and flows through a culvert under the Stoney Run Road entrance ramp. Bowden Branch then flows northwest through the cloverleaf, and continues west under MD 170 to its confluence with Stony Run.

Bowden Branch drains approximately 80 acres of BWI Airport and land use within this drainage area is dominated by Runway 10-28, the Stoney Run Road cloverleaf, and forested land. One stormwater management pond is associated with the headwaters of Bowden Branch.

Bowden Branch is an intermittent tributary of Stony Run. Bowden Branch does not appear on the NWI map. Based on maps and field observations, it appears that the channel was constructed as part of the Stoney Run Road interchange project. Portions of the banks and channel of the stream are lined with rip-rap, and the riparian zone consists of maintained turf. Wetland BB-1, within the Stoney Run Road cloverleaf, east of MD 170, is associated with Bowden Branch.

COE determined the segment of Bowden Branch that passes beneath the security fence to be a jurisdictional "waters of the U.S." on March 11, 2000. Portions of the stream buffer are mowed as part of fence crossing maintenance activities; however, no permits are required for this routine maintenance.

Wetland BB-1. Wetland BB-1 is a 2,795-square foot, palustrine, emergent, persistent, temporarily flooded (PEM1A) wetland associated with Bowden Branch. The wetland is approximately 275 feet south of Stoney Run Road and 50 feet east of MD 170, within the southern portion of the Stoney Run Road/MD 170 cloverleaf. This wetland is not identified on the NWI map for Relay, MD. Wetland BB-1 receives hydrology from surface runoff from nearby slopes and overbank flooding from Bowden Branch.

COE has not yet conducted a jurisdictional determination on Wetland BB-1. SHA plans to widen MD 170 in the vicinity of Wetland BB-1, and impacts to the wetland are expected.

Wetland BB-2. Wetland BB-2 is a 0.34-acre, palustrine, emergent, persistent, temporarily flooded (PEM1A) wetland within a depression along the light line for Runway 10-28, approximately 40 feet west of MD 170. This wetland is not identified on the NWI map for Relay, MD. Wetland BB-2 receives hydrology as groundwater and surface runoff from nearby slopes and MD 170, and amphibian habitat was observed. Wetland BB-2 forms the headwaters of an ephemeral channel (BB-EC3) which provides a visible surface connection from Wetland BB-2 to Bowden Branch.

COE has not yet conducted a jurisdictional determination on Wetland BB-2. MAA plans to install a fiber optic line in the vicinity of Wetland BB-2 and SHA plans to widen MD 170; and impacts to the wetland buffer are expected.

4.3.5 Bowden Branch Tributary

Bowden Branch Tributary is an unnamed intermittent tributary of Bowden Branch. The tributary emerges from a culvert at the western end of Taxiway F, flows north for approximately 200 feet, and enters a culvert beneath Stoney Run Road where it converges with Bowden Branch. Bowden Branch Tributary crosses the security fence approximately 100 feet south of the Stoney Run Road entrance ramp from MD 170 North, and it is shown on the NWI map as a palustrine, forested, broad-leaved deciduous, temporarily flooded (PFO1A) wetland. The NWI map indicates that Bowden Branch Tributary formerly contained the main channel of Bowden Branch, which was diverted following construction of the Stoney Run Road/MD 170 interchange.

The banks of Bowden Branch Tributary are lined with rip-rap and the riparian zone consists of maintained turf. The streambed consists of silt, and some hydrophytic vegetation, including cattails and river birch, was observed within the channel. The soils within the channel are not hydric.

COE determined Bowden Branch Tributary to be a jurisdictional "waters of the U.S." on March 11, 2000. Portions of the stream buffer are mowed as part of fence crossing maintenance activities; however no permits are necessary for this routine maintenance.

Ephemeral Channel to Bowden Branch-1. A 500-foot long ephemeral channel to Bowden Branch (BB-EC1) originates inside the eastern end of the southern portion of the Stoney Run Road/MD 170 cloverleaf and water in the channel flows intermittently in a westerly direction to Bowden Branch. Approximately 25 feet of the channel is lined with rip-rap.

Field investigations indicate that this channel is classified as "waters of the U.S." but COE has not yet conducted a jurisdictional determination on it. SHA plans to widen MD 170 in the vicinity of BB-EC1, and impacts to the channel are expected.

Ephemeral Channel to Bowden Branch-2. A 700-foot-long ephemeral channel to Bowden Branch (BB-EC2) originates inside of the eastern end of the southern portion of the Stoney Run Road/MD 170 cloverleaf and water in the channel flows intermittently in a westerly direction to Bowden Branch. Approximately 500 feet of the channel is lined with rip-rap.

Field investigations indicate that this channel is classified as "waters of the U.S." but COE has not yet conducted a jurisdictional determination on it. SHA plans to widen MD 170 in the vicinity of BB-EC2, and impacts to the channel are expected.

Ephemeral Channel to Bowden Branch-3. A 600-foot-long ephemeral channel to Bowden Branch (BB-EC3) originates at Wetland BB2 and intermittently conducts water north to Bowden Branch. This channel is approximately 30 feet west of MD 170 and is parallel to the roadway.

Field investigations indicate that this channel is classified as "waters of the U.S." but COE has not yet conducted a jurisdictional determination on it. SHA plans to widen MD 170 in the vicinity of BB-EC3, and impacts to the channel are expected.

4.3.6 King Branch

King Branch is an intermittent tributary of Stony Run located in a forested parcel of BWI Airport. King Branch does not appear on the NWI map for Relay, MD. The headwaters of the stream are approximately 600 feet east of the Stoney Run Road entrance ramp, and the stream flows west for approximately 500 feet before entering a culvert beneath a service road. It then flows west for approximately 100 feet, passes beneath the security fence, and enters a second culvert beneath the Stoney Run Road entrance ramp. The stream emerges from a culvert on the west side of the ramp and flows west to a culvert that conveys flow beneath MD 170. Two ephemeral channels converge with King Branch east of MD 170 and one ephemeral channel converges with King Branch west of MD 170. From MD 170, King Branch flows west to its confluence with Stony Run.

The channel of King Branch ranges in composition from unconsolidated silt, sand, and clay to gravel and pebbles. The portions of the channel at the security fence crossing and immediately west of the Stoney Run Road entrance ramp are lined with rip-rap. The riparian zone is forested, and the banks are well vegetated and stable. A series of wetlands are associated with the headwaters of King Branch and a wetland associated with King Branch is located east of MD 170, within the Maryland State Highway Administration (SHA) right-of-way.

King Branch drains approximately 93 acres of BWI Airport and land use in this drainage area includes forested land, the Northrop Grumman facility, service roads, and navigational aids.

COE determined the portion of King Branch that crosses the security fence to be a jurisdictional "waters of the U.S." on May 11, 2000. Portions of the stream buffer are mowed as part of the fence crossing maintenance activities; however, no permits are necessary for this routine maintenance.

Wetland KING-1. Wetland KING-1 contains a series of small, palustrine forested/palustrine emergent (PFO/PEM) wetlands associated with the headwaters and floodplain of King Branch that comprise approximately 0.07 acre. A small, narrow, palustrine forested wetland (PFO) is located in the headwaters of the stream and occupies approximately 0.01 acre. This wetland receives hydrology as groundwater and surface runoff from the surrounding upland area. Three small palustrine forested/palustrine emergent (PFO/PEM) wetlands are within the floodplain of the stream: two are located

immediately east of the service road and occupy approximately 0.04 acre, and one is located immediately west of the service road and occupies approximately 0.02 acre. These wetlands receive hydrology as groundwater, flooding from the unnamed tributary, and surface runoff from the surrounding upland area.

COE determined Wetland KING-1 to be a jurisdictional wetland on May 11, 2000. Portions of this wetland are mowed as part of fence crossing maintenance activities; however, permits are not necessary for this routine maintenance.

Wetland KING-2. Wetland KING-2 is located within the SHA right-of-way approximately 200 feet north of Stoney Run Road and 25 feet east of MD 170. KING-2 is a 0.13-acre, palustrine, emergent, persistent, temporarily flooded (PEM1A) wetland associated with King Branch and dominated by Common reed (*Phragmites australis*). This wetland receives hydrology from King Branch. Wetland KING-2 does not appear on the NWI map for Relay, Maryland.

COE has not conducted a jurisdictional determination on Wetland KING-2. SHA plans to widen MD 170 and impacts to the wetland are expected.

Ephemeral Channel to King Branch. Ephemeral Channel to King Branch (KING-EC1) is a 75-foot-long channel that originates in a depression approximately 30 feet west of MD 170 and 725 feet north of Stoney Run Road. KING-EC1 is culverted under the Hiker-Biker Trail and the intermittent water flows west to a culvert that connects to King Branch.

Field investigations indicate that KING-EC1 is classified as "waters of the U.S." but COE has not yet conducted a jurisdictional determination on KING-EC1. SHA plans to widen MD 170 and impacts are expected.

4.3.7 Kitten Branch

Kitten Branch is a tributary of Stony Run that originates within the AOA, south of Runway 10-28 and west of Runway 15R-33L. Kitten Branch flows 1,600 feet northwest from its headwaters, flows through a culvert beneath Runway 10-28, continues 1,200 feet northwest, passes beneath Taxiway F, and continues 3,800 feet northwest to pass beneath the security fence. Kitten Branch passes beneath MD 170 and continues to flow northwest off of airport property to its confluence with Stony Run. Stormwater management ponds and detention basins are within the drainage area upstream of Taxiway F. Downstream of Taxiway F, an intermittent stream and several wetlands occur both on both sides of Kitten Branch.

The segment of the Kitten Branch channel immediately south of Taxiway F is lined with rip-rap. Farther downstream, the streambed is composed of a variety of materials that range from gravel, cobbles, and pebbles to unconsolidated silt, sand, and clay. Sediment deposition was observed, and some sections of the streambanks were entrenched, scoured, and did not contain vegetation. The vegetation in the riparian zone of Kitten

Branch ranges from forested wetlands and upland forests, to emergent wetlands and maintained turf.

Kitten Branch drains approximately 709 acres of BWI Airport and land use in this drainage area includes runways, taxiways, and some forested land. Most of the Kitten Branch riparian buffer zone is forested. Consistent with USDA guidance, MAA proposes to convert this forest stand dominated by sycamore and red maple to a monotypic scrub/shrub area to minimize attractiveness of the area to wildlife and reduce the potential for hazardous wildlife near runways, taxiways, and aircraft approach/departure zones.

COE determined Kitten Branch to be a jurisdictional "waters of the U.S." on March 11, 2000. Portions of the stream buffer are mowed as part of AOA maintenance activities; however, permits are not necessary for this routine maintenance.

Wetland KB-1. Wetland KB-1 is a palustrine emergent (PEM) wetland that occupies approximately 0.2 acre within the eastern floodplain of Kitten Branch, approximately 400 feet north of Taxiway F. This wetland does not appear on the NWI map for Relay, Maryland. Wetland KB-1 occurs in a narrow depression along the base of the slope associated with Runway 15R-33L, and it appears to receive hydrology in the form of surface runoff from the runway. Wetland KB-1 is a disturbed site; the vegetation has been mowed and some portions of the soil profile consist of fill material.

COE determined Wetland KB-1 to be a jurisdictional wetland on March 11, 2000. Portions of this wetland are mowed as part of AOA maintenance activities; however, permits are not necessary for this routine maintenance.

Wetland KB-2. Wetland KB-2 is a palustrine, forested, broad-leaved deciduous (PFO1) wetland that occupies approximately 1.4 acres within the eastern floodplain of Kitten Branch, approximately 700 feet northwest of Wetland KB-1. This wetland does not appear on the NWI map for Relay, Maryland. Wetland KB-2 appears to receive hydrology as groundwater, surface runoff from Runway 15R-33L, and flooding from Kitten Branch. Wetland KB-2 is a disturbed site; the vegetation has been mowed, and some portions of the soil profile consist of fill material.

COE determined Wetland KB-2 to be a jurisdictional wetland on March 11, 2000. Portions of this wetland are mowed as part of AOA maintenance activities; however, permits are not necessary for this routine maintenance.

Wetland KB-3. Wetland KB-3 is a palustrine emergent/palustrine scrub-shrub (PEM/PSS) wetland that occupies approximately 2.5 acres within the eastern floodplain of Kitten Branch, immediately southwest of the MD 170/I-195 interchange. It appears incorrectly on the NWI map for Relay, MD as a palustrine, forested, broad-leaved deciduous wetland with a temporary water regime (PFO1A).

Sachs Branch flows into Wetland KB-3 from the east and assumes a braided pattern to its confluence with Kitten Branch. The wetland appears to receive hydrology from groundwater, surface runoff from Runway 15R-33L, and flooding from both Kitten Branch and Sachs Branch. The southern portion of the wetland that is adjacent to the security fence is disturbed by mowing, and the soil profile includes fill material. A large portion of the vegetative community is also dominated by herbaceous species.

COE determined Wetland KB-3 to be a jurisdictional wetland on March 11, 2000. Portions of this wetland are mowed as part of AOA maintenance activities; however, permits are not necessary for this routine maintenance.

Wetland KB-4. Wetland KB-4 is a palustrine, forested, broad-leaved deciduous wetland (PFO1) that is within the western floodplain of Kitten Branch, immediately south of MD 170 and east of the Northrop Grumman facility. Wetland KB-4 appears on the NWI map for Relay, Maryland as a palustrine, forested, broad-leaved deciduous wetland with a temporary water regime (PFO1A).

Wetland KB-4 occupies approximately 0.3 acre and receives hydrology as groundwater, surface runoff from nearby impervious areas, and flooding from Kitten Branch.

COE determined Wetland KB-4 to be a jurisdictional wetland on March 11, 2000. No maintenance activities are performed within this wetland.

Wetland KB-5. Wetland KB-5 is a palustrine, forested, broad-leaved deciduous wetland (PFO1) that occupies approximately 1.3 acres within the eastern floodplain of Kitten Branch, immediately north of Taxiway F and east of Taxiway W. Wetland KB-5 does not appear on the NWI map for Relay, Maryland. This wetland receives hydrology as groundwater, surface runoff, and flooding from Kitten Branch.

COE determined Wetland KB-5 to be a jurisdictional wetland on March 11, 2000. Wetland KB-5 falls within the Kitten Branch riparian buffer zone designated for conversion from forest to scrub-shrub.

Wetland KB-6. Wetland KB-6 is a palustrine, emergent wetland (PEM) that occupies approximately 0.18 acre within the eastern floodplain of Kitten Branch, immediately north of Runway 10-28 and south of Taxiway F. Wetland KB-6 does not appear on the NWI map for Relay, Maryland.

MAA received a permit to impact this wetland due construction of the Midfield Cargo Complex. No information was readily available regarding the jurisdictional determination by COE.

Wetland KB-7. Wetland KB-7 is a palustrine, emergent wetland (PEM) that occupies approximately 1,600 square feet within the western floodplain of Kitten Branch, north of Runway 10-28 and south of Taxiway F. Wetland KB-7 does not appear on the NWI map for Relay, Maryland.

This wetland was identified on a permit for impacts related to the Midfield Construction Complex in 1997. No information was readily available regarding the jurisdictional determination by COE.

4.3.8 Kitten Branch Tributary

Kitten Branch Tributary appears on the NWI map as a palustrine, forested, broad-leaved deciduous wetland with a temporary water regime (PFO1A) located north of Taxiway F and west of Kitten Branch. Kitten Branch Tributary is formed by the confluence of two smaller streams. One stream flows eastward from a service road and might have been constructed as a drainage ditch. It has a very straight channel and appears to have been contiguous with Wetland KBT-2 before the service road was constructed. It flows eastward for approximately 200 feet before its confluence with another unnamed stream to form the tributary.

From the confluence of these streams, Kitten Branch Tributary meanders approximately 300 feet east to a culvert beneath Taxiway W and then continues eastward to Kitten Branch. The streambed ranges in composition from unconsolidated silt, sand, and clay to gravel and pebbles. Sediment deposition, debris accumulation, entrenching, and scouring were observed, which indicates that the channel is subject to a flash flow regime. The banks of the tributary are vegetated with red maple. At the time of the field visit, the stream channel contained pooled water, but it did not contain base flow.

COE determined the Kitten Branch Tributary to be a jurisdictional "waters of the U.S." on March 11, 2000.

Wetland KBT-1. Wetland KBT-1 is a palustrine, forested, broad-leaved deciduous wetland (PFO1) south of Kitten Branch Tributary and approximately 350 feet north of Taxiway F. Wetland KBT-1 occupies approximately 0.2 acre and appears to receive hydrology as groundwater. This wetland does not appear on the NWI map for Relay, Maryland.

COE determined Wetland KBT-1 to be a jurisdictional wetland on March 11, 2000. It is recommended that the red maples in the forest stand surrounding Wetland KBT-1 be removed and replaced with pitch pines to prevent a potential approach surface conflict after the year 2019.

Wetland KBT-2. Wetland KBT-2 is a palustrine, forested, broad-leaved deciduous wetland (PFO1) that occupies a narrow, approximately 0.1-acre area immediately west of the Kitten Branch Tributary and approximately 350 feet north of Taxiway F. It does not appear on the NWI map for Relay, Maryland.

Wetland KBT-2 appears to have been constructed as a drainage ditch. This wetland is bounded by a service road to the east and appears to have been connected to the Kitten Branch Tributary prior to construction of the road. Wetland KBT-2 receives hydrology as groundwater.

MDE determined Wetland KBT-2 to be a jurisdictional wetland on March 11, 2000.

Wetland KBT-3. Wetland KBT-3 is a palustrine, forested, broad-leaved deciduous wetland (PFO1) approximately 350 feet north of the Kitten Branch Tributary and 100 feet west of Taxiway W. It occupies approximately 0.4 acre and does not appear on the NWI map for Relay, Maryland.

Wetland KBT-3 is located on an eastward slope, and its eastern edge forms a small channel that enters a culvert beneath the taxiway and drains to Kitten Branch. Wetland KBT-3 receives hydrology as groundwater.

COE determined Wetland KBT-3 to be a jurisdictional wetland on March 11, 2000. Portions of this wetland are mowed as part of AOA maintenance activities; however, permits are not necessary for this routine maintenance.

Wetland KBT-4. Wetland KBT-4 is a palustrine, broad-leaved deciduous, forested wetland (PFO1), approximately 600 feet north of Taxiway F, which occupies approximately 0.1 acre. The wetland appears to receive hydrology as groundwater and is not shown on the NWI map.

Wetland KBT-4 originates approximately 200 feet west of Taxiway W and drains eastward to a ditch that flows south and adjacent to the taxiway. An old foundation was observed nearby, and it appears that the wetland may have served as a drainage ditch in the past.

COE determined Wetland KBT-4 to be a jurisdictional wetland on March 11, 2000. It is recommended that the red maples in the forest stand surrounding Wetland KBT-4 be removed and replaced with pitch pines to prevent a potential approach surface conflict after the year 2019.

4.3.9 Sachs Branch

Sachs Branch is a perennial tributary of Kitten Branch within the northwest portion of BWI Airport, outside of the AOA. The headwaters of the stream originate at a stormwater management pond adjacent to the Sheraton Hotel. The stream emerges from a culvert north of Scott Drive and flows west for approximately 1,000 feet to enter a culvert beneath an exit ramp of the MD 170/I-195 interchange. Sachs Branch continues westward beneath the cloverleaf, where it converges with its tributary, and flows into Kitten Branch approximately 1,300 feet west of BWI Airport.

The banks of Sachs Branch are entrenched and scoured, which suggests that the stream is subject to a flash flow regime. The composition of the stream bottom ranges from unconsolidated silt, sand, and clay to gravel and pebbles.

Sachs Branch drains approximately 122 acres of BWI Airport and land use within this drainage area includes parking facilities, the Sheraton Hotel, the BWI Airport fuel farm, numerous underground oil/water separators, roadways, and cleared land.

COE determined Sachs Branch to be a jurisdictional "waters of the U.S." on May 11, 2000. MAA is constructing a new Terminal Roadway Return Loop and surface parking lot in the vicinity of Sachs Branch, and MAA has obtained a permit to add an additional outfall to Sachs Branch.

Wetland SAB-1. Wetland SAB-1 is a palustrine, emergent (PEM) wetland that occupies approximately 0.06 acre within the western side of the floodplain of Sachs Branch. Wetland SAB-1 is near the western boundary of BWI Airport, approximately 50 feet northeast of the exit ramp of the MD 170/I-195 interchange. This wetland receives hydrology as groundwater and flooding from Sachs Branch. Some of the vegetation in the area is disturbed by a layer of wood chips that cover the ground.

COE determined Wetland SAB-1 to be jurisdictional on May 11, 2000. No permits have been issued for this wetland.

Wetland SAB-2. Wetland SAB-2 is a palustrine, emergent/palustrine, scrub-shrub (PEM/PSS) wetland that occupies approximately 0.52 acre within the eastern side of the floodplain of Sachs Branch. Wetland SAB-2 is immediately north of Wetland SAB-1 and east of the exit ramp of the MD 170/I-195 interchange, and south of a steep hillside.

Wetland SAB-2 receives hydrology as groundwater and surface runoff from the adjacent roadway and hillside. Some of the vegetation in the area is disturbed by a layer of wood chips that cover the ground.

COE determined Wetland SAB-2 to be a jurisdictional wetland on May 11, 2000. No permits have been issued for this wetland.

4.3.10 Tributary of Sachs Branch

The tributary of Sachs Branch is an intermittent stream that originates north of MD 170, west of the MD 170/Elm Road intersection. The tributary flows southwest to enter a culvert beneath MD 170 and emerges from the culvert on the south side MD 170. The stream flows west for approximately 700 feet, and enters a culvert beneath an exit ramp of the MD 170/I-195 interchange in the northwestern corner of the airport property. The Tributary of Sachs Branch converges with Sachs Branch beneath the southeast cloverleaf of the MD 170/I-195 interchange.

The stream banks are entrenched and scoured, which suggests that the stream is subject to a flash flow regime. The composition of the stream bottom ranges from unconsolidated silt, sand, and clay to gravel, pebbles, and cobbles. Water from this tributary drains to Sachs Branch, therefore, this stream is classified as "waters of the U.S."

The Tributary of Sachs Branch drains approximately 54 acres of MAA-owned property, and land use within this drainage area is dominated by airport facilities, parking facilities, and roadways.

COE determined the Tributary of Sachs Branch to be a jurisdictional "waters of the U.S." on May 11, 2000. MAA is constructing a new Terminal Roadway Return Loop and surface parking lot in the vicinity of the Tributary of Sachs Branch, and it has received a permit to add an additional outfall to Sachs Branch.

4.3.11 Stony Run

The headwaters of Stony Run originate approximately 6,000 feet south of Dorsey Road and west of MD 170. Stony Run flows north through some MAA-owned properties to its confluence with the Patapsco River, nearly 2 miles northwest of BWI Airport. Stony Run is classified as a Use IV stream throughout its length. Use IV streams are recreational trout waters, which have the potential to hold or support adult trout put and take fishing (COMAR 26.08.02.02). Wetlands associated with Stony Run are considered wetlands of special state concern (COMAR 26:23:06:01), contain habitat for rare, threatened, and endangered species, and include a 100-foot buffer. Forested wetlands border Stony Run for much of its length. Some of those wetlands occur on MAA property.

Wetland SR-1. Wetland SR-1, is a palustrine, broad-leaved deciduous, forested wetland (PFO1) that occupies approximately 0.04 acre in the southeastern portion of the Stoney Run Road Development Area. It is approximately 225 feet west of New Ridge Road. The wetland occurs in a small, isolated depression containing standing water and does not appear on the NWI map.

COE determined Wetland SR-1 to be a jurisdictional wetland on May 11, 2000. MAA is constructing a consolidated rental car facility in the area containing of Wetland SR-1, and Wetland SR-1 will be filled during construction activities in late 2001 as part of this project. MAA is obtaining a permit to fill this wetland and has identified a mitigation site adjacent to Deep Run, which is west of BWI Airport.

Wetland SR-2. Wetland SR-2 is a palustrine, broad-leaved deciduous, forested wetland (PFO1) that occupies approximately 0.08 acre within the southern portion of the Stoney Run Road Development Area. The wetland is approximately 700 feet west of New Ridge Road. SES observed a deteriorating concrete spring head and a manhole within the wetland.

COE determined this wetland to be non-jurisdictional. MDE determined Wetland SR-2 to be a jurisdictional wetland on May 11, 2000. MAA is planning the construction of a consolidated rental car facility in the area containing Wetland SR-2, and Wetland SR-2 will be filled in as part of this project. MAA is in the process of obtaining a permit to fill this wetland for construction activities in late 2001. MAA has identified a mitigation site adjacent to Deep Run, which is west of BWI Airport.

Wetland SR-3. Wetland SR-3 is a palustrine, forested, broad-leaved deciduous, temporarily flooded (PFO1A) wetland that extends from a location 400 feet east of New Ridge Road east to the Amtrak rail line. The southern boundary of Wetland SR-3 is formed by the MAA service road for the Runway 10-28 light line, and the northern boundary of wetland SR-3 has not yet been delineated. Wetland SR-3 is identified on the NWI map for Relay, MD as a palustrine, forested, broad-leaved deciduous wetland. Stony Run flows north through this wetland, and this wetland is known habitat for Swamp Pink (*Helonias butata*), which is listed on both State and Federal endangered species lists, and listed as potential habitat for four other rare threatened and endangered species. This wetland receives hydrology from groundwater and overbank flooding.

COE determined portions of Wetland SR-3 to be jurisdictional on May 11, 2000 and March 30, 2001. MAA is planning the construction of a consolidated rental car facility and tenant parking areas as well as a fiber optic line and sewer line in the vicinity of Wetland SR-3, and impacts to the wetland buffer are expected. MAA is in the process of obtaining permits for disturbance of the area.

Wetland SR-4. Wetland SR-4 is a palustrine, forested, broad-leaved deciduous/needle-leaved evergreen, seasonally flooded (PFO1/4C) wetland that extends from 400 feet east of New Ridge Road to approximately 140 feet west of the Amtrak rail line. The northern boundary of this wetland is formed by the MAA service road for the Runway 10-28 navigational aids and the southern boundary has not yet been delineated. Based on field observations, it appears that Wetlands SR-3 and SR-4 were one contiguous wetland until the service road was constructed several years ago. Wetland SR-4 is identified on the NWI map for Relay, MD as a palustrine, forested, broad-leaved deciduous wetland. Stony Run flows north through Wetland SR-4 and the wetland receives hydrology from groundwater and overbank flooding. COE determined a portion of Wetland SR-4 to be jurisdictional on March 30, 2001.

Wetland SR-5. Wetland SR-5 is a palustrine, forested, broad-leaved deciduous, saturated (PFO1B) wetland located approximately 80 feet east of New Ridge Road and 225 feet south of Stoney Run Road. The eastern boundary of this wetland has not been delineated, but it is likely to connect with Wetland SR-3. This wetland is not identified on the NWI map for Relay, MD. Wetland SR-5 receives hydrology as surface runoff from nearby slopes and roads. COE determined a portion of Wetland SR-5 to be jurisdictional on March 30, 2001.

Wetland SR-6. Wetland SR-6 is a palustrine, forested/scrub-shrub, broad-leaved deciduous, seasonally flooded (PFO/SS1C) wetland located approximately 80 feet east of New Ridge Road and 300 feet south of Stoney Run Road. The eastern boundary of this wetland has not yet been delineated, but it is likely to connect with Wetland SR-3. This wetland is not identified on the NWI map for Relay, MD. Wetland SR-6 receives hydrology as groundwater and surface runoff from nearby slopes. COE determined a portion of Wetland SR-6 to be jurisdictional on March 30, 2001.

Wetland SR-7. Wetland SR-7 is a palustrine, forested broad-leaved deciduous/needle-leaved evergreen, seasonally flooded (PFO1/4C) wetland north of Stoney Run Road. Wetland SR-7 extends from Stony Run west approximately 600 feet. The southern boundary of this wetland is formed by an intermittent tributary of Stony Run and the northern boundary of Wetland SR-7 has not yet been delineated. This wetland is not identified on the NWI map for Relay, MD. Wetland SR-7 receives hydrology as groundwater and overbank flooding from Stony Run and SRT. COE determined a portion of Wetland SR-7 to be jurisdictional on March 30, 2001.

Stony Run Tributary 1. An unnamed intermittent tributary of Stony Run, Stony Run Tributary 1, originates 50 feet north of the New Ridge Road/Stoney Run Road intersection to Stony Run and flows east for approximately 650 feet. Baseflow was observed in the stream and the composition of the stream bottom is unconsolidated silt, sand, and clay. This stream forms the southern boundary of Wetland SR-7. COE determined Stony Run Tributary 1 to be a jurisdictional "waters of the U.S." on March 30, 2001.

Stony Run Tributary 2. An unnamed tributary of Stony Run, Stony Run Tributary 2, flows west from a culvert under MD 170 immediately south of Old Stoney Run Road to Stony Run. Baseflow was observed in the stream and the composition of the stream bottom is unconsolidated silt, sand, and clay.

Field investigations indicate that this stream is a "waters of the U.S." COE has not performed a jurisdictional determination on Stony Run Tributary 2 within the past five years. SHA plans to widen MD 170, and impacts to the stream are expected. MAA is obtaining a jurisdictional determination for the area.

Ephemeral Channel to Stony Run Tributary 2. A 100-foot-long ephemeral channel (SRT2-EC) provides overflow relief for Stony Run Tributary 2. SRT2-EC originates at the bank of Stony Run Tributary 2, approximately 30 feet west of MD 170 and converges with SRT-2 approximately 130 feet west of MD 170.

Field investigations classify this channel as "waters of the U.S." COE has not performed a jurisdictional determination on SRT2-EC within the past five years. SHA plans to widen MD 170, and impacts to the channel are expected. MAA is obtaining a jurisdictional determination for the area.

4.3.12 Isolated Wetlands

Several wetlands on MAA-owned property are not identified on the NWI map for Relay, MD, and do not have visible surface connections to "water of the U.S." These wetlands are classified as isolated wetlands and are described below.

Wetland A. Wetland A is a 289-square foot, isolated, palustrine, emergent, persistent, temporarily flooded (PEM1A) wetland located on the east side of the southern portion of the Stoney Run Road/MD170 cloverleaf.

COE has not yet conducted a jurisdictional determination on Wetland A. SHA plans to widen MD 170 and improve the Stoney Run Road/MD 170 interchange, and impacts to the wetland are expected. MAA is obtaining a jurisdictional determination for the area.

Wetland B. Wetland B is a 172-square foot, palustrine, emergent, persistent, saturated (PEM1B) wetland approximately 50 feet west of MD 170 and 650 feet south of the Stoney Run Road. Wetland B is surrounded by vacant land.

COE has not yet conducted a jurisdictional determination on Wetland B. SHA plans to widen MD 170 and improve the Stoney Run Road/MD 170 interchange, and impacts to the wetland are expected. MAA is obtaining a jurisdictional determination for the area.

Wetland C. Wetland C is a 317-square foot, palustrine, emergent, persistent, temporarily flooded (PEM1A) wetland approximately 25 feet west of MD 170, 30 feet east of the hiker/biker trail, and 650 feet north of Stoney Run Road. Wetland C is not identified on the NWI map for Relay, MD.

COE has not conducted a jurisdictional determination on Wetland C within the past five years. SHA plans to widen MD 170 and improve the Stoney Run Road/MD 170 interchange, and impacts to the wetland are expected. MAA is obtaining a jurisdictional determination for the area.

Wetland D. Wetland D is a 614-square foot, palustrine, emergent, persistent, temporarily flooded (PEM1A) wetland approximately 35 feet west of MD 170 and 850 feet north of Stoney Run Road, along the eastern edge of the hiker/biker trail. Wetland D is not identified on the NWI map for Relay, MD.

COE has not conducted a jurisdictional determination on Wetland D within the past five years. SHA plans to widen MD 170 and improve the Stoney Run Road/MD 170 interchange, and impacts to the wetland are expected. MAA is obtaining a jurisdictional determination for the area.

Wetland E. Wetland E is an 836-square foot, palustrine, forested, broad-leaved deciduous/coniferous, saturated (PFO1/4B) wetland approximately 50 feet west of MD 170 and 850 feet north of Stoney Run Road, along the western edge of the hiker/biker trail. Wetland E is not identified on the NWI map for Relay, MD.

COE has not conducted a jurisdictional determination on Wetland E within the past five years. SHA plans to widen MD 170 and improve the Stoney Run Road/MD 170 interchange, and impacts to the wetland are expected. MAA is obtaining a jurisdictional determination for the area.

Wetland F. Wetland F is a 2,405-square foot, palustrine, emergent, persistent, temporarily flooded (PEM1A) wetland approximately 30 feet west of MD 170 and 850 feet north of Stoney Run Road, along the eastern edge of the hiker/biker trail. Wetland F is not identified on the NWI map for Relay, MD.

COE has not conducted a jurisdictional determination on Wetland F within the past five years. SHA plans to widen MD 170 and improve the Stoney Run Road/MD 170 interchange, and impacts to the wetland are expected. MAA is obtaining a jurisdictional determination for the area.

Wetland G. Wetland G is a 0.17-acre, palustrine, emergent, persistent, temporarily flooded (PEM1A) wetland approximately 40 feet west of MD 170 and 1,200 feet north of Stoney Run Road, along the eastern edge of the hiker/biker trail. Wetland G is not identified on the NWI map for Relay, MD.

COE has not conducted a jurisdictional determination on Wetland G within the past five years. SHA plans to widen MD 170 and improve the Stoney Run Road/MD 170 interchange, and impacts to the wetland are expected. MAA is obtaining a jurisdictional determination for the area.

Wetland H. Wetland H is a 1,632-square foot, palustrine, forested, broad-leaved deciduous, temporarily flooded (PFO1A) wetland approximately 60 feet west of MD 170 and 1,250 feet north of Stoney Run Road, along the western edge of the hiker/biker trail. Wetland H is not identified on the NWI map for Relay, MD.

COE has not conducted a jurisdictional determination on Wetland H within the past five years. SHA plans to widen MD 170 and improve the Stoney Run Road/MD 170 interchange, and impacts to the wetland are expected. MAA is obtaining a jurisdictional determination for the area.

Waterway I. Waterway I is a 100-foot long ephemeral channel that originates approximately 100 feet west of MD 170 and 1,375 feet north of Stoney Run Road, along the western edge of the hiker/biker trail. Waterway I intermittently conducts water north to Wetland J. This waterway is not identified on the NWI map for Relay, MD.

Field investigations indicate that Waterway I is classified as "waters of the U.S." but COE has not conducted a jurisdictional determination on Waterway I within the past five years. SHA plans to widen MD 170 and impacts to the wetland are expected. MAA is obtaining a jurisdictional determination for the area.

Wetland J. Wetland J is a 0.17-acre, palustrine, emergent, persistent, temporarily flooded (PEM1A) wetland approximately 75 feet west of MD 170 and 1,475 feet north of Stoney Run Road, along the western edge of the hiker/biker trail. Wetland J is not identified on the NWI map for Relay, MD.

COE has not conducted a jurisdictional determination on Wetland J within the past five years. SHA plans to widen MD 170 and impacts to the wetland are expected. MAA is obtaining a jurisdictional determination for the area.

Wetland K. Wetland K is a 1,492 square foot, palustrine, emergent, persistent, temporarily flooded (PEM1A) wetland approximately 15 feet west of MD 170 and 1,3855 feet north of Stoney Run Road. Wetland K is not identified on the NWI map for Relay, MD.

COE has not conducted a jurisdictional determination on Wetland K within the past five years. SHA plans to widen MD 170 and impacts to the wetland are expected. MAA is obtaining a jurisdictional determination for the area.

Waterway L. Waterway L is a 100-foot long ephemeral channel that provides drainage for MD 170. Waterway L originates at the edge of pavement of MD 170 approximately 1,925 feet north of Stoney Run Road. The channel enters an underground culvert that empties into an isolated wetland outside of the study area.

Field investigations indicate that Waterway L is classified as "waters of the U.S." but COE has not yet conducted a jurisdictional determination on Waterway L. SHA plans to widen MD 170 and impacts to the waterway are expected. MAA is obtaining a jurisdictional determination for the area.

4.4 PINY RUN DRAINAGE AREA

Piny Run originates more than 2 miles south of the Stoney Run Road Development Area and flows north to its confluence with Deep Run, northwest of the Stoney Run Road Development Area. Approximately 60.5 acres of the Stoney Run Road Development Area are within the Piny Run drainage area. An unnamed tributary of Piny Run and two wetlands associated with the Piny Run tributary are within the Stoney Run Road Development Area, west of Ridge Road.

4.4.1 Tributary of Piny Run

The Tributary of Piny Run consists of two unnamed intermittent tributaries of Piny Run that converge west of the Stoney Run Road Development Area. A forested wetland (Wetland TPR-1) is adjacent to and associated with the headwaters of the Tributary of Piny Run, and a second forested wetland (Wetland TPR-2) is within the northwestern floodplain of the Tributary of Piny Run.

The stream banks of the Tributary of Piny Run are entrenched and scoured in some areas, which suggests that the stream is subject to a flash flow regime. The channel substrate ranges in composition from unconsolidated silt, sand, and clay to gravel and pebbles. Numerous groundwater seeps associated with Wetlands TPR-1 and TPR-2 contribute to the Tributary of Piny Run.

COE determined Wetland TPR-1 to be a jurisdictional wetland on May 11, 2000. MAA has proposed a conservation easement on the approximately 3-acre area containing the stream, wetland, and buffers.

Wetland TPR-1. Wetland TPR-1 is a palustrine, broad-leaved deciduous, forested wetland (PFO1) that occupies approximately 0.12 acre within the western floodplain of the Tributary of Piny Run, in the western portion of the Stoney Run Road Development Area. Wetland TPR-1 is located in the headwaters of the Tributary of Piny Run, east of Wetland TPR-2, and is bounded by a remnant road and an upland forested area to the west, a small open field area to the north, and upland forested areas to the east and south. Wetland TPR-1 receives hydrology as groundwater, and overbank flooding from the Tributary of Piny Run.

COE determined Wetland TPR-1 to be a jurisdictional wetland on May 11, 2000. MAA has proposed a conservation easement on the approximately 3-acre area containing the stream, wetland, and buffers.

Wetland TPR-2. Wetland TPR-2 is a 1.33-acre, palustrine, broad-leaved deciduous, forested wetland (PFO1) located west of Wetland TPR-1. This wetland is bounded by undeveloped forested land to the north and west, Wetland TPR-1 to the east, and the Tributary of Piny Run to the south. Wetland TPR-2 receives hydrology as groundwater and overbank flooding from the Tributary of Piny Run.

COE determined Wetland TPR-1 to be a jurisdictional wetland on May 11, 2000. MAA has proposed a conservation easement on the approximately 3-acre area containing the stream, wetland, and buffers.

Table 4-1
WETLAND DESCRIPTIONS AND LOCATIONS

SUBWATERSHED	WETLAND/STREAM	TYPE	WETLAND SIZE	NAD 83 NORTHING (feet)	NAD 83 EASTING (feet)	LOCATION
Cabin Branch	Cabin Branch	Waters of the U.S.	NA	555450	1409700	Northeast Portion of BWI Airport
Sawmill Creek	Muddy Bridge Branch	Waters of the U.S.	NA	550650	1411050	BWI Fence Crossing; eastern airport boundary on MD Route 170
Sawmill Creek	Irving Branch	Waters of the U.S.	NA	547350	1411240	BWI Fence Crossing
Sawmill Creek	Phelps Branch	Waters of the U.S.	NA	545850	1410000	BWI Fence Crossing
Sawmill Creek	PB-1	PEM and PFO1	2,100 sq ft	545475	1410300	BWI Fence Crossing
Sawmill Creek	Fork Branch	Waters of the U.S.	NA	545700	1409650	BWI Fence Crossing
Sawmill Creek	FB-1	PEM/PSS1	0.5 acre	546450	1407000	Aircraft Operations Area
Sawmill Creek	FB-2	PEM	1,977 sq ft	545400	1408800	BWI Fence Crossing
Stony Run	Clark Branch	Waters of the U.S.	NA	545400	1399800	BWI Fence Crossing
Stony Run	CLB-1	PEM (with PFO at headwaters)	NA	543900	1401600	BWI Fence Crossing
Stony Run	Hawkins Branch	Waters of the U.S.	NA	546750	1399950	BWI Fence Crossing
Stony Run	HB-1	PEM	NA	546900	1398750	BWI Fence Crossing
Stony Run	Signal Branch	Waters of the U.S.	NA	548125	1399050	BWI Fence Crossing
Stony Run	SB-1	PFO1A	0.11 acre	548100	1398900	West of MD 170, South of Signal Branch
Stony Run	SB-2	PFO1A	0.75 acre	548250	1398900	West of MD 170, North of Signal Branch
Stony Run	Bowden Branch	Waters of the U.S.	NA	549900	1400100	BWI Fence Crossing
Stony Run	BB-1	PEM1A	2.795 sq. ft.	550275	1399500	Stoney Run Road/MD 170 Cloverleaf
Stony Run	BB-2	PEM1A	0.34 acre	549975	1399200	West of MD 170, at Runway 10-28 Light Line
Stony Run	Bowden Branch Tributary	Waters of the U.S	NA	549825	1399475	BWI Fence Crossing
Stony Run	BB-EC1	Waters of the U.S. (Ephemeral Channel)	NA	550125	1399800	Stoney Run Road/MD 170 Cloverleaf; southern portion, southernmost channel
Stony Run	BB-EC2	Waters of the U.S. (Ephemeral Channel)	NA	550500	1399650	Stoney Run Road/MD 170 Cloverleaf; southern portion, northernmost channel
Stony Run	BB-EC3	Waters of the U.S. (Ephemeral Channel)	NA	549750	1399200	West of MD 170, between Runway 10-28 Light Line and Bowden Branch
Stony Run	King Branch	Waters of the U.S.	NA	550575	1400100	BWI Fence Crossing; north of Stoney Run Road interchange
Stony Run	KING-1	PFO1 and PEM	0.07 acre	550650	1400475	BWI Fence Crossing, 200 feet north of Stoney Run Road
Stony Run	KING-2	PEM1A	0.13 acre	550800	1399650	Stoney Run Road/MD 170 Cloverleaf
Stony Run	KING-EC1	Waters of the U.S. (Ephemeral Channel)	NA	551325	1699425	West of MD 170, North of Stoney Run Road
Stony Run	Kitten Branch	Waters of the U.S.	NA	552150	1402500	Aircraft Operations Area
Stony Run	KB-1	PEM	0.2 acre	550800	1403700	Upper Reaches of Kitten Branch, Aircraft Operations Area
Stony Run	KB-2	PFO1	1.4 acres	551550	1402950	Upper Reaches of Kitten Branch, Aircraft Operations Area
Stony Run	KB-3	PEM/PSS	2.5 acres	554100	1401600	Upper Reaches of Kitten Branch, Aircraft Operations Area
Stony Run	KB-4	PFO1	0.3 acre	550950	1402800	Upper Reaches of Kitten Branch, Aircraft Operations Area
Stony Run	KB-5	PFO1	1.3 acres	550650	1403250	Upper Reaches of Kitten Branch, Aircraft Operations Area
Stony Run	KB-6	PEM	0.18 acre	549750	1404000	Upper Reaches of Kitten Branch, Aircraft Operations Area
Stony Run	KB-7	PEM	1,600 sq. ft.	549900	1403700	Upper Reaches of Kitten Branch, Aircraft Operations Area
Stony Run	Kitten Branch Tributary	Waters of the U.S.	NA	550650	1402800	Aircraft Operations Area
Stony Run	KBT-1	PFO1	0.2 acre	550500	1402650	Aircraft Operations Area
Stony Run	KBT-2	PFO1	0.1 acre	550500	1402200	Aircraft Operations Area
Stony Run	KBT-3	PFO1	0.4 acre	551250	1402575	Aircraft Operations Area
Stony Run	KBT-4	PFO1	0.1 acre	550950	1402800	Aircraft Operations Area
Stony Run	Sachs Branch	Waters of the U.S.	NA	554250	1403400	South of Aviation Boulevard, West of Elm Road
Stony Run	Tributary of Sachs Branch	Waters of the U.S.	NA	555000	1402800	Intersects Aviation Boulevard, West of Elm Road
Stony Run	SAB-1	PEM	0.06 acre	554250	1402725	South of Aviation Boulevard, West of Elm Road
Stony Run	SAB-2	PEM/SS	0.52 acre	554400	1402800	South of Aviation Boulevard, West of Elm Road
Stony Run	Stony Run	Waters of the U.S.	NA	549450	1398450	West of MD 170 and Amtrak rail line
Stony Run	SR-1	PFO1	0.04 acre	549525	1396275	Stoney Run Road Development Area; 225' west of New Ridge Road, to be filled in late 2001

*Wetland size cannot be determined. Only portions of wetland have been delineated.

NA - Total length of stream, or size of wetland not available.

Legend:

PEM - Palustrine, emergent

PEM1A - Palustrine, emergent, persistent, temporarily flooded

PEM1B - Palustrine, emergent, persistent, saturated

PEM/SS - Palustrine, emergent/scrub-shrub

PFO1 - Palustrine, forested, broad-leaved deciduous

PFO1B - Palustrine, forested, broad-leaved deciduous, saturated

PFO1/4 - Palustrine forested, broad-leaved deciduous/coniferous

PFO1/4B - Palustrine, forested, broad-leaved deciduous/coniferous, saturated

PFO1/4C - Palustrine, forested, broad-leaved deciduous/coniferous, seasonal

PFO/SS1C - Palustrine, forested/scrub-shrub, broad-leaved decidous, seasonal

Straughan Environmental Services, Inc. 2000 and 2001.

Table 4-1
WETLAND DESCRIPTIONS AND LOCATIONS

SUBWATERSHED	WETLAND/STREAM	TYPE	WETLAND SIZE	NAD 83 NORTHING (feet)	NAD 83 EASTING (feet)	LOCATION
Stony Run	SR-2	PFO1	0.08 acre	549450	1395750	Stoney Run Road Development Area; 700' west of New Ridge Road, to be filled in late 2001
Stony Run	SR-3	PFO1	TBD*	549900	1397700	Between New Ridge Road and Amtrak line
Stony Run	SR-4	PFO1/4C	TBD*	549450	1397850	Between New Ridge Road and Amtrak line
Stony Run	SR-5	PFO1B	TBD*	550800	1397550	80' east of New Ridge Road and 225' south of Stoney Run Road
Stony Run	SR-6	PFO/SS1C	TBD*	550950	1397550	80' east of New Ridge Road and 300' south of Stoney Run Road
Stony Run	SR-7	PFO1/4C	TBD*	551100	1398150	North of Stoney Run Road, east of New Ridge Road intersection
Stony Run	Stony Run Tributary 1	Waters of the U.S.	650 lf	551100	1397850	50' north of Stoney Run/ New Ridge Road intersection
Stony Run	Stony Run Tributary 2	Waters of the U.S.	NA	552450	1399800	West of MD 170, South of Old Stoney Run Road
Stony Run	SRT2-EC	Waters of the U.S. (Ephemeral Channel)	100 lf	552450	1399800	West of MD 170, South of Old Stoney Run Road
Stony Run	A	PEM1A	289 sq. ft.	550275	1399875	Stoney Run Road/MD 170 Cloverleaf
Stony Run	B	PEM1B	172 sq. ft.	549975	1399200	50' west of MD 170 and 650' south of Stoney Run Road
Stony Run	C	PEM1A	317 sq. ft.	551250	1399500	25' west of MD 170 and 650' north of Stoney Run Road
Stony Run	D	PEM1A	614 sq. ft.	551475	1399500	35' west of MD 170 and 850' north of Stoney Run Road
Stony Run	E	PFO1/4B	836 sq. ft.	551475	1399425	50' west of MD 170 and 800' north of Stoney Run Road
Stony Run	H	PFO1A	1,632 sq. ft.	551850	1399550	60' west of MD 170, 1,250' north of Stoney Run Road
Stony Run	I	Waters of the U.S. (Ephemeral Channel)	100 lf	552000	1399575	100' west of MD 170, 1,375' north of Stoney Run Road
Stony Run	J	PEM1A	0.17 acre	552150	1399650	75' west of MD 170, 1,475' north of Stoney Run Road
Stony Run	K	PEM1A	1,492 sq. ft.	552000	1399650	15' west of MD 170, 1,385' north of Stoney Run Road
Stony Run	L	Waters of the U.S. (Ephemeral Channel)	100 lf	552450	1399725	West edge of MD 170, 1,925' north of Stoney Run Road
Piny Run	Tributary of Piny Run Wetland	Waters of the U.S.	NA	550050	1393350	Western portion of the Stoney Run Road Development Area
Piny Run	Wetland TPR-1	PFO1	0.12 acre	550350	1393950	Stoney Run Development Area
Piny Run	Wetland TPR-2	PFO1	1.33 acres	550200	1393800	Stoney Run Development Area

*Wetland size cannot be determined. Only portions of wetland have been delineated.

NA - Total length of stream, or size of wetland not available.

Legend:

PEM - Palustrine, emergent
PEM1A - Palustrine, emergent, persistent, temporarily flooded
PEM1B - Palustrine, emergent, persistent, saturated
PEM/SS - Palustrine, emergent/scrub-shrub
PFO1 - Palustrine, forested, broad-leaved deciduous
PFO1B - Palustrine, forested, broad-leaved deciduous, saturated
PFO1/4 - Palustrine forested, broad-leaved deciduous/coniferous
PFO1/4B - Palustrine, forested, broad-leaved deciduous/coniferous, saturated
PFO1/4C - Palustrine, forested, broad-leaved deciduous/coniferous, seasonal
PFO/SS1C - Palustrine, forested/scrub-shrub, broad-leaved decidous, seasonal

Straughan Environmental Services, Inc. 2000 and 2001.

5 REGULATORY FRAMEWORK AND PERMITTED ACTIVITIES

Wetlands and "waters of the U.S." are regulated by both the Maryland Department of the Environment (MDE) and the U.S. Army Corps of Engineers (COE) under the Clean Water Act. Any impacts to wetlands and "waters of the U.S." must be approved and permitted by these agencies. Each agency has its own criteria for determining the jurisdictional status of wetlands and for regulating impacts.

5.1 MARYLAND DEPARTMENT OF THE ENVIRONMENT

MDE is responsible for implementing state and federal regulations and coordinating activities with COE. MDE regulations regarding nontidal wetlands are presented in Title 5, Subtitle 5-901 through 5-911; Annotated Code of Maryland (COMAR); COMAR Title 26, Subtitle 23. Maryland law requires that regulated activities may not be conducted in a nontidal wetland or its 25-foot buffer without a permit, letter of exemption, or an exemption under COMAR 26.23.01.02. MDE regulates activities within 100 feet of wetlands of special state concern, such as those associated with Stony Run.

Regulated activities include:

- Removal, excavation, or dredging of sediment or organic matter;
- Changing existing drainage characteristics, sedimentation patterns, flow patterns, or flood retention characteristics;
- Disturbance of the water level;
- Dumping or discharging of material, or filling with material;
- Alterations to existing topography; and
- Destruction or removal of vegetation that will alter the characteristics of the wetland.

An entity may apply for a permit to conduct regulated activities in a nontidal wetland by submitting a Joint Federal/State Application for the Alteration of any Floodplain, Waterway, Tidal, or Nontidal Wetland in Maryland (JF/SA) to MDE. The permit application must identify the following:

- the project requires access to a wetland;
- the applicant will avoid and minimize adverse impacts to the wetland; and
- the project will not degrade groundwater or surface waters.

The application must be submitted to the Wetlands and Waterways Program of MDE, MDE notifies the applicant of receipt of the application, coordinates with other State and Federal agencies to expedite review of the JF/SA, works with COE to develop a permit for the project, and reviews the permit with other State agencies. MDE notifies the applicant within 45 days of receipt of the application whether the application is complete and that the wetland delineation is correct, or that modifications must be made to the

application prior to approval. If MDE does not notify the applicant within 45 days, the application is considered to be complete and correct (COMAR 26.23.02.02). MDE may notify the applicant that the review process will be extended in the case of inclement weather or if the permit application requires additional review by other State or Federal agencies.

If a proposed project would cause permanent impacts to a jurisdictional wetland or waterway, MDE will issue a public notice at the applicant's expense to notify the public of the intended activity. The notice provides the public with an opportunity to make a written response or to request a public information hearing. A hearing will only be granted if more than 5,000 square feet of impacts to wetlands are expected.

If written comments are received or a public hearing is held, the applicant may provide additional information to address public concerns, and MDE renders a decision to grant, deny, or conditionally approve a permit and provide written notice of the permit decision to the applicant and other interested parties. Work authorized by the permit must be initiated within three years and be completed within the time specified by the permit. The applicant may not resubmit a denied application within six months of notice of denial.

MDE requires that an applicant develop and implement mitigation practices to compensate for losses or damage to the nontidal wetlands impacted by permitted activities. The applicant must submit mitigation plans consistent with COMAR 26.23.04.03 through 26.23.04.05. MDE may choose to accept monetary compensation when the creation, restoration, or enhancement of nontidal wetlands is not feasible.

5.2 U.S. ARMY CORPS OF ENGINEERS

COE regulations regarding activities in wetlands and "waters of the U.S." were published in the Federal Register Notice of Thursday, March 9, 2000, Final Notice of Issuance and Modification of Nationwide permits (pp 12818 to12899). COE takes jurisdiction over "waters of the U.S.", ephemeral channels, and associated wetlands joined by a visible surface connection under Section 404 of the Clean Water Act or Section 10 of the Rivers and Harbors Act of 1899. COE defines "waters of the U.S." as "Coastal and inland waters, lakes, rivers, and streams that are navigable waters of the United States, including their adjacent wetlands" and "Tributaries to navigable waters of the United States, including adjacent wetlands." (*Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987)). Isolated wetlands that do not have a visible surface connection to "waters of the U.S." may fall under MDE jurisdiction.

An applicant may request a permit to conduct regulated activities in a nontidal wetland by submitting a JF/SA to MDE, who in turn coordinates with COE. A JF/SA application, also know as a Section 404 permit application, and wetland report must be submitted to request a jurisdictional determination by COE. Notification to COE must include a description of the "waters of the U.S." or the buffer zone to be impacted, and it must

include a written statement that demonstrates that the applicant has taken steps to accomplish the following:

- Minimize discharges into "waters of the U.S.";
- Avoid changing sediment characteristics in areas of shellfish beds or fish spawning;
- Prevent stream gradient and water velocity increases;
- Avoid adverse impacts to the course, capacity, or condition of the "waters of the U.S."; and
- Minimize downstream turbidity.

Within 15 days of receipt of the application, COE and the applicant may conduct a field investigation of the nontidal wetland to verify the delineation and make a jurisdictional determination (JD) to determine what kind of permit will be required for the proposed activities.

A public notice is then issued with a 30-day comment period. The general public, special interest groups, State, local, and other Federal agencies may use this time to review the proposal and forward comments to COE. COE renders a decision to grant or deny the application and the applicant then has 60 days to file an appeal regarding the decision.

Types of Permits Issued

COE issues three types of permits: individual, regional, and nationwide.

- Individual permits are issued for an individual application after the public notice period.
- Regional permits are issued for a general category of activities when the activities are similar and cause minimal adverse impacts. This permit reduces dual control by State and Federal agencies.
- Nationwide permits are issued for a category of projects throughout the United States.

In addition to these permits, COE and MDE administer a Maryland State Programmatic General Permit for projects in wetlands and "waters of the U.S." in the State of Maryland.

5.3 FEDERAL AVIATION ADMINISTRATION

Based on regulations set forth by the Federal Aviation Administration, MAA must perform routine maintenance at BWI Airport to ensure the safety of the traveling public. Maintenance is crucial to the safe operation of activities in the Aircraft Operations Area (AOA) and it is required to provide devices, such as fences and cameras, to ensure a secure facility.

5.3.1 Aircraft Operations Area

The Aircraft Operations Area (AOA) is defined as the portion of BWI used by aircraft for landing, takeoff, and surface maneuvers. The areas between and adjacent to runways and taxiways, such as turf, service roads (for ground service equipment, etc.), vegetated areas, and swales. MAA must maintain these areas to ensure appropriate drainage, maintain lines of site between runways and taxiways, and provide additional areas for emergency maneuvers and equipment.

Several palustrine, forested and palustrine, scrub-shrub wetlands have been identified throughout the AOA. MAA must maintain vegetation in these areas to fulfill FAA regulations and achieve the following goals:

- Reduce habitat for wildlife, (e.g., flocking birds, waterfowl, deer) that could pose hazards to aircraft;
- Avoid intrusions into imaginary surfaces (e.g., trees and vegetation in areas adjacent to taxiways must not reach heights that exceed the elevation of the taxiways); and
- Provide a clear line of vision for aircraft on runways and taxiways.

5.3.2 Security Considerations

FAA Regulation (FAR) Part 107, Aviation Security, specifies that all airports maintain security fences with 10- to 20-foot clear zones to provide a clear view for inspection and security cameras. Such maintenance includes clearing all woody growth within 10 feet of the security fence every 3 to 4 years and treating vines along the fence with herbicide.

The security fence at BWI Airport crosses several jurisdictional streams and wetlands, and their buffers. To maintain vegetation in areas of the security fence that contain forested areas or require grubbing, MAA must obtain appropriate permits from COE and MDE.

5.4 REGULATED ACTIVITIES

As discussed in Section 4, MAA performed extensive field investigations to identify all wetlands and "waters of the U.S." on the Aircraft Operations Area 2000. As part of its survey activities, MAA identified areas that would require maintenance to fulfill FAA regulations. MAA submitted a JF/SA to obtain a permit to perform the necessary maintenance activities. The permit was submitted to MDE in June 2000, following the jurisdictional determinations performed by COE and MDE.

MDE required MAA to provide additional information to complete the permit review and informed MAA that mitigation would be required to compensate for maintenance activities, such as clearing and grubbing, performed in palustrine forested and scrub-

shrub wetlands. MDE informed MAA that areas classified as palustrine emergent wetlands and stream buffers would not require agency authorization.

Additional fieldwork was performed in late 2000 and 2001 to identify jurisdictional areas on nearby MAA properties. Several of these areas are pending jurisdictional determination.

Table 5-1 presents a summary of stream and wetland areas and the maintenance activities that must be performed. The table includes the following data for each wetland or stream:

- Delineation date,
- Jurisdictional Determination date,
- Maintenance disturbance or impact, and
- Permit requirement/status.

Figure 4 illustrates the locations of the streams and wetlands and the type of maintenance required in each area.

Best Management Practices

In addition to these regulated activities, MAA has reviewed COE and MDE data to identify the Best Management Practices that must be used to maintain herbaceous and woody vegetation in these sensitive wetland areas:

A. Avoid the use of heavy equipment within wetlands. Ride-on mowers may be used providing the ground is able to support them. If ride-on mowers are not feasible to use in an area, then either push mowers or weed whackers must be used.

B. Grass clippings must not be collected and piled. They should be left in place as mowing proceeds. If clippings are collected, they must be broadcast spread over the area subject to mowing.

C. Woody vegetation (shrubs and trees) must be trimmed as necessary. The vegetation must then be chipped and broadcast spread across the area from which it was taken. ***No on-site piling of vegetation will be permitted.***

D. All other activities in wetlands must adhere to the following Best Management Practices for Working in Wetlands as put forth by Maryland Department of the Environment:

- No excess fill, construction materials, or debris are to be stockpiled or stored in the wetlands or buffer.
- Place materials in a location and manner that does not adversely impact surface or subsurface water flow into or out of the nontidal wetlands.

- Do not use the excavated materials as backfill if it contains waste metal products, unsightly debris, toxic materials, or any other deleterious substance. If additional backfill is required, use clean material free of waste metal products, unsightly debris, toxic materials, or any other deleterious substance.
- Place heavy equipment on mats, or suitably operate the equipment to prevent damage to the nontidal wetlands or buffer.
- Repair and maintain any serviceable structure or fill so there is no permanent loss of nontidal wetlands in excess of nontidal wetlands lost under the original structure or fill.
- Rectify any nontidal wetlands temporarily impacted by any construction activity.
- After installation has been completed, make post-construction grades and elevations of nontidal wetlands temporarily impacted the same as the original grades and elevations.
- To protect important aquatic species, in-stream work is prohibited as determined by the classification of the stream as follows: Class 1 waters – in stream work may not be conducted during the period of March 1 through June 15, inclusive, during any year.

Table 5-1
MAINTENANCE ACTIVITIES AND PERMIT REQUIREMENTS

WETLAND/STREAM	TYPE	WETLAND SIZE	DELINEATION DATE	JURISDICTIONAL DETERMINATION DATE	MAINTENANCE DISTURBANCE / IMPACTS
Cabin Branch	Waters of the U.S.	NA	NA	Pending JD	None
Muddy Bridge Branch	Waters of the U.S.	NA	Dec-99	03/11/2000	Mowing of 1,000 square feet of stream buffer at security fence crossing every 3 to 4 months
Irving Branch	Waters of the U.S.	NA	NA	Pending JD	None
Phelps Branch	Waters of the U.S.	NA	Dec-99	03/11/2000	Mowing of 1,000 square feet of stream buffer at security fence crossing every 3 to 4 months
PB-1	PEM and PFO1	2,100 sq ft	12/13/1999	03/11/2000	Mowing of 2,100 square feet of wetlands at fence crossing every 3 to 4 months
Fork Branch	Waters of the U.S.	NA	Dec-99	03/11/2000	Mowing of 1,000 square feet of stream buffer at security fence crossing every 3 to 4 months
FB-1	PEM/PSS1	0.5 acre	12/01/1999	03/11/2000	Mowing of vegetation to maintain aircraft operations area (no permit required)
FB-2	PEM	1,977 sq ft	12/01/1999	03/11/2000	Mowing of 1,977 square feet of wetland at fence crossing every 3 to 4 months
Clark Branch	Waters of the U.S.	NA	12/22/1999	6/11/96 and 3/11/00	None
CLB-1	PEM (with PFO at headwaters)	NA	12/22/1999	03/11/2000	Mowing of wetland at fence crossing every 3 to 4 months
Hawkins Branch	Waters of the U.S.	NA	12/23/1999	6/11/96 and 3/11/00	None
HB-1	PEM	NA	12/23/1999	03/11/2000	Clearing and grubbing at fence crossing every 3 to 4 months
Signal Branch	Waters of the U.S.	NA	Dec-99	3/11/2000	Mowing of 1,000 square feet of stream buffer at security fence crossing every 3 to 4 months
SB-1	PFO1A	0.11 acre	03/14/2001	Pending JD	None
SB-2	PFO1A	0.75 acre	03/19/2001	Pending JD	None
Bowden Branch	Waters of the U.S.	NA	Dec-99	03/11/2000	Mowing of 1,000 square feet of stream buffer at security fence crossing every 3 to 4 months
BB-1	PEM1A	2.795 sq. ft.	03/14/2001	Pending JD	None
BB-2	PEM1A	0.34 acre	01/23/2001	Pending JD	None
Bowden Branch Tributary	Waters of the U.S	NA	Dec-99	03/11/2000	Mowing of 1,000 square feet of stream buffer at security fence crossing every 3 to 4 months
BB-EC1	Waters of the U.S. (Ephemeral Channel)	NA	03/14/2001	Pending JD	None
BB-EC2	Waters of the U.S. (Ephemeral Channel)	NA	03/14/2001	Pending JD	None
BB-EC3	Waters of the U.S. (Ephemeral Channel)	NA	03/14/2001	Pending JD	None
King Branch	Waters of the U.S.	NA	04/11/2000	05/11/2000	Clearing and grubbing at fence crossing every 3 to 4 months
KING-1	PFO1 and PEM	0.07 acre	04/11/2000	05/11/2000	Mowing of wetland at fence crossing every 3 to 4 months
KING-2	PEM1A	0.13 acre	03/14/2001	Pending JD	None
KING-EC1	Waters of the U.S. (Ephemeral Channel)	NA	03/19/2001	Pending JD	None
Kitten Branch	Waters of the U.S.	NA	Dec-99	03/11/2000	Mowing of 1,000 square feet of stream buffer at security fence crossing every 3 to 4 months
KB-1	PEM	0.2 acre	12/16/1999	03/11/2000	.2 acre mowing of wetland
KB-2	PFO1	1.4 acres	12/17/1999	03/11/2000	1.4 acre mowing of wetland
KB-3	PEM/PSS	2.5 acres	12/17/1999	03/11/2000	Mowing of 1,000 square feet of wetland at fence crossing every 3 to 4 months
KB-4	PFO1	0.3 acre	12/21/1999	03/11/2000	None
KB-5	PFO1	1.3 acres	12/21/1999	03/11/2000	Proposal to convert from forest to scrub shrub; if project goes forward, a permit will be required
KB-6	PEM	0.18 acre	Unknown	Unknown	Impacted during Midfield Cargo Complex construction
KB-7	PEM	1,600 sq. ft.	Unknown	Unknown	None
Kitten Branch Tributary	Waters of the U.S.	NA	Dec-99	03/11/2000	None
KBT-1	PFO1	0.2 acre	02/07/2000	03/11/2000	None
KBT-2	PFO1	0.1 acre	02/07/2000	3/11/00 (MDE)	None
KBT-3	PFO1	0.4 acre	02/10/2000	03/11/2000	Mowing of emergent portion of wetland to maintain aircraft operations area
KBT-4	PFO1	0.1 acre	12/23/1999	03/11/2000	None
Sachs Branch	Waters of the U.S.	NA	Jan-00	05/11/2000	Permit obtained to add outfall during road construction (Permit no. 00-NT-0269/200065177; November 28, 2000)
Tributary of Sachs Branch	Waters of the U.S.	NA	Jan-00	05/11/2000	None
SAB-1	PEM	0.06 acre	01/27/2000	05/11/2000	None
SAB-2	PEM/SS	0.52 acre	02/09/2000	05/11/2000	None

*Wetland size cannot be determined. Only portions of wetland have been delineated.

NA - Total length of stream, or size of wetland not available.

Legend:

PEM - Palustrine, emergent

PEM1A - Palustrine, emergent, persistent, temporarily flooded

PEM1B - Palustrine, emergent, persistent, saturated

PEM/SS - Palustrine, emergent/scrub-shrub

PFO1 - Palustrine, forested, broad-leaved deciduous

PFO1B - Palustrine, forested, broad-leaved deciduous, saturated

PFO1/4 - Palustrine forested, broad-leaved deciduous/coniferous

PFO1/4B - Palustrine, forested, broad-leaved deciduous/coniferous, saturated

PFO1/4C - Palustrine, forested, broad-leaved deciduous/coniferous, seasonal

PFO/SS1C - Palustrine, forested/scrub-shrub, broad-leaved decidous, seasonal

Source:

Straughan Environmental Services, Inc. 2000 and 2001

Table 5-1
MAINTENANCE ACTIVITIES AND PERMIT REQUIREMENTS

WETLAND/STREAM	TYPE	WETLAND SIZE	DELINEATION DATE	JURISDICTIONAL DETERMINATION DATE	MAINTENANCE DISTURBANCE / IMPACTS
Stony Run	Waters of the U.S.	NA	01/23/2001	03/30/2001	None
SR-1	PFO1	0.04 acre	09/01/1999	05/11/2000	Permit submitted to fill wetlands as part of tenant lot construction; awaiting approval
SR-2	PFO1	0.08 acre	09/01/1999	5/11/00 (MDE)	Permit submitted to fill wetlands as part of tenant lot construction; awaiting approval
SR-3	PFO1	TBD*	10/11/1999	5/11/2000 and 3/30/2001	Potential impacts associated with installation of utilities associated with Consolidated Rental Car Facility in late 2001
SR-4	PFO1/4C	TBD*	01/23/2001	03/30/2001	Potential impacts associated with installation of utilities associated with Consolidated Rental Car Facility in late 2001
SR-5	PFO1B	TBD*	02/09/2001	03/30/2001	Potential impacts associated with installation of utilities associated with Consolidated Rental Car Facility in late 2001
SR-6	PFO/SS1C	TBD*	02/09/2001	03/30/2001	Potential impacts associated with installation of utilities associated with Consolidated Rental Car Facility in late 2001
SR-7	PFO1/4C	TBD*	02/01/2001	03/30/2001	Potential impacts associated with installation of utilities associated with Consolidated Rental Car Facility in late 2001
Stony Run Tributary 1	Waters of the U.S.	650 lf	02/01/2001	03/30/2001	Potential impacts associated with installation of utilities associated with Consolidated Rental Car Facility in late 2001
Stony Run Tributary 2	Waters of the U.S.	NA	03/20/2001	Pending JD	SHA plans to widen MD 170 and improve the interchange with Stoney Run Road
SRT2-EC	Waters of the U.S. (Ephemeral Channel)	100 lf	03/20/2001	Pending JD	SHA plans to widen MD 170 and improve the interchange with Stoney Run Road
A	PEM1A	289 sq. ft.	03/14/2001	Pending JD	SHA plans to widen MD 170 and improve the interchange with Stoney Run Road
B	PEM1B	172 sq. ft.	03/19/2001	Pending JD	None
C	PEM1A	317 sq. ft.	03/20/2001	Pending JD	SHA plans to widen MD 170 and improve the interchange with Stoney Run Road
D	PEM1A	614 sq. ft.	03/20/2001	Pending JD	SHA plans to widen MD 170 and improve the interchange with Stoney Run Road
E	PFO1/4B	836 sq. ft.	03/20/2001	Pending JD	None
F	PEM1A	2,405 sq. ft.	03/20/2001	Pending JD	SHA plans to widen MD 170 and improve the interchange with Stoney Run Road
G	PEM1A	0.17 acre	03/20/2001	Pending JD	SHA plans to widen MD 170 and improve the interchange with Stoney Run Road
H	PFO1A	1,632 sq. ft.	03/20/2001	Pending JD	None
I	Waters of the U.S. (Ephemeral Channel)	100 lf	03/20/2001	Pending JD	None
J	PEM1A	0.17 acre	03/20/2001	Pending JD	None
K	PEM1A	1,492 sq. ft.	03/20/2001	Pending JD	SHA plans to widen MD 170 and improve the interchange with Stoney Run Road
L	Waters of the U.S. (Ephemeral Channel)	100 lf	03/20/2001	Pending JD	SHA plans to widen MD 170 and improve the interchange with Stoney Run Road
Tributary of Piny Run Wetland	Waters of the U.S.	NA	03/01/2000	05/11/2000	None
Wetland TPR-1	PFO1	0.12 acre	03/01/2000	05/11/2000	None
Wetland TPR-2	PFO1	1.33 acres	03/01/2000	05/11/2000	None

*Wetland size cannot be determined Only portions of wetland have been delineated

NA - Total length of stream, or size of wetland not available

Legend

PEM - Palustrine, emergent

PEM1A - Palustrine, emergent persistent, temporarily flooded

PEM1B - Palustrine, emergent, persistent, saturated

PEM/SS - Palustrine, emergent/scrub-shrub

PFO1 - Palustrine, forested, broad-leaved deciduous

PFO1B - Palustrine, forested, broad-leaved deciduous, saturated

PFO1/4 - Palustrine forested, broad-leaved deciduous/coniferous

PFO1/4B - Palustrine, forested, broad-leaved deciduous/coniferous, saturated

PFO1/4C - Palustrine, forested, broad-leaved deciduous/coniferous, seasonal

PFO/SS1C - Palustrine, forested/scrub-shrub, broad-leaved decidous, seasonal

Source

Straughan Environmental Services, Inc 2000 and 2001

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APPENDIX A
COE AND MDE PERMITS

STRAUGHAN
ENVIRONMENTAL
SERVICES, INC.

November 29, 2001

Mr. Michael Stygar, P.E.
Michael Baker Corporation
801 Cromwell Park Drive, Suite 110
Glen Burnie, MD 21061

Subject: Natural Resources Inventory for the Proposed Widening of Maryland Route 170 at Baltimore/Washington International (BWI) Airport

Dear Mr. Stygar:

Straughan Environmental Services, Inc., (SES) is pleased to present the Natural Resources Inventory for the proposed expansion of MD Route 170 and a copy of the Joint Federal/State Application (JF/SA) requesting a jurisdictional determination (JD) of wetlands and "waters of the U.S." by the U.S. Army Corps of Engineers. Nine copies of the report and the JF/SA have been forwarded to the Maryland Aviation Administration (MAA). MAA will submit five copies and the JD request to the Maryland Department of the Environment. Please note that no submission is required for the Maryland Department of Natural Resources Forest Service is required at this time, but a Forest Conservation Plan might be required when preliminary plans are complete.

Thank you for this opportunity to work with Michael Baker Corporation. If you have any questions or require further information please do not hesitate to call me at (301) 989-3265. Thank you.

Sincerely,
STRAUGHAN ENVIRONMENTAL SERVICES, INC.,

Roger J. Windschitl
Senior Project Manager

Enclosures

cc: Ms. Eileen K. Straughan, SES
√Ms. Robin Bowie, MAA

3905 NATIONAL DRIVE, SUITE 370
BURTONSVILLE, MARYLAND 20866
301.989.3265 FAX 301.989.3271

Natural Resources Inventory for Maryland 170 Anne Arundel County, Maryland

Prepared for:

Maryland Aviation Administration

Prepared by:

STRAUGHAN ENVIRONMENTAL SERVICES, INC.

3905 National Drive, Suite 370
Burtonsville, Maryland 20866

Under Contract To:

Michael Baker Corporation
801 Cromwell Park Drive, Suite 110
Glen Burnie, MD 21061

November 2001

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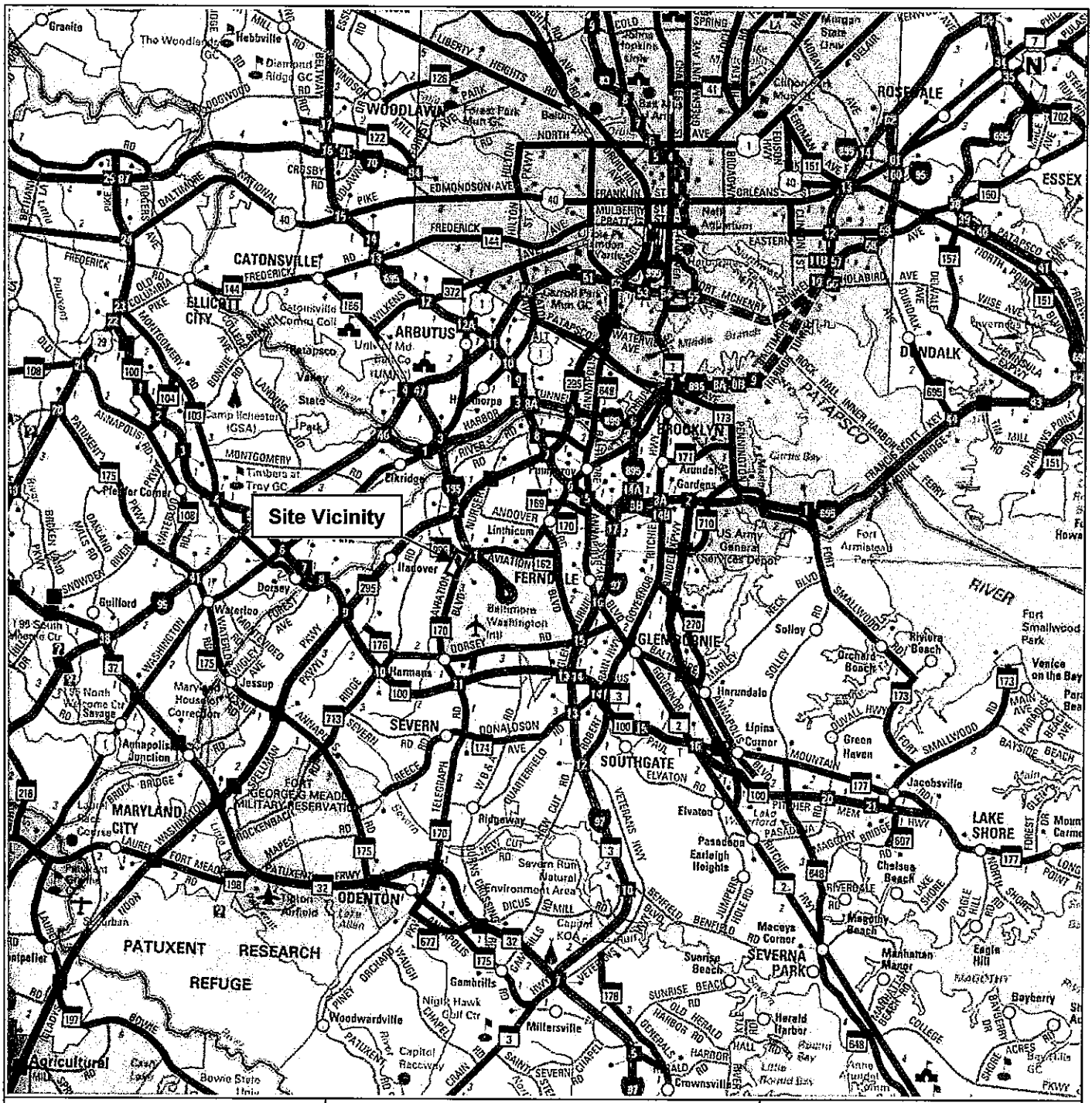
1 INTRODUCTION

1.1 PROJECT DESCRIPTION

Straughan Environmental Services, Inc., (SES) was retained by the Michael Baker Jr. Corporation to assess the potential impacts to natural resources associated with the proposed widening of Maryland Route 170 (MD 170) from Mathison Way to Amtrak Way in Anne Arundel County, Maryland (see Figure 1). The natural resources assessed by SES include: forest stands, wetlands, endangered species habitat, floodplains, wild and scenic rivers, and historic resources. Information provided by SES will be used to assess the potential effects to these resources as a result of the proposed road widening. SES investigated and assessed all natural resources through field investigations, a review of published documents, and consultation with federal and state agencies.

1.2 STUDY AREA

The Maryland State Highway Administration (SHA) proposes to widen MD 170 from Mathison Way north to Amtrak Way, west of Baltimore/Washington International (BWI) Airport, in Anne Arundel County, Maryland (see Figure 2). The limits of disturbance (LOD) for the proposed road widening will extend 30 feet along the west side of MD 170 and include the Stoney Run Road cloverleaf on the east side of MD 170, north of Mathison Way and south of Amtrak Way. SES investigated a study area that extends 100 feet west of the proposed LOD in compliance with the *State Forest Conservation Technical Manual* (Maryland Department of Natural Resources [MD DNR], 1997).



STRAUGHAN ENVIRONMENTAL SERVICES, INC.

Figure 1: Site Vicinity

Widening of Maryland 170

Anne Arundel County, Maryland

Legend

Site Vicinity

Approximate Scale:

1 inch = 4 miles

Source: Alexandria Drafting Company, 2000. Maryland and Delaware map. Used with permission.

STRAUGHAN ENVIRONMENTAL SERVICES, INC.

Figure 2: Study Area

Widening of Maryland 170
Anne Arundel County, Maryland

Legend:

Approximate study area boundary

Scale: 1 inch = 2,000 feet

Note: ADC map incorrectly shows Stoney Run Road as Hanover Road.
Source: ADC of Alexandria, Inc., 1998. Anne Arundel County, Maryland. (Used with permission.)

2 METHODOLOGY

2.1 WETLANDS

SES reviewed the study area for potential wetlands using aerial photography, the *USGS Topographic Map for Relay, MD* (USGS, 1957 (photorevised 1966 and 1974), the *National Wetlands Inventory (NWI) map for Relay, MD* (USFWS, 1981), *Soil Survey of Anne Arundel County, Maryland* (USDA, 1973), and field investigation results. Potential wetland determinations were based on U.S. Army Corps of Engineers (COE) vegetation, hydrology, and soil parameters, as described in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987). Potential wetlands were classified based on the U.S. Fish and Wildlife Service system (Cowardin, et al., 1979).

All fieldwork was performed according to the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987) using the routine on-site method. The manual outlines a three-parameter approach to delineating wetlands. All three parameters (hydrophytic vegetation, hydric soils, and hydrology) must be evident to classify the area as a wetland, unless the site has been disturbed (atypical) or is considered a problem area. In the case of disturbed or problem areas, only two parameters must be evident to classify these areas as wetlands. "Waters of the U.S." are defined by the US Army Corps of Engineers as "Coastal and inland waters, lakes, rivers, and streams that are navigable waters of the United States, including their adjacent wetlands" and "Tributaries to navigable waters of the United States, including adjacent wetlands." (*Corps of Engineers Wetlands Delineation Manual*, Environmental Laboratory, 1987).

2.2 FOREST STAND DELINEATION

The Maryland State Highway Administration plans to widen an approximately 5,400-foot portion of MD 170 as a road improvement project; therefore, only a general characterization of the forest stands rather than the collection of data from individual sample plots, is required. SES characterized forest stands within the LOD and within 100 feet of the LOD (study area) in accordance with the *State Forest Conservation Technical Manual* (MD DNR, 1997).

SES summarized the sample plot information for each stand on Forest Stand Summary Work Sheets, provided a brief narrative description of each stand, photographed existing conditions, and created an environmental features map to depict pertinent information.

2.3 FLOODPLAINS

SES consulted flood insurance rate maps published by the Federal Emergency Management Agency (FEMA) to determine whether the study area is in a 100-year floodplain. Floodplains are defined in Executive Order 11988, "Floodplain Management," as "the lowland and relatively

flat areas adjoining inland and coastal waters including flood prone areas of offshore islands, including at a minimum, that area subject to a one percent or greater chance of flooding in any given year..." (i.e., the area that would be inundated by a 100-year flood).

2.4 RARE, THREATENED, AND ENDANGERED SPECIES

SES addressed rare, threatened, or endangered flora and fauna, in accordance with Section 7 of the Endangered Species Act, by:

- Consulting with the USFWS and Maryland Department of Natural Resources' (MD DNR's) Wildlife and Heritage Division to identify any rare, threatened, or endangered species that may occur in or near the study areas;
- Determining whether the appropriate habitat for any identified rare, threatened, or endangered species occurs in the study areas during the field investigation; and
- Inspecting those specific habitats for the presence of rare, threatened, or endangered species.

2.5 WILD AND SCENIC RIVERS

SES determined whether any rivers identified in this inventory are within or near the study areas by reviewing the Wild and Scenic Rivers Act. The Wild and Scenic Rivers Act (PL 90 542 as amended) describes those river areas eligible to be included in a system afforded protection by the Act as free-flowing and possessing "outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural or other similar values." The United States Department of the Interior (DOI) maintains a National Inventory of river segments that qualify for inclusion in the National Wild and Scenic River System.

2.6 HISTORIC RESOURCES

SES obtained information regarding cultural resources within the LOD from the Maryland Historical Trust. The area within the LOD was assessed for prehistoric and historic cultural resources. Historic structures and archeological site files for sites in the LOD were examined, as well as historic maps and archeological survey reports for surveys that have taken place in the vicinity of the Stoney Run Road Development Area.

3 FINDINGS

3.1 PUBLISHED INFORMATION

3.1.1 Soils

The *Soil Survey of Anne Arundel County* (USDA, 1973) indicates that several soil series occur along the LOD (see Figure 3). Typical soil profiles for these soil series are presented in Table 3-1.

- Bibb soils (Bm) consist of poorly drained, silty soils that have a dark grayish-brown to light olive-brown silt loam surface layer and dark-gray or gray silt loam underlying material. These soils occur on flood plains along many of the major streams and drainageways in the county.

- Cut and Fill land (CuB) soils consist of soil materials that have been altered by machines for urban uses. The surface layer varies in texture and may be sandy, silty, or clayey material that contains gravel in some places, or it may be a mixture of these in various proportions.

- Evesboro soils (EoB) consist of very deep, well drained to excessively drained, very sandy soils of the uplands. These soils have a surface layer that is generally grayish brown and a subsoil that is a brighter yellowish brown or brownish yellow. They formed primarily in old dunelike deposits of sand.

- Gravel and Borrow pits (Gp) consist chiefly of areas where soil material has been removed for use in industrial enterprises, highway construction, or land fills.

- Sassafras soils (SaB2, SaC3) consist of deep, well drained soils on uplands that have a loamy surface layer and a yellowish-brown to strong-brown subsoil of dominantly sandy clay loam. These soils formed in beds of sandy sediments containing moderate amounts of silt and clay.

Typical soil profiles for Bibb silt loam, Evesboro loamy sand, and Sassafras fine sandy loam are presented in Table 3.1-1. Soil profiles are not available for Cut and Fill land or Gravel and Borrow pits.

Table 3.1-1
TYPICAL SOIL PROFILES

Soil Series	Depth (Inches)	Color	Texture
Bibb silt loam	0-3	Dark grayish-brown	Silt loam
	3-9	Dark grayish-brown	Silt loam
	9-27	Dark-gray	Silt loam
	27-36	Gray	Loam
	36-50	Gray	Silty clay
Evesboro loamy sand	0-2	Light brownish-gray	Loamy sand
	2-28	Yellowish-brown	Loamy sand
	28-43	Brownish-yellow	Loamy sand
	43-60	Pale-brown	Sand

Table 3.1-1 TYPICAL SOIL PROFILES			
Soil Series	**Depth (Inches)**	**Color**	**Texture**
Sassafras fine sandy loam	0-2	Very dark gray	Fine sandy loam
	2-11	Dark grayish-brown	Fine sandy loam
	11-17	Yellowish-brown	Fine sandy loam
	17-30	Strong brown	Sandy clay loam
	30-37	Strong brown	Sandy clay loam
	37-50	Yellowish-brown	Very coarse sand and small gravel

The Bibb soil series is listed as a hydric soil in *Hydric Soils of the United States* (USDA, 1991) and in the *State of Maryland Hydric Soils List* (State of Maryland, 1990). Sassafras soils are listed in the *State of Maryland Hydric Soils List* as having unnamed hydric inclusions. Sassafras soils (SaB_2, SaC_2) are listed in the *Soil Survey of Anne Arundel County* (USDA, 1973) as prime farmland, however these soils were previously disturbed within the study area.

None of the soil series within the study area have a reported K-value (erodability factor) greater than 0.35, which indicates that these soils do not pose construction-related hazards. Table 3.1-2 provides additional information and limitations for each soil subclass.

Table 3.1-2 SOIL CHARACTERISTICS AND LIMITATIONS				
Soil Type	**Hydric Status**	**K-Value[a]**	**Prime or Unique Farmlands**	**Restrictions and Limitations**
Bibb silt loam (Bm)	Yes	0.28	No	None
Cut and Fill land (CuB)	No	N/A	N/A	None
Evesboro loamy sand (EoB)	No	0.17	No	None
Gravel and Borrow pits (Gp)	No	0.02	No	None
Sassafras fine sandy loam (SaB_2)	No	0.28	Yes	None
Sassafras fine sandy loam (SaC_3)	No	0.28	No	None

a. K-value indicates the erodability factor associated with a soil type. Soils with K-values greater than 0.35 pose construction-related hazards.

Sources:

USDA, Soil Conservation Service, 1973. *Soil Survey of Anne Arundel County, Maryland.*
State of Maryland, 1990. *State of Maryland Hydric Soils List.*
USDA, Soil Conservation Service, 1991. *Hydric Soils of the United States.*

STRAUGHAN ENVIRONMENTAL SERVICES, INC.

Figure 3: Soil Series Map

Widening of Maryland 170

Anne Arundel County, Maryland

Legend:

———	Approximate Study Area Boundary
Bm	Bibb silt loam
CuB	Cut and fill land
EoB	Evesboro loamy sand
Gp	Gravel and Borrow Pits
SaB2, SaC3	Sassafras fine sandy loam

Approximate Scale: 1 inch = 1,666 feet

Source: USDA, Soil Conservation Service, Soil Survey of Anne Arundel County, Maryland, Sheet Number 3, 1973.

3.1.2 Wetlands and "Waters of the U.S."

The NWI map indicates the presence of Bowden Branch and Signal Branch, which are considered "waters of the U.S." Bowden Branch crosses the southwestern corner of the Stoney Run Road cloverleaf east of MD 170, flows under MD 170, and continues west to Stony Run. Signal Branch flows west from BWI Airport, beneath MD 170 immediately north of Mathison Way, to its confluence with Stony Run (see Figure 4).

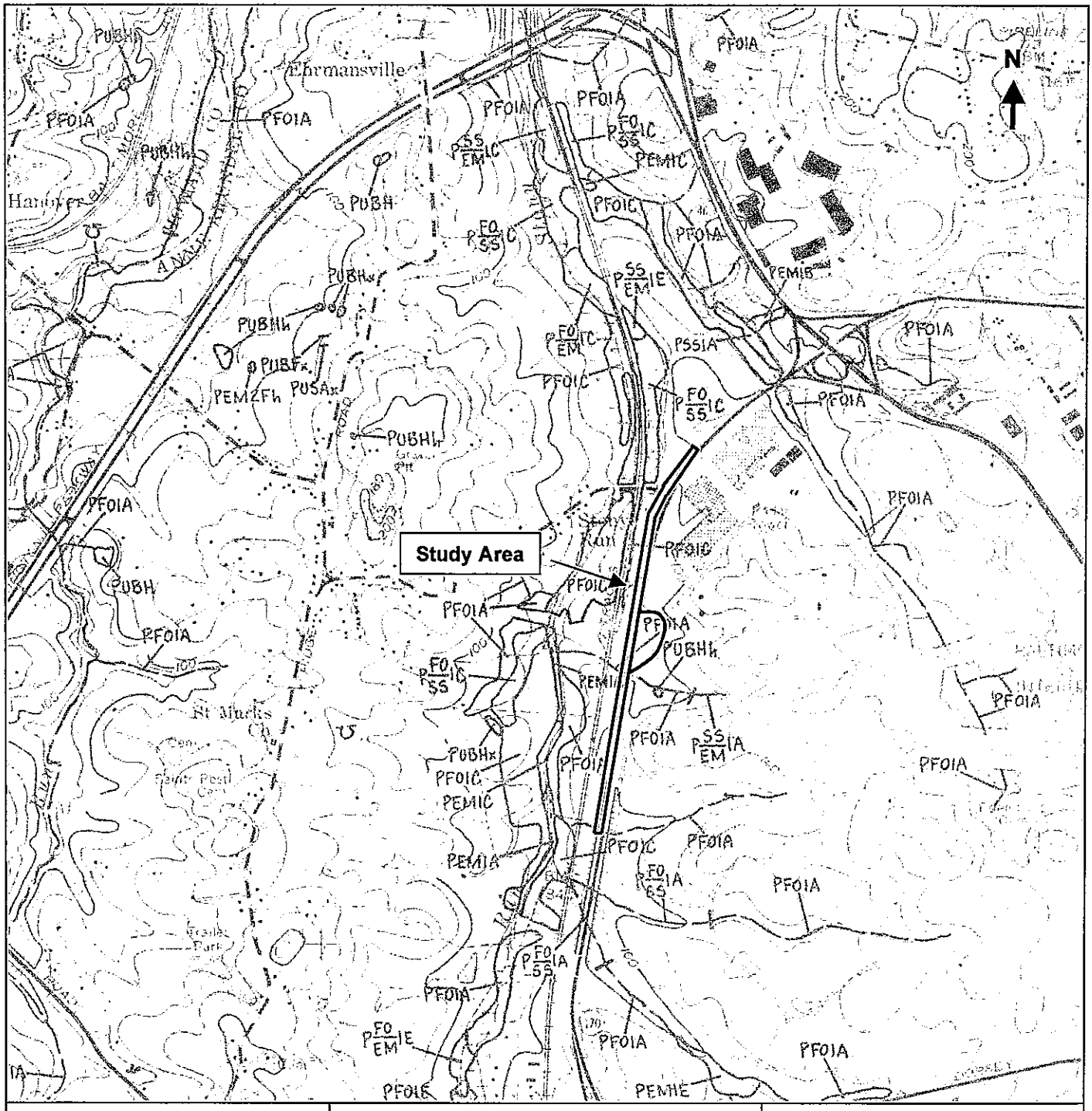
3.1.3 Floodplains

SES reviewed the *Flood Insurance Rate Map for Anne Arundel County, Panel No.* 240008 0005 C (FEMA, 1983) to determine whether the study area is within a 100-year floodplain. The Flood Insurance Rate Map indicates that the study area is not in a 100-year floodplain. The nearest published 100-year floodplain is associated with Stony Run (see Attachment A, Environmental Features Map).

3.1.4 Rare, Threatened, and Endangered Species

Section 7 of the Endangered Species Act, as amended, requires each Federal agency to ensure that "any action authorized, funded, or carried out by such agency ... is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary, after consultation as appropriate with the affected States, to be critical, unless such agency has been granted an exemption for such action by the Committee."

According to MD DNR, there are no records to indicate the presence of endangered flora or fauna within the study area (Byrne, 2001). According to the U.S. Fish and Wildlife Service (USFWS), Swamp pink (*Helonias bullata*), a federally threatened plant, has been documented within the Stony Run wetlands which are west of the Amtrak rail line adjacent to the study area (Pennington, 2001). USFWS recommends that projects performed near these resources include measures to minimize potential hydrologic changes, siltation, and runoff.



STRAUGHAN ENVIRONMENTAL SERVICES, INC.

Figure 4: National Wetlands Inventory Map

Widening of Maryland 170

Anne Arundel County, Maryland

Legend:

Approximate Study Area Boundary

Approximate Scale:

1 inch = 2,000 feet

Source: United States Department of the Interior, Fish and Wildlife Service. NWI map for Relay, Maryland. 1981.

3.1.5 Wild and Scenic Rivers

According to the Wild and Scenic Rivers Act no Wild and Scenic Rivers occur within the study area. The only designated Wild and Scenic River in Maryland is the portion of the Youghiogheny River between Miller's Run and the southern corporate limits of Friendsville, which is in western Maryland.

3.1.6 Cultural and Historic Resources

SES obtained information regarding cultural resources within the LOD from the Maryland Historical Trust (MHT). The area within the LOD was surveyed in 1976 by Geoffrey Conrad, who conducted a pedestrian and windshield survey of much of the area around BWI airport. He recorded site 18AN367, immediately west of MD Route 170. A year later, Dennis Curry re-identified the site and conducted a pedestrian and shovel test pit survey. He noted surface erosion and disturbance by sand and gravel quarry activities, but recommended limited additional excavations. Kinsey re-examined the site in 1979 with 3-foot by 3-foot test units in an area extending 135 feet on the west side of MD Route 170. Kinsey found artifacts on the site, but noted that they were not in their original context and that bulldozing had destroyed the site. Kinsey concluded that site 18AN367 was not eligible for the National Register of Historic Places. No other prehistoric or historic archeological sites have been found within the LOD.

Archival research conducted at MHT suggests a low probability of impacting historic structures or historic archeological sites. Historic maps show no houses in the immediate project area. The project area does not include any properties that are listed on the Maryland Inventory of Historic Properties or on the National Register of Historic Places.

3.2 FIELD INVESTIGATION

3.2.1 Wetlands

SES performed wetland investigations on January 23, March 14, 19, and 20, 2001, to identify the locations and boundaries of potential wetlands within the study area. SES collected data from sample plots in areas that likely contained wetlands, based on topography and vegetation. The locations of the sample plots and the boundaries of areas delineated by SES as potential wetlands or "waters of the U.S." are presented in the Environmental Features Map (Appendix A). Routine Data Forms for the representative sample plots for these areas are presented in Appendix B.

When describing the vegetation for the areas sampled, certain abbreviations are used to represent the indicator status for each vegetative species. These indicators are presented in Table 3.2-1.

Table 3.2-1
WETLAND PLANT INDICATOR DEFINITIONS

Indicator Status	Definition
OBL	Occurs with an estimated 99% probability in wetlands.
FACW	Estimated 67% to 99% probability of occurrence in wetlands.
FAC	Equally likely to occur in wetlands and non-wetlands (34% to 66% probability of occurrence).
FACU	Estimated 67% to 99% probability of occurrence in non-wetlands, 1% to 33% probability of occurrence in wetlands.
UPL	Greater than 99% occurrence in non-wetlands in this region, may occur in wetlands in other regions.
UNK	Unknown indicator status.
NI	Insufficient information available to determine an indicator status.
NA	Not available
+	Frequency occurs in the higher end of a category.
-	Frequency occurs in the lower end of a category.
*	Tentative assignment based on limited information from which to determine the indicator status.

Source: Resource Management Group, Inc. Environmental Planners and Consultants. 1999. *National List of Plant Species that Occur in Wetlands, Region 1 - Northeast.*

SES identified 15 wetlands and 12 "waters of the U.S." during its field investigations. Each of these areas are described in the following paragraphs and are illustrated on the Environmental Features Map.

Wetland B. Wetland B is an approximately 0.44 acre palustrine, emergent, persistent, temporarily flooded (PEM1A) wetland within a depression along the light line for Runway 10-28, approximately approximately 40 feet west of MD 170. The LOD runs within the wetland buffer. SES selected Sample Plot 1-B to characterize Wetland B, and Sample Plot 2-B to characterize the adjacent upland.

Sample Plot 1-B

On January 23, 2001, SES examined soils, vegetation, and hydrology at wetland Sample Plot 1-B, approximately 80 feet west of MD 170. Table 3.2-2 summarizes the investigation results, Table 3.2-3 presents dominant vegetation, and Table 3.2-4 summarizes soil data.

Table 3.2-2
SAMPLE PLOT 1-B GENERAL INFORMATION

Classification	Wetland (PEM1A)
Sample Location	80 feet west of MD 170 and within the light line for Runway 10-28
Hydrology Indicators	Inundated, saturated in the upper 12 inches, water marks, drainage patterns in wetlands, oxidized root channels in upper 12 inches, and water-stained leaves
Percent Hydrophytic Vegetation	100% (see Table 3.2-3)
Hydric Soils	Yes (see Table 3.2-4)

Table 3.2-3
SAMPLE PLOT 1-B DOMINANT VEGETATION

Common Name	BOTANICAL NAME	Indicator Status
Soft Rush	*Juncus effusus*	FACW+
Wool-Grass	*Scirpus cyperinus*	FACW+
Aster species	*Aster* spp.	NA
Switchgrass	*Panicum virgatum*	FAC

Table 3.2-4
SAMPLE PLOT 1-B SOIL DESCRIPTION

Depth (in.)	Color	Description	Mottles
0-1	Black (10YR 2/1)	Organic, fibric, saturated	None
1-21	Gray (10YR 5/1)	Clayey, coarse sand, saturated	Few, small, distinct, very pale brown (10YR7/4) Few, coarse, prominent, very dark brown (10YR 2/2)

Sample Plot 1-B satisfies the three mandatory wetland technical criteria. The area is classified as a palustrine, emergent, persistent, temporarily flooded (PEM1A) wetland.

Sample Plot 2-B

On January 23, 2001, SES examined soils, vegetation, and hydrology at upland Sample Plot 2-B, approximately 140 feet west of MD 170. Table 3.2-5 summarizes the investigation results, Table 3.2-6 presents dominant vegetation, and Table 3.2-7 summarizes soil data.

Table 3.2-5
SAMPLE PLOT 2-B GENERAL INFORMATION

Classification	Upland
Sample Location	140 feet west of MD 170 and within the light line for Runway 10-28
Hydrology Indicators	None
Percent Hydrophytic Vegetation	0 (see Table 3.2-6)
Hydric Soils	No (see Table 3.2-7)

Table 3.2-6
SAMPLE PLOT 2-B DOMINANT VEGETATION

Common Name	Botanical Name	Indicator Status
Multiflora Rose	*Rosa multiflora*	FACU
Grass species	*Gramineae* spp	NA

Table 3.2-7
SAMPLE PLOT 2-B SOIL DESCRIPTION

Depth (in.)	Color	Description	Mottles
0-3	Light olive brown (2.5Y 5/4)	Saturated, loamy sand	Common, fine, prominent, reddish yellow (7.5YR 7/6)
3-6	Light olive brown (2.5Y 5/6)	Moist, loamy, coarse sand	Common, medium, prominent, yellow (10YR 7/8)
6-21	Reddish yellow (7.5YR 6/8)	Loamy sand	Many, coarse, prominent, yellowish brown (10YR 5/4) Many, coarse, prominent, white (10R 8/1)

Sample Plot 2-B does not satisfy any of the three mandatory wetland technical criteria. The area is classified as upland.

Waterway N. King Branch is a perennial stream approximately 0.5 mile feet north of Mathison Way. It originates on BWI Airport, north of the west end of Runway 10-28, and flows west to a culvert that conveys it below the Stoney Run Road exit ramp. From that culvert it continues to flow west for 600 feet to a second culvert that conveys it below MD 170, and it then flows west to its confluence with Stony Run. Waterway N includes a 20-foot reach of King Branch that flows west from the BWI security fence to the east side of the Stoney Run Road exit ramp. SES classified Waterway N as "waters of the U.S."

Waterway O. Waterway O includes an approximately 1,022-foot reach of King Branch that flows west from the culvert below the Stoney Run Road exit ramp to the culvert below MD 170 (see Waterway N for additional information regarding King Branch). Waterway O also includes two ephemeral channels that converge with King Branch immediately east of MD 170. SES classified Waterway O as "waters of the U.S."

Wetland P. Wetland P is an approximately 0.13-acre palustrine, emergent, persistent, temporarily flooded (PEM1A) wetland associated with King Branch and dominated by Common reed (*Phragmites australis*). The wetland is approximately 200 feet north of Stoney Run Road, 40 feet east of MD 170, and within the LOD. SES selected Sample Plot 1-P to characterize Wetland P and Sample Plot 2-P to characterize the adjacent upland.

Sample Plot 1-P

On March 14, 2001, SES examined soils, vegetation, and hydrology at wetland Sample Plot 1-P, within the LOD. Table 3.2-8 summarizes the investigation results, Table 3.2-9 presents dominant vegetation, and Table 3.2-10 summarizes soil data.

Table 3.2-8
SAMPLE PLOT 1-P GENERAL INFORMATION

Classification	Wetland (PEM1A)
Sample Location	200 feet north of Stoney Run Road and 40 feet east of MD 170
Hydrology Indicators	Inundated, saturated in the upper 12 inches, and free water in pit at 5 inches
Percent Hydrophytic Vegetation	100% (see Table 3.2-9)
Hydric Soils	No (see Table 3.2-10)

Table 3.2-9
SAMPLE PLOT 1-P DOMINANT VEGETATION

Common Name	Botanical Name	Indicator Status
Black Willow	*Salix nigra*	FACW+
Common Reed	*Phragmites australis*	FACW
Soft Rush	*Juncus effusus*	FACW+
Wool-Grass	*Scirpus cyperinus*	FACW+
Swamp Milkweed	*Asclepias incarnata*	OBL

Table 3.2-10
SAMPLE PLOT 1-P SOIL DESCRIPTION

Depth (in.)	Color	Description	Mottles
0-6	Dark grayish brown (10YR 4/2)	Saturated, fibric, organic	None
6-21	Brown (10YR 5/3)	Gravelly, loamy sand	Many, coarse, distinct, reddish brown (5YR 5/4)

Sample Plot 1-P is in a disturbed area and satisfies two of the three mandatory wetland technical criteria. The area is classified as a palustrine, emergent, persistent, temporarily flooded (PEM1A) wetland.

Sample Plot 2-P

On March 14, 2001, SES examined soils, vegetation, and hydrology at upland Sample Plot 2-P, approximately 200 feet north of Stoney Run Road, and 50 feet east of MD 170. Table 3.2-11 summarizes the investigation results, Table 3.2-12 presents dominant vegetation, and Table 3.2-13 summarizes soil data.

Table 3.2-11
SAMPLE PLOT 2-P GENERAL INFORMATION

Classification	Upland
Sample Location	200 feet north of Stoney Run Road, and 50 feet east of MD 170
Hydrology Indicators	Saturated in the upper 12 inches
Percent Hydrophytic Vegetation	0 (see Table 3.2-12)
Hydric Soils	No (see Table 3.2-13)

Table 3.2-12
SAMPLE PLOT 2-P DOMINANT VEGETATION

Common Name	Botanical Name	Indicator Status
Grass species	*Gramineae* spp.	NA

Table 3.2-13
SAMPLE PLOT 2-P SOIL DESCRIPTION

Depth (in.)	Color	Description	Mottles
0-3	Very dark grayish brown (10YR 3/2)	Saturated, sandy loam	None
3-21	Brown (10YR 5/3)	Coarse sand	Few, medium, distinct, reddish brown (5YR 5/4)

Sample Plot 2-P does not satisfy any of the three mandatory wetland technical criteria. The area is classified as upland.

Wetland Q

Wetland Q is an approximately 0.06-acre palustrine, emergent, persistent, temporarily flooded (PEM1A) wetland associated with Bowden Branch. The wetland is approximately 275 feet south of Stoney Run Road, 50 feet east of MD 170, and within the LOD. SES selected Sample Plot 1-Q to characterize Wetland Q, and Sample Plot 2-Q to characterize the adjacent upland.

Sample Plot 1-Q

On March 14, 2001, SES examined soils, vegetation, and hydrology at Sample Plot 1-Q, approximately 300 feet south of Stoney Run Road and 75 feet east of MD 170. Table 3.2-14 summarizes the investigation results, Table 3.2-15 presents dominant vegetation, and Table 3.2-16 summarizes soil data.

Table 3.2-14
SAMPLE PLOT 1-Q GENERAL INFORMATION

Classification	Wetland (PEM1A)
Sample Plot Coordinates	300 feet south of Stoney Run Road and 75 feet east of MD 170
Hydrology Indicators	Inundated, saturated in the upper 12 inches, water marks, drainage patterns in wetlands, water-stained leaves, and free water in pit at 5 inches
Percent Hydrophytic Vegetation	66% (see Table 3.2-15)
Hydric Soils	No (see Table 3.2-16)

Table 3.2-15
SAMPLE PLOT 1-Q DOMINANT VEGETATION

Common Name	Botanical Name	Indicator Status
Soft Rush	*Juncus effusus*	FACW+
Wool Grass	*Scirpus cyperinus*	FACW+
Goldenrod species	*Solidago* spp.	NA
Grass species	*Gramineae* spp.	NA
Chinese Bushclover	*Lespedeza cuneata*	UPL

Table 3.2-16
SAMPLE PLOT 1-Q SOIL DESCRIPTION

Depth (in.)	Color	Description	Mottles
0-12	Dark yellowish brown (10YR 4/6)	Silt loam with gravel	Common, coarse, distinct, yellowish red (5YR 5/6)
12+	Refusal	NA	NA

Sample Plot 1-Q is in a disturbed area and satisfies two of the three mandatory wetland technical criteria. The area is classified as a palustrine, emergent, persistent, temporarily flooded (PEM1A) wetland.

Sample Plot 2-Q

On March 14, 2001, SES examined soils, vegetation, and hydrology at Sample Plot 2-Q, approximately 300 feet south of Stoney Run Road and 100 feet east of MD 170. Table 3.2-17 summarizes the investigation results, Table 3.2-18 presents dominant vegetation, and Table 3.2-19 summarizes soil data.

Table 3.2-17
SAMPLE PLOT 2-Q GENERAL INFORMATION

Classification	Upland
Sample Plot Coordinates	300 feet south of Stoney Run Road and 100 feet east of MD 170
Hydrology Indicators	Saturated in the upper 12 inches
Percent Hydrophytic Vegetation	0 (see Table 3.2-18)
Hydric Soils	No (see Table 3.2-19)

Table 3.2-18
SAMPLE PLOT 2-Q DOMINANT VEGETATION

Common Name	Botanical Name	Indicator Status
Chinese Bushclover	*Lespedeza cuneata*	UPL
Grass species	*Gramineae* spp.	NA

Table 3.2-19
SAMPLE PLOT 2-Q SOIL DESCRIPTION

Depth (in.)	Color	Description	Mottles
0-7	Dark brown (10YR 3/3)	Fibric silty sand with gravel	None
7-12	Red (2.5YR 5/6)	Silty loam	None
12+	Refusal		

Sample Plot 2-Q satisfies only one of the three mandatory wetland technical criteria. The area is classified as upland.

Waterway S. Bowden Branch originates in the eastern region of the airport, approximately 480 feet northwest of Runway 10-28. Bowden Branch flows west, passes beneath the security fence and through a culvert under the Stoney Run Road entrance ramp, flows northwest through the cloverleaf, and continues west under MD 170 to its confluence with Stony Run. Waterway S includes a 189-foot reach of Bowden Branch that flows through the cloverleaf, within the LOD. SES classified Waterway S as "waters of the U.S."

5 REFERENCES

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APPENDIX A

ENVIRONMENTAL FEATURES MAP

APPENDIX B

DATA FORMS: ROUTINE WETLAND DETERMINATION

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Fiber Optic Line Installation
Applicant: Maryland Aviation Administration
Investigator: Leyla Lange and Mike Thompson
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: January 23, 2001
County: Anne Arundel
State: Maryland
Community ID: PEM1A
Transect ID: Wetland B
Plot ID: 1-B

VEGETATION

Dominant Plant Species	Stratum	Indicator
Juncus effusus	Herb	FACW+
Scirpus cyperinus	Herb	FACW+
Panicum virgatum	Herb	FAC
Aster spp.	Herb	NA

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 75.00%

Remarks

Although the percentage of hydrophytic vegetation is calculated at 75% above, it is actually 100% since Aster was not identifiable to species level. Sample plot satisfies the hydrophytic vegetation criterion .

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water 4 (in.)
Depth to free water in pit 0 (in.)
Depth to saturated soil 0 (in.)

Primary Wetland Hydrology Indicators

☒ Inundated
☒ Saturated in Upper 12 Inches
☒ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☒ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☒ Oxidized Root Channels in Upper 12"
☒ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Sample plot satisfies the wetland hydrology criterion.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Fiber Optic Line Installation	Date: January 23, 2001
Applicant: Maryland Aviation Administration	County: Anne Arundel
Investigator: Leyla Lange and Mike Thompson	State: Maryland
Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Community ID: PEM1A
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No	Transect ID: Wetland B
Is the area a Problem Area? ☐ Yes ☒ No	Plot ID: 1-B

SOILS

Soil Map Unit Name: Evesboro Loamy Sand

Drainage Class: Well drained to excessively well drained.

Soil Tax Subgroup: Typic Quarzipasamments

Confirm Map Type: ☐ Yes ☒ No

Soil Profile Description:

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-1	O	10YR 2/1	None	None	Saturated organic, fibric layer
1-21	A	10YR 5/1	10YR 7/4	Few, small, distinct	Saturated clayey coarse sand
			10YR 2/2	Few, coarse, prominent	

Soil Indicators

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☒ Aquic Moisture Regime
- ☒ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Hydric Soils List
- ☐ Other (explain in Remarks)

Remarks

Sample plot satisfies the hydric soil criterion. Large pebbles were encountered in the A horizon.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No

Wetland Hydrology Present? ☒ Yes ☐ No

Hydric Soils Present? ☒ Yes ☐ No

Is this Sampling within a Wetland? ☒ Yes ☐ No

Remarks

Sample plot satisfies the three mandatory wetland technical criteria. SES classified the area as a palustrine, emergent, persistent temporarily flooded wetland (PEM1A).

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Fiber Optic Line Installation
Applicant: Maryland Aviation Administration
Investigator: Leyla Lange and Mike Thompson
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: January 23, 2001
County: Anne Arundel
State: Maryland
Community ID: Upland
Transect ID: Wetland B
Plot ID: 2-B

VEGETATION

Dominant Plant Species	Stratum	Indicator
Rosa multiflora	Herb	FACU
Gramineae spp.	Herb	NA

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 0.00%

If the FAC-neutral test is used, this data does NOT provide a secondary indicator of wetland hydrology

Remarks

Gramineae spp. not identifiable to species level due to lack of inflorescence. Hydrophytic vegetation criterion not satisfied.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit None (in.)
Depth to saturated soil None (in.)

Primary Wetland Hydrology Indicators

☐ Inundated
☐ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☐ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Indicators of hydrology absent, sample plot does not satisfy the wetland hydrology criterion.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Fiber Optic Line Installation	Date: January 23, 2001
Applicant: Maryland Aviation Administration	County: Anne Arundel
Investigator: Leyla Lange and Mike Thompson	State: Maryland
Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Community ID: Upland
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No	Transect ID: Wetland B
Is the area a Problem Area? ☐ Yes ☒ No	Plot ID: 2-B

SOILS

Soil Map Unit Name: Evesboro Loamy Sand

Drainage Class: Well drained to excessively well drained.

Soil Tax Subgroup: Typic Quarzipasamments

Confirm Map Type: ☐ Yes ☒ No

Soil Profile Description:

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-3	A	2.5Y 5/4	7.5YR 3/5	Common, fine, prom.	Saturated loamy sand
3-6	B1	2.5Y 5/6	10YR 7/8	Common, med., prom.	Moist loamy coarse sand
6-21	B2	7.5YR 6/8	10YR 5/4	Many, coarse, prom.	Loamy sand
			10YR 8/1	Many, coarse, prom.	

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☐ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Large pebbles were encountered in the B horizon. Soil is mostly fill. Sample plot does not satisfy the hydric soil criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☐ Yes ☒ No

Wetland Hydrology Present? ☐ Yes ☒ No

Hydric Soils Present? ☐ Yes ☒ No

Is this Sampling within a Wetland? ☐ Yes ☒ No

Remarks

Sample plot does not satisfy any of the three mandatory wetland technical criteria. SES classified the area as upland.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening
Applicant: Maryland Aviation Administration
Investigator: Mike Thompson and Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: March 14, 2001
County: Anne Arundel
State: Maryland
Community ID: Wetland PEM1A
Transect ID:
Plot ID: 1-P

VEGETATION

Dominant Plant Species	Stratum	Indicator
Salix nigra	Tree	FACW+
Phragmites australis	Shrub	FACW
Juncus effusus	Herb	FACW+
Scirpus cyperinus	Herb	FACW+
Asclepias incarnata	Herb	OBL

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-): 100.00%

Remarks
Sample plot satisfies the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)
☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations
Depth of surface water 0.5 (in.)
Depth to free water in pit 5 (in.)
Depth to saturated soil 0 (in.)

Primary Wetland Hydrology Indicators
☒ Inundated
☒ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators
☐ Oxidized Root Channels in Upper 12"
☐ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks
Indicators of hydrology present; sample plot satisfies the wetland hydrology criterion.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening	Date: March 14, 2001
Applicant: Maryland Aviation Administration	County: Anne Arundel
Investigator: Mike Thompson and Jennifer Bird	State: Maryland
Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Community ID: Wetland PEM1A
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No	Transect ID:
Is the area a Problem Area? ☐ Yes ☒ No	Plot ID: 1-P

SOILS

Soil Map Unit Name: Sassafras fine sandy loam — Drainage Class: Well drained

Soil Tax Subgroup: Typic Hapludults — Confirm Map Type: ☐ Yes ☒ No

Soil Profile Description: Sassafras fine sandy loam is well drained and severely eroded.

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-6	A	10YR 4/2	None	None	Saturated, fibric, organic
6-21	B	10YR 5/3	5YR 5/4	Many, course, distinct	Gravelly, loamy sand

Soil Indicators

- ☐ Histosol
- ☐ Histic Epipedon
- ☒ Sulfidic Odor
- ☒ Aquic Moisture Regime
- ☒ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Hydric Soils List
- ☐ Other (explain in Remarks)

Remarks

Sample plot does not satisfy the hydric soil criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No

Wetland Hydrology Present? ☒ Yes ☐ No

Hydric Soils Present? ☐ Yes ☒ No

Is this Sampling within a Wetland? ☒ Yes ☐ No

Remarks

Sample plot is in a disturbed area and satisfies two of the three mandatory wetland technical criteria. SES classified the area as a palustrine, emergent, persistent, temporarily flooded wetland (PEM1A).

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening
Applicant: Maryland Aviation Administration
Investigator: Mike Thompson and Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: March 14, 2001
County: Anne Arundel
State: Maryland
Community ID: Upland
Transect ID:
Plot ID: 2-P

VEGETATION

Dominant Plant Species	Stratum	Indicator
Gramineae spp.	Herb	NA

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 0.00%

Remarks

Sample plot is in a mowed grass lawn. Grasses were unidentifiable due to lack of inflorescence. Sample plot does not satisfy the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit None (in.)
Depth to saturated soil 0 (in.)

Primary Wetland Hydrology Indicators

☐ Inundated
☒ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☐ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Sample plot satisfies the wetland hydrology criterion.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening	Date: March 14, 2001
Applicant: Maryland Aviation Administration	County: Anne Arundel
Investigator: Mike Thompson and Jennifer Bird	State: Maryland
Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Community ID: Upland
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No	Transect ID:
Is the area a Problem Area? ☐ Yes ☒ No	Plot ID: 2-P

SOILS

Soil Map Unit Name: Sassafras fine sandy loam — Drainage Class: Well drained

Soil Tax Subgroup: Typic Hapludults — Confirm Map Type: ☐ Yes ☒ No

Soil Profile Description: Sassafras fine sandy loam is well drained and severely eroded.

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-3	A	10YR 3/2	None	None	Saturated sandy loam
3-21	B	10YR 5/3	5YR 4/4	Few, medium, distinct	Coarse sand

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☐ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Sample plot does not satisfy the hydric soil criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☐ Yes ☒ No

Wetland Hydrology Present? ☒ Yes ☐ No

Hydric Soils Present? ☐ Yes ☒ No

Is this Sampling within a Wetland? ☐ Yes ☒ No

Remarks

Sample plot satisfies only one of the three mandatory wetland technical criteria. SES classified the area as upland.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening
Applicant: Maryland Aviation Administration
Investigator: Mike Thompson and Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: March 14, 2001
County: Anne Arundel
State: Maryland
Community ID: Wetland PEM1A
Transect ID:
Plot ID: 1-Q

VEGETATION

Dominant Plant Species	Stratum	Indicator
Juncus effusus	Herb	FACW+
Scirpus cyperinus	Herb	FACW+
Solidago spp.	Herb	NA
Gramineae spp.	Herb	NA
Lespedeza cuneata	Herb	UPL

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 40.00%

If the FAC-neutral test is used, this data provides a secondary indicator of wetland hydrology

Remarks

Although the percentage of hydrophytic vegetation is calculated at 40% above, it is actually 66%, since the Gramineae species was unidentifiable due to lack of inflorescence and the Solidago species was unidentifiable due to lack of flowers. Sample plot satisfies the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water .5 (in.)
Depth to free water in pit 5 (in.)
Depth to saturated soil 0 (in.)

Primary Wetland Hydrology Indicators

☒ Inundated
☒ Saturated in Upper 12 Inches
☒ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☒ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☒ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Sample plot satisfies the wetland hydrology criterion.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening
Applicant: Maryland Aviation Administration
Investigator: Mike Thompson and Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: March 14, 2001
County: Anne Arundel
State: Maryland
Community ID: Wetland PEM1A
Transect ID:
Plot ID: 1-Q

SOILS

Soil Map Unit Name: Sassafras fine sandy loam
Drainage Class: Well drained
Soil Tax Subgroup: Typic Hapludults
Confirm Map Type: ☐ Yes ☒ No

Soil Profile Description: Sassafras fine sandy loam is well drained and severely eroded.

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-12	A	10YR 4/6	5YR 5/6	Common, coarse, distinct	Silt loam with gravel
12+	Refusal				

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☒ Aquic Moisture Regime
☒ Reducing Conditions
☒ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Refusal at 12 inches. Sample plot does not satisfy the hydric soil criterion. Large pebbles were encountered in the A horizon.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No
Wetland Hydrology Present? ☒ Yes ☐ No
Hydric Soils Present? ☐ Yes ☒ No
Is this Sampling within a Wetland? ☒ Yes ☐ No

Remarks

Sample plot is in a disturbed area and satisfies two of the three mandatory wetland technical criteria. SES classified the area as a palustrine, emergent, persistent, temporarily flooded wetland (PEM1A).

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening

Applicant: Maryland Aviation Administration

Investigator: Mike Thompson and Jennifer Bird

Do Normal Circumstances exist on the site? ☒ Yes ☐ No

Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No

Is the area a Problem Area? ☐ Yes ☒ No

Date: March 14, 2001

County: Anne Arundel

State: Maryland

Community ID: Upland

Transect ID:

Plot ID: 2-Q

VEGETATION

Dominant Plant Species	Stratum	Indicator
Lespedeza cuneata	Herb	UPL
Gramineae spp.	Herb	NA

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 0.00%

If the FAC-neutral test is used, this data does NOT provide a secondary indicator of wetland hydrology

Remarks

Gramineae species was unidentifiable due to lack of inflorescence. Sample plot does not satisfy the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

- ☐ Stream, Lake or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other
- ☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)

Depth to free water in pit None (in.)

Depth to saturated soil 0 (in.)

Primary Wetland Hydrology Indicators

- ☐ Inundated
- ☒ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

- ☐ Oxidized Root Channels in Upper 12"
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks

Sample plot satisfies the wetland hydrology criterion.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening
Applicant: Maryland Aviation Administration
Investigator: Mike Thompson and Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: March 14, 2001
County: Anne Arundel
State: Maryland
Community ID: Upland
Transect ID:
Plot ID: 2-Q

SOILS

Soil Map Unit Name: Sassafras fine sandy loam
Drainage Class: Well drained
Soil Tax Subgroup: Typic Hapludults
Confirm Map Type: ☐ Yes ☒ No

Soil Profile Description: Sassafras fine sandy loam is well drained and severely eroded.

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-7	A	10YR 3/3	None	None	Fibric silty sand with gravel
7-12	B	2.5YR 5/6	None	None	Silty loam
12+	Refusal				

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☐ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Refusal at 12 inches. Sample plot does not satisfy the hydric soil criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☐ Yes ☒ No
Wetland Hydrology Present? ☒ Yes ☐ No
Hydric Soils Present? ☐ Yes ☒ No
Is this Sampling within a Wetland? ☐ Yes ☒ No

Remarks

Sample plot is in a disturbed area and satisfies only one of the three mandatory wetland technical criteria. SES classified the area as upland.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening
Applicant: Maryland Aviation Administration
Investigator: Mike Thompson and Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: March 14, 2001
County: Anne Arundel
State: Maryland
Community ID: Wetland PEM1A
Transect ID:
Plot ID: 1-U

VEGETATION

Dominant Plant Species	Stratum	Indicator
Juncus effusus	Herb	FACW+
Gramineae spp.	Herb	NA

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 50.00%

Remarks

Although the percentage of hydrophytic vegetation is calculated at 50% above, it is actually 100% since the Gramineae species was unidentifiable due to lack of inflorescence. Sample plot satisfies the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water 1 (in.)
Depth to free water in pit 0 (in.)
Depth to saturated soil 0 (in.)

Primary Wetland Hydrology Indicators

☒ Inundated
☒ Saturated in Upper 12 Inches
☒ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☒ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Sample plot satisfies the wetland hydrology criterion.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening	Date: March 14, 2001
Applicant: Maryland Aviation Administration	County: Anne Arundel
Investigator: Mike Thompson and Jennifer Bird	State: Maryland
Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Community ID: Wetland PEM1A
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No	Transect ID:
Is the area a Problem Area? ☐ Yes ☒ No	Plot ID: 1-U

SOILS

Soil Map Unit Name: Sassafras fine sandy loam — Drainage Class: Well drained

Soil Tax Subgroup: Typic Hapludults — Confirm Map Type: ☐ Yes ☒ No

Soil Profile Description: Sassafras fine sandy loam is well drained and severely eroded.

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-15	A	7.5YR 3/4	5YR 5/6	Many, medium, distinct	Sandy loam
15+	Refusal				

Soil Indicators

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☒ Aquic Moisture Regime
- ☒ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Hydric Soils List
- ☐ Other (explain in Remarks)

Remarks

Refusal at 15 inches. Sample plot does not satisfy the hydric soil criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No

Wetland Hydrology Present? ☒ Yes ☐ No

Hydric Soils Present? ☐ Yes ☒ No

Is this Sampling within a Wetland? ☒ Yes ☐ No

Remarks

Sample plot is in a disturbed area and satisfies two of the three mandatory wetland technical criteria. SES classified the area as a palustrine, emergent, persistent, temporarily flooded (PEM1A) wetland.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening
Applicant: Maryland Aviation Administration
Investigator: Mike Thompson and Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: March 14, 2001
County: Anne Arundel
State: Maryland
Community ID: Upland
Transect ID:
Plot ID: 2-U

VEGETATION

Dominant Plant Species	Stratum	Indicator
Populus grandidentata	Tree	FACU-
Quercus acutissima	Shrub	UPL
Gramineae spp.	Herb	NA

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 0.00%

If the FAC-neutral test is used, this data does NOT provide a secondary indicator of wetland hydrology

Remarks

Gramineae species was unidentifiable due to lack of inflorescence. Area is landscaped and mowed. Sample plot does not satisfy the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit 10 (in.)
Depth to saturated soil 0 (in.)

Primary Wetland Hydrology Indicators

☐ Inundated
☒ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☐ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Sample plot satisfies the wetland hydrology criterion.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening	Date: March 14, 2001
Applicant: Maryland Aviation Administration	County: Anne Arundel
Investigator: Mike Thompson and Jennifer Bird	State: Maryland
Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Community ID: Upland
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No	Transect ID:
Is the area a Problem Area? ☐ Yes ☒ No	Plot ID: 2-U

SOILS

Soil Map Unit Name: Sassafras fine sandy loam — Drainage Class: Well drained

Soil Tax Subgroup: Typic Hapludults — Confirm Map Type: ☐ Yes ☒ No

Soil Profile Description: Sassafras fine sandy loam is well drained and severely eroded.

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-12	A	10YR 4/2	None	None	Fibric sandy silt loam
12-21	B	Liquid soils			

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☐ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

A horizon contains clay inclusions and gravel. Liquid soils below 12 inches. Sample plot does not satisfy the hydric soil criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☐ Yes ☒ No

Wetland Hydrology Present? ☒ Yes ☐ No

Hydric Soils Present? ☐ Yes ☒ No

Is this Sampling within a Wetland? ☐ Yes ☒ No

Remarks

Sample plot is in a disturbed area and satisfies only one of the three mandatory wetland technical criteria. SES classified the area as upland.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening
Applicant: Maryland Aviation Administration
Investigator: Mike Thompson and Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: March 14, 2001
County: Anne Arundel
State: Maryland
Community ID: Wetland PFO1A
Transect ID:
Plot ID: 1-V

VEGETATION

Dominant Plant Species	Stratum	Indicator
Acer rubrum	Tree	FAC
Acer rubrum	Shrub	FAC
Vaccinium corymbosum	Shrub	FACW-
Smilax rotundifolia	Herb	FAC
Thelypteris thelypteroides	Herb	FACW+

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 100.00%

Remarks

Sample plot satisfies the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit 8 (in.)
Depth to saturated soil 0 (in.)

Primary Wetland Hydrology Indicators

☐ Inundated
☒ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☒ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☒ Oxidized Root Channels in Upper 12"
☐ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Sample plot satisfies the wetland hydrology criterion.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening	Date: March 14, 2001
Applicant: Maryland Aviation Administration	County: Anne Arundel
Investigator: Mike Thompson and Jennifer Bird	State: Maryland
Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Community ID: Wetland PFO1A
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No	Transect ID:
Is the area a Problem Area? ☐ Yes ☒ No	Plot ID: 1-V

SOILS

Soil Map Unit Name: Bibb silt loam — Drainage Class: Poorly drained

Soil Tax Subgroup: Typic Haplaquents — Confirm Map Type: ☒ Yes ☐ No

Soil Profile Description: Bibb silt loam is poorly drained and mottled.

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-21	A	10YR 5/1	None	None	Fine silty clay

Soil Indicators

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☒ Aquic Moisture Regime
- ☒ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☒ Listed on Hydric Soils List
- ☐ Other (explain in Remarks)

Remarks

Sample plot satisfies the hydric soil criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No

Wetland Hydrology Present? ☒ Yes ☐ No

Hydric Soils Present? ☒ Yes ☐ No

Is this Sampling within a Wetland? ☒ Yes ☐ No

Remarks

Sample plot satisfies the three mandatory wetland technical criteria. SES classified the area as a palustrine, forested, broad-leaved deciduous, temporarily flooded (PFO1A) wetland.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening
Applicant: Maryland Aviation Administration
Investigator: Mike Thompson and Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: March 14, 2001
County: Anne Arundel
State: Maryland
Community ID: Upland
Transect ID:
Plot ID: 2-V

VEGETATION

Dominant Plant Species	Stratum	Indicator
Quercus falcata	Tree	FACW
Liriodendron tulipifera	Tree	FACU
Acer rubrum	Tree	FAC
Liriodendron tulipifera	Shrub	FACU
Vaccinium corymbosum	Shrub	FACW-
Acer rubrum	Shrub	FAC
Lonicera japonica	Herb	FAC-
Gramineae spp.	Herb	NA

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 50.00%

If the FAC-neutral test is used, this data does NOT provide a secondary indicator of wetland hydrology

Remarks

Although the percentage of hydrophytic vegetation is calculated at 50% above, it is actually 57% since the Gramineae species was unidentifiable due to lack of inflorescence. Sample plot satisfies the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit None (in.)
Depth to saturated soil None (in.)

Primary Wetland Hydrology Indicators

☐ Inundated
☐ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☐ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Sample plot does not satisfy the wetland hydrology criterion.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening	Date: March 14, 2001
Applicant: Maryland Aviation Administration	County: Anne Arundel
Investigator: Mike Thompson and Jennifer Bird	State: Maryland
Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Community ID: Upland
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No	Transect ID:
Is the area a Problem Area? ☐ Yes ☒ No	Plot ID: 2-V

SOILS

Soil Map Unit Name: Sassafras fine sandy loam — Drainage Class: Well drained

Soil Tax Subgroup: Typic Hapludults — Confirm Map Type: ☐ Yes ☒ No

Soil Profile Description: Sassafras fine sandy loam is well drained and severely eroded.

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-4	A	10YR 4/2	None	None	Sandy loam
4-21	B1	2.5Y 6/6	10YR 4/2	Many, coarse, distinct	Loamy sand

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☐ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Sample plot does not satisfy the hydric soil criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No

Wetland Hydrology Present? ☐ Yes ☒ No

Hydric Soils Present? ☐ Yes ☒ No

Is this Sampling within a Wetland? ☐ Yes ☒ No

Remarks

Sample plot satisfies only one of the three mandatory wetland technical criteria. SES classified the area as upland.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening
Applicant: Maryland Aviation Administration
Investigator: Mike Thompson and Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: March 19, 2001
County: Anne Arundel
State: Maryland
Community ID: Wetland PFOIA
Transect ID:
Plot ID: 1-X

VEGETATION

Dominant Plant Species	Stratum	Indicator
Acer rubrum	Tree	FAC
Acer rubrum	Shrub	FAC
Vaccinium corymbosum	Shrub	FACW-
Smilax rotundifolia	Herb	FAC
Thelypteris thelypteroides	Herb	FACW+
Magnolia virginiana	Herb	FACW+

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 100.00%

Remarks

Sample plot satisfies the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit None (in.)
Depth to saturated soil 0 (in.)

Primary Wetland Hydrology Indicators

☐ Inundated
☒ Saturated in Upper 12 Inches
☒ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☐ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Sample plot satisfies the wetland hydrology criterion.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening	Date: March 19, 2001
Applicant: Maryland Aviation Administration	County: Anne Arundel
Investigator: Mike Thompson and Jennifer Bird	State: Maryland
Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Community ID: Wetland PFOIA
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No	Transect ID:
Is the area a Problem Area? ☐ Yes ☒ No	Plot ID: 1-X

SOILS

Soil Map Unit Name: Bibb silt loam — Drainage Class: Poorly drained

Soil Tax Subgroup: Typic Haplaquents — Confirm Map Type: ☒ Yes ☐ No

Soil Profile Description: Bibb silt loam is poorly drained and mottled.

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-18	A	10YR 2/1	None	None	Saturated loamy sand
18-21	B1	10YR 4/2	None	None	Saturated loamy sand

Soil Indicators

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☒ Aquic Moisture Regime
- ☒ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☒ Listed on Hydric Soils List
- ☐ Other (explain in Remarks)

Remarks

Sample plot satisfies the hydric soil criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No

Wetland Hydrology Present? ☒ Yes ☐ No

Hydric Soils Present? ☒ Yes ☐ No

Is this Sampling within a Wetland? ☒ Yes ☐ No

Remarks

Sample plot satisfies the three mandatory wetland technical criteria. SES classified the area as a palustrine, forested, broad-leaved deciduous, temporarily flooded (PFO1A) wetland.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening
Applicant: Maryland Aviation Administration
Investigator: Mike Thompson and Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: March 19, 2001
County: Anne Arundel
State: Maryland
Community ID: Upland
Transect ID:
Plot ID: 2-X

VEGETATION

Dominant Plant Species	Stratum	Indicator
Acer rubrum	Tree	FAC
Pinus taeda	Tree	FAC-
Pinus virginiana	Tree	UPL
Acer rubrum	Shrub	FAC
Vaccinium corymbosum	Shrub	FACW-

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 60.00%

If the FAC-neutral test is used, this data does NOT provide a secondary indicator of wetland hydrology

Remarks

Sample plot satisfies the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit None (in.)
Depth to saturated soil 16 (in.)

Primary Wetland Hydrology Indicators

☐ Inundated
☐ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☐ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Sample plot does not satisfy the wetland hydrology criterion.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening	Date: March 19, 2001
Applicant: Maryland Aviation Administration	County: Anne Arundel
Investigator: Mike Thompson and Jennifer Bird	State: Maryland
Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Community ID: Upland
Is the site significantly disturbed (Atypical Situation)? ☐ Yes ☒ No	Transect ID:
Is the area a Problem Area? ☐ Yes ☒ No	Plot ID: 2-X

SOILS

Soil Map Unit Name: Evesboro loamy sand — Drainage Class: Well drained

Soil Tax Subgroup: Typic Quartzipsamments — Confirm Map Type: ☐ Yes ☒ No

Soil Profile Description: Evesboro loamy sand is well drained and has a low erosion hazard.

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-3	A	10YR 2/2	None	None	Fibric sandy loam
3-21	B1	2.5Y 6/6	None	None	Sand

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☐ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Sample plot does not satisfy the hydric soil criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No

Wetland Hydrology Present? ☐ Yes ☒ No

Hydric Soils Present? ☐ Yes ☒ No

Is this Sampling within a Wetland? ☐ Yes ☒ No

Remarks

Sample plot satisfies only one of the three mandatory wetland technical criteria. SES classified the area as upland.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening
Applicant: Maryland Aviation Administration
Investigator: Mike Thompson and Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: March 19, 2001
County: Anne Arundel
State: Maryland
Community ID: Wetland PEM1B
Transect ID:
Plot ID: 1-AA

VEGETATION

Dominant Plant Species	Stratum	Indicator
Juncus effusus	Herb	FACW+
Gramineae spp.	Herb	NA

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 50.00%

Remarks

Although the percentage of hydrophytic vegetation is calculated at 50% above, it is actually 100% since the Gramineae species was unidentifiable due to lack of inflorescence. Sample plot satisfies the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit 12 (in.)
Depth to saturated soil 0 (in.)

Primary Wetland Hydrology Indicators

☐ Inundated
☒ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☐ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Sample plot satisfies the wetland hydrology criterion.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening	Date: March 19, 2001
Applicant: Maryland Aviation Administration	County: Anne Arundel
Investigator: Mike Thompson and Jennifer Bird	State: Maryland
Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Community ID: Wetland PEM1B
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No	Transect ID:
Is the area a Problem Area? ☐ Yes ☒ No	Plot ID: 1-AA

SOILS

Soil Map Unit Name: Evesboro loamy sand — Drainage Class: Well drained

Soil Tax Subgroup: Typic Quartzipsamments — Confirm Map Type: ☐ Yes ☒ No

Soil Profile Description: Evesboro loamy sand is well drained and has a low erosion hazard.

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-16	A	5Y 2.5/1	None	None	Gravelly sandy loam
16-18	B1	2.5Y 6/2	None	None	Coarse sand
18+	Refusal				

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☒ Aquic Moisture Regime
☒ Reducing Conditions
☒ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Sample plot satisfies the hydric soil criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No

Wetland Hydrology Present? ☒ Yes ☐ No

Hydric Soils Present? ☒ Yes ☐ No

Is this Sampling within a Wetland? ☒ Yes ☐ No

Remarks

Sample plot satisfies the three mandatory wetland technical criteria. SES classified the area as a palustrine, emergent, persistent, saturated (PEM1B) wetland.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening
Applicant: Maryland Aviation Administration
Investigator: Mike Thompson and Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: March 19, 2001
County: Anne Arundel
State: Maryland
Community ID: Upland
Transect ID:
Plot ID: 2-AA

VEGETATION

Dominant Plant Species	Stratum	Indicator
Gramineae spp.	Herb	NA

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 0.00%

Remarks

Area is mowed and therefore disturbed. Sample plot does not satisfy the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit None (in.)
Depth to saturated soil None (in.)

Primary Wetland Hydrology Indicators

☐ Inundated
☐ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☐ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Sample plot does not satisfy the wetland hydrology criterion.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening	Date: March 19, 2001
Applicant: Maryland Aviation Administration	County: Anne Arundel
Investigator: Mike Thompson and Jennifer Bird	State: Maryland
Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Community ID: Upland
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No	Transect ID:
Is the area a Problem Area? ☐ Yes ☒ No	Plot ID: 2-AA

SOILS

Soil Map Unit Name: Evesboro loamy sand — Drainage Class: Well drained

Soil Tax Subgroup: Typic Quartzipsamments — Confirm Map Type: ☐ Yes ☒ No

Soil Profile Description: Evesboro loamy sand is well drained and has a low erosion hazard.

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-5	A	10YR 4/4	None	None	Gravelly sandy loam
5-10	B1	10YR 5/4	None	None	Gravelly sandy loam
10-12	B2	10YR 5/4	10YR 8/1	Many, coarse, distinct	Gravelly fine sandy silt
12+	Refusal		7.5YR 6/8	Many, fine, distinct	

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☐ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Area shows evidence of having been a former stockpile area. Soils appear to be fill materials. Sample plot does not satisfy the hydric soil criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☐ Yes ☒ No

Wetland Hydrology Present? ☐ Yes ☒ No

Hydric Soils Present? ☐ Yes ☒ No

Is this Sampling within a Wetland? ☐ Yes ☒ No

Remarks

Sample plot does not satisfy any of the three mandatory wetland technical criteria. SES classified the area as upland.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening
Applicant: Maryland Aviation Administration
Investigator: Leyla Lange and Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: March 20, 2001
County: Anne Arundel
State: Maryland
Community ID: Wetland PEM1A
Transect ID:
Plot ID: 1-CC

VEGETATION

Dominant Plant Species	Stratum	Indicator
Typha latifolia	Herb	OBL
Juncus roemeranus	Herb	OBL
Festuca arundinacea	Herb	FACU
Carex spp.	Herb	NA

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 50.00%

If the FAC-neutral test is used, this data provides a secondary indicator of wetland hydrology

Remarks

Although the percentage of hydrophytic vegetation is calculated at 50% above, it is actually 66% since the Carex was unidentifiable to species level. Area is mowed and therefore disturbed. Sample plot satisfies the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water 2 (in.)
Depth to free water in pit 0 (in.)
Depth to saturated soil 0 (in.)

Primary Wetland Hydrology Indicators

☒ Inundated
☒ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☒ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☒ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Sample plot satisfies the wetland hydrology criterion.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening	Date: March 20, 2001
Applicant: Maryland Aviation Administration	County: Anne Arundel
Investigator: Leyla Lange and Jennifer Bird	State: Maryland
Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Community ID: Wetland PEM1A
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No	Transect ID:
Is the area a Problem Area? ☐ Yes ☒ No	Plot ID: 1-CC

SOILS

Soil Map Unit Name: Cut and fill land

Drainage Class: Variable drainage

Soil Tax Subgroup: N/A

Confirm Map Type: ☒ Yes ☐ No

Soil Profile Description: Cut and fill land is severely disturbed.

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
Refusal					

Soil Indicators

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Hydric Soils List
- ☐ Other (explain in Remarks)

Remarks

Soils are disturbed and gravelly. Refusal occurred at surface. Sample plot does not meet the hydric soils criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No

Wetland Hydrology Present? ☒ Yes ☐ No

Hydric Soils Present? ☐ Yes ☒ No

Is this Sampling within a Wetland? ☒ Yes ☐ No

Remarks

Sample plot is in a disturbed area and satisfies two of the three mandatory wetland technical criteria. SES classified the area as a palustrine, emergent, persistent, temporarily flooded (PEM1A) wetland.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening
Applicant: Maryland Aviation Administration
Investigator: Leyla Lange and Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: March 20, 2001
County: Anne Arundel
State: Maryland
Community ID: Wetland PEM1A
Transect ID:
Plot ID: 1-EE

VEGETATION

Dominant Plant Species	Stratum	Indicator
Pinus virginiana	Tree	UPL
Prunus serotina	Shrub	FACU
Panicum virgatum	Herb	FAC
Juncus effusus	Herb	FACW+
Juncus roemeranus	Herb	OBL

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 60.00%

If the FAC-neutral test is used, this data indicates a tie between hydrophytic and non-hydrophytic dominants. Nondominants must be used.

Remarks

Area is mowed and therefore disturbed. Sample plot satisfies the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water 2 (in.)
Depth to free water in pit 0 (in.)
Depth to saturated soil 0 (in.)

Primary Wetland Hydrology Indicators

☒ Inundated
☒ Saturated in Upper 12 Inches
☒ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☐ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Sample plot satisfies the wetland hydrology criterion.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening	Date: March 20, 2001
Applicant: Maryland Aviation Administration	County: Anne Arundel
Investigator: Leyla Lange and Jennifer Bird	State: Maryland
Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Community ID: Wetland PEM1A
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No	Transect ID:
Is the area a Problem Area? ☐ Yes ☒ No	Plot ID: 1-EE

SOILS

Soil Map Unit Name: Cut and fill land

Drainage Class: Variable drainage

Soil Tax Subgroup: N/A

Confirm Map Type: ☒ Yes ☐ No

Soil Profile Description: Cut and fill land is severely disturbed.

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
Refusal					

Soil Indicators

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Hydric Soils List
- ☐ Other (explain in Remarks)

Remarks

Soils are disturbed and gravelly. Refusal occurred at surface. Sample plot does not meet the hydric soils criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No

Wetland Hydrology Present? ☒ Yes ☐ No

Hydric Soils Present? ☐ Yes ☒ No

Is this Sampling within a Wetland? ☒ Yes ☐ No

Remarks

Sample plot is in a disturbed area and satisfies two of the three mandatory wetland technical criteria. SES classified the area as a palustrine, emergent, persistent, temporarily flooded (PEM1A) wetland.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening
Applicant: Maryland Aviation Administration
Investigator: Leyla Lange and Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: March 20, 2001
County: Anne Arundel
State: Maryland
Community ID: PFO1/4B
Transect ID:
Plot ID: 1-FF

VEGETATION

Dominant Plant Species	Stratum	Indicator
Pinus taeda	Tree	FAC-
Acer rubrum	Tree	FAC
Quercus palustris	Tree	FACW
Acer rubrum	Shrub	FAC
Nyssa sylvatica	Shrub	FACW+
Pinus virginiana	Shrub	UPL
Gramineae spp.	Herb	NA

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-): 57.14%

If the FAC-neutral test is used, this data indicates a tie between hydrophytic and non-hydrophytic dominants. Nondominants must be used.

Remarks

Although the percentage of hydrophytic vegetation is calculated at 57.14% above, it is actually 66% since the Gramineae was unidentifiable to species level. Sample plot satisfies the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water 1 (in.)
Depth to free water in pit 0 (in.)
Depth to saturated soil 0 (in.)

Primary Wetland Hydrology Indicators

☒ Inundated
☒ Saturated in Upper 12 Inches
☒ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☒ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Sample plot satisfies the wetland hydrology criterion.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening
Applicant: Maryland Aviation Administration
Investigator: Leyla Lange and Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: March 20, 2001
County: Anne Arundel
State: Maryland
Community ID: PFO1/4B
Transect ID:
Plot ID: 1-FF

SOILS

Soil Map Unit Name: Cut and fill land
Drainage Class: Variable drainage
Soil Tax Subgroup: N/A
Confirm Map Type: ☒ Yes ☐ No

Soil Profile Description: Cut and fill land is severely disturbed.

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-2	A	10YR3/4	None	None	Gravelly sand
2+	Refusal				

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☐ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Soils are disturbed and gravelly. Refusal occurred at 2 inches. Sample plot does not meet the hydric soils criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No
Wetland Hydrology Present? ☒ Yes ☐ No
Hydric Soils Present? ☐ Yes ☒ No
Is this Sampling within a Wetland? ☒ Yes ☐ No

Remarks

Sample plot is in a disturbed area and satisfies two of the three mandatory wetland technical criteria. SES classified the area as a palustrine, forested, broad-leaved deciduous/coniferous, saturated (PFO1/4B) wetland.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening
Applicant: Maryland Aviation Administration
Investigator: Leyla Lange and Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: March 20, 2001
County: Anne Arundel
State: Maryland
Community ID: Wetland PEM1A
Transect ID:
Plot ID: 1-GG

VEGETATION

Dominant Plant Species	Stratum	Indicator
Juncus effusus	Herb	FACW+
Juncus roemeranus	Herb	OBL
Andropogon virginicus	Herb	FACU
Panicum virgatum	Herb	FAC
Festuca arundinacea	Herb	FACU

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 60.00%

If the FAC-neutral test is used, this data indicates a tie between hydrophytic and non-hydrophytic dominants. Nondominants must be used.

Remarks

Sample plot satisfies the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water 3 (in.)
Depth to free water in pit 0 (in.)
Depth to saturated soil 0 (in.)

Primary Wetland Hydrology Indicators

☒ Inundated
☒ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☐ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Sample plot satisfies the wetland hydrology criterion.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening
Applicant: Maryland Aviation Administration
Investigator: Leyla Lange and Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: March 20, 2001
County: Anne Arundel
State: Maryland
Community ID: Wetland PEM1A
Transect ID:
Plot ID: 1-GG

SOILS

Soil Map Unit Name: Cut and fill land
Drainage Class: Variable drainage
Soil Tax Subgroup: N/A
Confirm Map Type: ☒ Yes ☐ No

Soil Profile Description: Cut and fill land is severely disturbed.

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-8	A	7.5YR 4/6	None	None	Gravelly sand
8+	Refusal				

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☐ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Soils are disturbed and gravelly. Refusal occurred at 8 inches. Sample plot does not meet the hydric soils criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No
Wetland Hydrology Present? ☒ Yes ☐ No
Hydric Soils Present? ☐ Yes ☒ No
Is this Sampling within a Wetland? ☒ Yes ☐ No

Remarks

Sample plot is in a disturbed area and satisfies two of the three mandatory wetland technical criteria. SES classified the area as a palustrine, emergent, persistent, temporarily flooded (PEM1A) wetland.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening
Applicant: Maryland Aviation Administration
Investigator: Leyla Lange and Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: March 20, 2001
County: Anne Arundel
State: Maryland
Community ID: Wetland PEM1A
Transect ID:
Plot ID: 1-HH

VEGETATION

Dominant Plant Species	Stratum	Indicator
Typha latifolia	Herb	OBL
Juncus effusus	Herb	FACW+
Asclepias incarnata	Herb	OBL
Andropogon virginicus	Herb	FACU
Ludwigia x lacustris	Herb	OBL

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 80.00%

If the FAC-neutral test is used, this data provides a secondary indicator of wetland hydrology

Remarks

Sample plot satisfies the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water 4 (in.)
Depth to free water in pit 0 (in.)
Depth to saturated soil 0 (in.)

Primary Wetland Hydrology Indicators

☒ Inundated
☒ Saturated in Upper 12 Inches
☒ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☒ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☐ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Sample plot satisfies the wetland hydrology criterion.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening	Date: March 20, 2001
Applicant: Maryland Aviation Administration	County: Anne Arundel
Investigator: Leyla Lange and Jennifer Bird	State: Maryland
Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Community ID: Wetland PEM1A
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No	Transect ID:
Is the area a Problem Area? ☐ Yes ☒ No	Plot ID: 1-HH

SOILS

Soil Map Unit Name: Cut and fill land — Drainage Class: Variable drainage

Soil Tax Subgroup: N/A — Confirm Map Type: ☒ Yes ☐ No

Soil Profile Description: Cut and fill land is severely disturbed.

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
Refusal					

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☐ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Soils are disturbed and gravelly. Refusal occurred at surface. Sample plot does not meet the hydric soils criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No

Wetland Hydrology Present? ☒ Yes ☐ No

Hydric Soils Present? ☐ Yes ☒ No

Is this Sampling within a Wetland? ☒ Yes ☐ No

Remarks

Sample plot is in a disturbed area and satisfies two of the three mandatory wetland technical criteria. SES classified the area as a palustrine, emergent, persistent, temporarily flooded (PEM1A) wetland.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening
Applicant: Maryland Aviation Administration
Investigator: Leyla Lange and Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: March 20, 2001
County: Anne Arundel
State: Maryland
Community ID: Wetland PFO1A
Transect ID:
Plot ID: 1-II

VEGETATION

Dominant Plant Species	Stratum	Indicator
Pinus taeda	Tree	FAC-
Salix nigra	Shrub	FACW+
Betula nigra	Shrub	FACW
Andropogon virginicus	Herb	FACU
Juncus effusus	Herb	FACW+

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 60.00%

If the FAC-neutral test is used, this data provides a secondary indicator of wetland hydrology

Remarks

Sample plot satisfies the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water 1 (in.)
Depth to free water in pit 0 (in.)
Depth to saturated soil 0 (in.)

Primary Wetland Hydrology Indicators

☒ Inundated
☒ Saturated in Upper 12 Inches
☒ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☐ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Sample plot satisfies the wetland hydrology criterion.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening	Date: March 20, 2001
Applicant: Maryland Aviation Administration	County: Anne Arundel
Investigator: Leyla Lange and Jennifer Bird	State: Maryland
Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Community ID: Wetland PFO1A
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No	Transect ID:
Is the area a Problem Area? ☐ Yes ☒ No	Plot ID: 1-II

SOILS

Soil Map Unit Name: Cut and fill land

Drainage Class: Variable drainage

Soil Tax Subgroup: N/A

Confirm Map Type: ☒ Yes ☐ No

Soil Profile Description: Cut and fill land is severely disturbed.

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
Refusal					

Soil Indicators

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Hydric Soils List
- ☐ Other (explain in Remarks)

Remarks

Soils are disturbed and gravelly. Refusal occurred at surface. Sample plot does not meet the hydric soils criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No

Wetland Hydrology Present? ☒ Yes ☐ No

Hydric Soils Present? ☐ Yes ☒ No

Is this Sampling within a Wetland? ☒ Yes ☐ No

Remarks

Sample plot is in a disturbed area and satisfies two of the three mandatory wetland technical criteria. SES classified the area as a palustrine, forested, broad-leaved deciduous, temporarily flooded (PFO1A) wetland.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening
Applicant: Maryland Aviation Administration
Investigator: Leyla Lange and Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: March 20, 2001
County: Anne Arundel
State: Maryland
Community ID: Wetland PEM1A
Transect ID:
Plot ID: 1-KK

VEGETATION

Dominant Plant Species	Stratum	Indicator
Juncus effusus	Herb	FACW+
Andropogon virginicus	Herb	FACU
Dichanthelium clandestinum	Herb	FAC+
Festuca arundinacea	Shrub	FACU
Cyperus strigosus	Herb	FACW

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 60.00%

If the FAC-neutral test is used, this data provides a secondary indicator of wetland hydrology

Remarks

Sample plot satisfies the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water 1 (in.)
Depth to free water in pit 0 (in.)
Depth to saturated soil 0 (in.)

Primary Wetland Hydrology Indicators

☒ Inundated
☒ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☒ Sediment Deposits
☒ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☒ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Sample plot satisfies the wetland hydrology criterion.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening
Applicant: Maryland Aviation Administration
Investigator: Leyla Lange and Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: March 20, 2001
County: Anne Arundel
State: Maryland
Community ID: Wetland PEM1A
Transect ID:
Plot ID: 1-KK

SOILS

Soil Map Unit Name: Cut and fill land
Drainage Class: Variable drainage
Soil Tax Subgroup: N/A
Confirm Map Type: ☒ Yes ☐ No

Soil Profile Description: Cut and fill land is severely disturbed.

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
Refusal					

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☐ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Soils are disturbed and gravelly. Refusal occurred at surface. Sample plot does not meet the hydric soils criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No
Wetland Hydrology Present? ☒ Yes ☐ No
Hydric Soils Present? ☐ Yes ☒ No
Is this Sampling within a Wetland? ☒ Yes ☐ No

Remarks

Sample plot is in a disturbed area and satisfies two of the three mandatory wetland technical criteria. SES classified the area as a palustrine, emergent, persistent, temporarily flooded (PEM1A) wetland.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening
Applicant: Maryland Aviation Administration
Investigator: Michael Thompson and Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: March 23, 2001
County: Anne Arundel
State: Maryland
Community ID: Wetland PEM1A
Transect ID:
Plot ID: 1-OO

VEGETATION

Dominant Plant Species	Stratum	Indicator
Juncus effusus	Herb	FACW+
Typha latifolia	Herb	OBL
Panicum virgatum	Herb	FAC
Pinus virginiana	Herb	UPL
Gramineae spp.	Herb	NA

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 60.00%

If the FAC-neutral test is used, this data provides a secondary indicator of wetland hydrology

Remarks

Although the percentage of hydrophytic vegetation is calculated at 60% above, it is actually 75% since Gramineae could not be identified to species level due to a lack of inflorescence. Sample plot satisfies the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water 4 (in.)
Depth to free water in pit 0 (in.)
Depth to saturated soil 0 (in.)

Primary Wetland Hydrology Indicators

☒ Inundated
☒ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☒ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Sample plot satisfies the wetland hydrology criterion.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening	Date: March 23, 2001
Applicant: Maryland Aviation Administration	County: Anne Arundel
Investigator: Michael Thompson and Jennifer Bird	State: Maryland
Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Community ID: Wetland PEM1A
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No	Transect ID:
Is the area a Problem Area? ☐ Yes ☒ No	Plot ID: 1-OO

SOILS

Soil Map Unit Name: Cut and fill land
Drainage Class: Variable drainage
Soil Tax Subgroup: N/A
Confirm Map Type: ☒ Yes ☐ No

Soil Profile Description: Cut and fill land is severely disturbed.

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
Refusal					

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☐ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Soils are disturbed and gravelly. Refusal occurred at surface. Sample plot does not meet the hydric soils criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No
Wetland Hydrology Present? ☒ Yes ☐ No
Hydric Soils Present? ☐ Yes ☒ No
Is this Sampling within a Wetland? ☒ Yes ☐ No

Remarks

Sample plot is in a disturbed area and satisfies two of the three mandatory wetland technical criteria. SES classified the area as a palustrine, emergent, persistent, temporarily flooded (PEM1A) wetland.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening
Applicant: Maryland Aviation Administration
Investigator: Michael Thompson and Jennifer Bird
Do Normal Circumstances exist on the site? ☒ Yes ☐ No
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No
Is the area a Problem Area? ☐ Yes ☒ No

Date: March 23, 2001
County: Anne Arundel
State: Maryland
Community ID: Upland
Transect ID:
Plot ID: 1-UPL

VEGETATION

Dominant Plant Species	Stratum	Indicator
Pinus taeda	Tree	FAC-
Pinus virginiana	Tree	UPL
Gramineae spp.	Herb	NA

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-): 0.00%

If the FAC-neutral test is used, this data does NOT provide a secondary indicator of wetland hydrology

Remarks

Gramineae could not be identified to species level due to the lack of infloresence. Sample plot does not satisfy the hydrophytic vegetation criterion.

HYDROLOGY

Recorded Data (explain in remarks)

☐ Stream, Lake or Tide Gauge
☒ Aerial Photographs
☐ Other
☐ No Recorded Data Available

Field Observations

Depth of surface water None (in.)
Depth to free water in pit None (in.)
Depth to saturated soil 0 (in.)

Primary Wetland Hydrology Indicators

☐ Inundated
☒ Saturated in Upper 12 Inches
☐ Water Marks
☐ Drift Lines
☐ Sediment Deposits
☐ Drainage Patterns in Wetlands

Secondary Wetland Hydrology Indicators

☐ Oxidized Root Channels in Upper 12"
☐ Water-Stained Leaves
☐ Local Soil Survey Data
☐ FAC-Neutral Test
☐ Other (Explain in Remarks)

Remarks

Sample plot satisfies the wetland hydrology criterion.

CORPS DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: MD 170 Widening	Date: March 23, 2001
Applicant: Maryland Aviation Administration	County: Anne Arundel
Investigator: Michael Thompson and Jennifer Bird	State: Maryland
Do Normal Circumstances exist on the site? ☒ Yes ☐ No	Community ID: Upland
Is the site significantly disturbed (Atypical Situation)? ☒ Yes ☐ No	Transect ID:
Is the area a Problem Area? ☐ Yes ☒ No	Plot ID: 1-UPL

SOILS

Soil Map Unit Name: Cut and fill land — Drainage Class: Variable drainage

Soil Tax Subgroup: N/A — Confirm Map Type: ☒ Yes ☐ No

Soil Profile Description: Cut and fill land is severely disturbed.

Depth (inches)	Horizon	Matrix Color (munsell moist)	Mottle Colors (munsell moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
Refusal					

Soil Indicators

☐ Histosol
☐ Histic Epipedon
☐ Sulfidic Odor
☐ Aquic Moisture Regime
☐ Reducing Conditions
☐ Gleyed or Low-Chroma Colors
☐ Concretions
☐ High Organic Content in Surface Layer in Sandy Soils
☐ Organic Streaking in Sandy Soils
☐ Listed on Hydric Soils List
☐ Other (explain in Remarks)

Remarks

Soils are disturbed and gravelly. Refusal occurred at surface. Sample plot does not meet the hydric soils criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☐ Yes ☒ No

Wetland Hydrology Present? ☒ Yes ☐ No

Hydric Soils Present? ☐ Yes ☒ No

Is this Sampling within a Wetland? ☒ Yes ☐ No

Remarks

Sample plot is in a disturbed area and satisfies only one of the three mandatory wetland technical criteria. SES classified the area as upland.

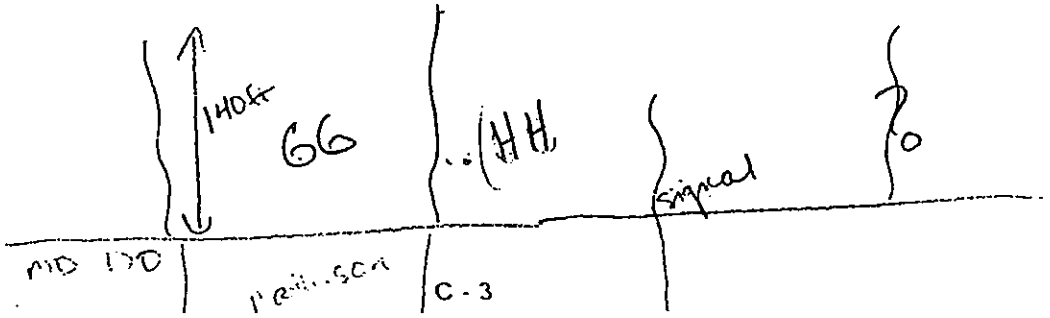
APPENDIX C

FOREST STAND SUMMARY WORK SHEETS

Property Name: MD 170
Location: _____ (Town, County, ADC Map#, and Grid Coordinates)
Prepared By: MB, MWT Date: 3-14-01

Stand Variable	Stand # ~~FR~~ 66	Stand # ~~55~~ HH
1. Dominant species/Codominant species	Red Maple, TP, VA Pine Princess Tree, TP, White Oak	RM, VA Pine RM
2. Successional stage	Early-mid	early
3. Basal area in s.f. per acre		
4. Size class of dominant species	6-12	2-6
5. Percent of canopy closure	60%	90%
6. Number of tree species per acre		
7. Common understory species per acre	-highbush bby, sassafras, VA pine, white oak	highbush bby greenbrier sp?
8. Percent of understory cover 3' to 20' tall	50%	20%
9. Number of woody plant species 3' to 20' tall		
10. Common herbaceous species 0' to 3' tall	VA pine, lowbush bby	lowbush bby, sweetbay greenbrier sp?
11. Percent of herbaceous & woody plant cover 0' to 3' tall	30%	10%
12. List of major invasive plant species & percent of cover	none	none
13. Number of standing dead trees 6" dbh or greater	0	
14. Comments Sheet___ of ___		

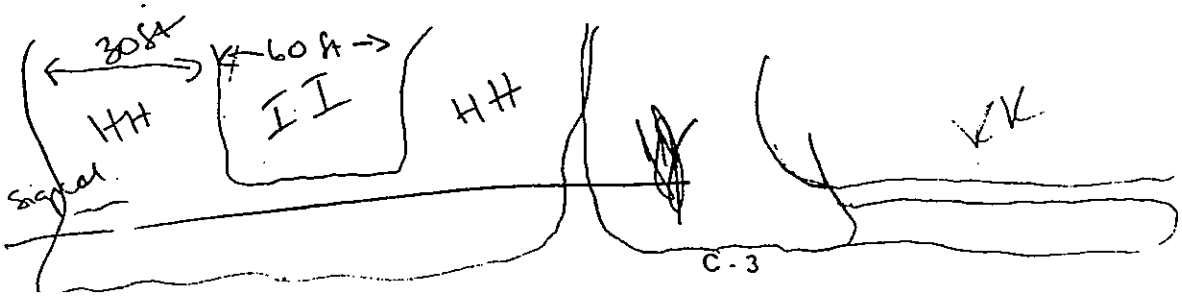
Forest Stand Summary Worksheet C:2



Property Name: MD 170
Location: _____ (Town, County, ADC Map#, and Grid Coordinates)
Prepared By: JB, MWT Date: 3-19-01

Stand Variable	Stand # II	Stand # SS
1. Dominant species/Codominant species	VA Pine - Dom Red Maple, VA Pine - Codom	Loblolly, TD, VA Pine VA Pine, Red Maple
2. Successional stage	Early - mid	Early - mid
3. Basal area in s.f. per acre		
4. Size class of dominant species	6-12	6-12
5. Percent of canopy closure	95%	90%
6. Number of tree species per acre		
7. Common understory species per acre	Red Maple, highbush bby	highbush bby, pin oak
8. Percent of understory cover 3' to 20' tall	10%	20%
9. Number of woody plant species 3' to 20' tall		
10. Common herbaceous species 0' to 3' tall	grass sp	Dewberry bby Jap honeysuckle
11. Percent of herbaceous & woody plant cover 0' to 3' tall	20%	10%
12. List of major invasive plant species & percent of cover	none	jh
13. Number of standing dead trees 6" dbh or greater	2	1
14. Comments Sheet___ of ___	stand in good health	Fair health

Forest Stand Summary Worksheet C:2



Property Name: MD 170
Location: _____ (Town, County, ADC Map#, and Grid Coordinates)
Prepared By: MB MLOT Date: _____

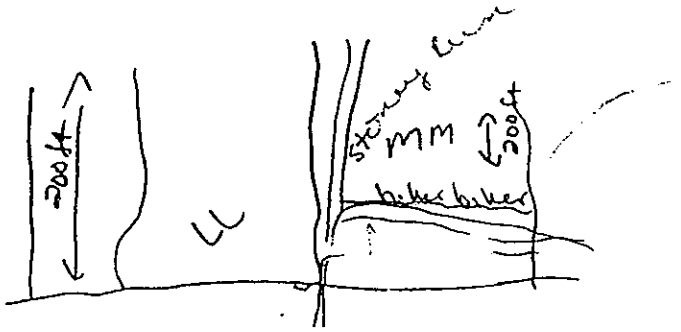
Stand Variable	Stand # V K	Stand #
1. Dominant species/Codominant species	TP, RM dom co	
2. Successional stage	early mid	
3. Basal area in s.f. per acre		
4. Size class of dominant species	6-12	
5. Percent of canopy closure	90	
6. Number of tree species per acre		
7. Common understory species per acre	highbush blby holly, RM	grapevine, j.h.
8. Percent of understory cover 3' to 20' tall	60	
9. Number of woody plant species 3' to 20' tall		
10. Common herbaceous species 0' to 3' tall	lowbush blby grass	
11. Percent of herbaceous & woody plant cover 0' to 3' tall	40	
12. List of major invasive plant species & percent of cover	none	
13. Number of standing dead trees 6" dbh or greater	none	
14. Comments Sheet___ of ___	good health	

Forest Stand Summary Worksheet C:2

Property Name: MD 170
Location: 1 (Town, County, ADC Map#, and Grid Coordinates)
Prepared By: MWT, RB Date:

Stand Variable	Stand # LL	Stand # MM
1. Dominant species/Codominant species	White Oak, VA Pine White oak, S Red Oak River Birch, Hackberry, blgum	VA Pine, Loblolly Pine
2. Successional stage	early - mid	Early - mid
3. Basal area in s.f. per acre		
4. Size class of dominant species	2-6	6-12
5. Percent of canopy closure	30020	100 %
6. Number of tree species per acre		
7. Common understory species per acre	VA pine Jap honeysuckle Am elm highbush blby river birch	red maple, black cherry white oak
8. Percent of understory cover 3' to 20' tall	30 %	10
9. Number of woody plant species 3' to 20' tall		
10. Common herbaceous species 0' to 3' tall	jap honeysuckle rubus sp ~~trumpet creeper~~, switchgrass	bl. cherry
11. Percent of herbaceous & woody plant cover 0' to 3' tall	70 %	<10
12. List of major invasive plant species & percent of cover	60 %	none
13. Number of standing dead trees 6" dbh or greater	1	
14. Comments Sheet ___ of ___	many vines poor health fragmented stand	good health

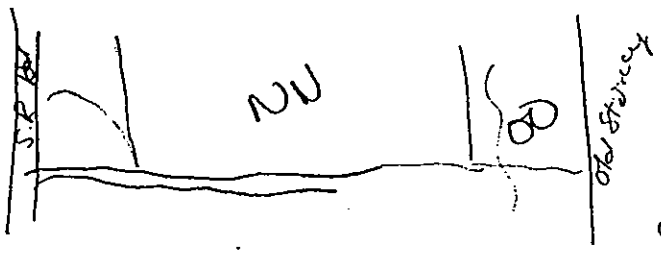
Forest Stand Summary Worksheet kingbranch C:2



Property Name: MP170
Location: _____ (Town, County, ADC Map#, and Grid Coordinates)
Prepared By: MWT, JB Date: _____

Stand Variable	Stand # NN	Stand # OO
1. Dominant species/Codominant species	Va Pine . Loblolly	Red Maple River Birch, TP
2. Successional stage	early	early
3. Basal area in s.f. per acre		
4. Size class of dominant species	6-12	2-6
5. Percent of canopy closure	100%	25%
6. Number of tree species per acre		
7. Common understory species per acre	va pine, red maple	arrow-wood poison ivy fox grape
8. Percent of understory cover 3' to 20' tall	50%	40%, patchy
9. Number of woody plant species 3' to 20' tall		
10. Common herbaceous species 0' to 3' tall	<10	switchgrass sensitive fern privet poison ivy wild onion
11. Percent of herbaceous & woody plant cover 0' to 3' tall	va pine Am holly	jap honeysuckle 100%
12. List of major invasive plant species & percent of cover	0	J.h. 80%
13. Number of standing dead trees 6" dbh or greater	0	0
14. Comments Sheet___ of ___	good health	poor health many vines stream

Forest Stand Summary Worksheet C:2



APPENDIX D

REGULATORY AGENCY CORRESPONDENCE

MAR 09 2001

Straughan Environmental Services, Inc.

Parris N. Glendening
Governor

Kathleen Kennedy Townsend
Lt. Governor

Maryland Department of Natural Resources
Forest, Wildlife and Heritage Service
Tawes State Office Building
Annapolis, Maryland 21401

Sarah J. Taylor-Rogers, Ph. D.
Secretary

Stanley K. Arthur
Deputy Secretary

March 5, 2001

Ms. Jennifer A. Bird
Straughan Environmental Services, Inc.
3905 National Drive, Suite 370
Burtonsville, MD 20866

RE: **Environmental Review for Aviation Boulevard Between Amtral Way and Matheson Way, BWI, Anne Arundel County, Maryland.**

Dear Ms. Bird:

The Wildlife and Heritage Division has no records for Federal or State rare, threatened or endangered plants or animals within this project site. This statement should not be interpreted as meaning that no rare, threatened or endangered species are present. Such species could be present but have not been documented because an adequate survey has not been conducted or because survey results have not been reported to us.

However, in the vicinity of the project site, there is a record for Swamp Pink (*Helonias bullata*), listed by the US Fish and Wildlife Service as Threatened and by the State of Maryland as Endangered. This perennial wildflower could potentially occur on the site in areas of appropriate nontidal wetland habitat, including forested wet depressions, spring seeps, bogs, wet meadows and margins of small streams. If this project requires a state permit, such as a nontidal wetlands permit from the Maryland Department of the Environment, it is likely that we would recommend a survey by a qualified surveyor be conducted for this species in areas of appropriate habitat during the appropriate flowering period when it is most easily recognizable.

Also, the forested area on the project site contains Forest Interior Dwelling Bird habitat. Populations of many Forest Interior Dwelling Bird species (FIDS) are declining in Maryland and throughout the eastern United States. The conservation of this habitat is strongly encouraged by the Department of Natural Resources. The following guidelines will help minimize the project's impacts on FIDS and other native forest plants and wildlife:

1. Concentrate development to nonforested areas.

2. If forest loss or disturbance is absolutely unavoidable, concentrate or restrict development to the perimeter of the forest (i.e., within 300 feet of the existing forest edge), particularly in narrow peninsulas of upland forest less than 300 feet wide.

3. Limit forest removal to the "footprint" of houses and to that which is absolutely necessary for the placement of roads and driveways.

4. Wherever possible, minimize the number and length of driveways and roads.

5. Roads and driveways should be as narrow and short as possible; preferably less than 25 feet and 15 feet, respectively.

6. Maintain forest canopy closure over roads and driveways.

7. Maintain forest habitat up to the edges of roads and driveways; do not create or maintain mowed grassy berms.

8. Maintain or create wildlife corridors (for details, see Critical Area Commission's Guidance Paper on Wildlife Corridors).

9. Do not remove or disturb forest habitat during May-August, the breeding season for most FIDS. This seasonal restriction may be expanded to February-August if certain early nesting FIDS (e.g., Barred Owl) are present.

10. Afforestation efforts should target (1) riparian or streamside areas that lack woody vegetation, (2) forested riparian areas less than 300 feet, and (3) gaps or peninsulas of nonforested habitat within or adjacent to existing FIDS habitat.

For further technical assistance regarding conservation of these species, you may contact Katharine McCarthy of the Wildlife and Heritage Division, at (410) 260-8569 or at the above address.

Sincerely,

Lori A. Byrne

Lori A. Byrne,
Environmental Review Specialist,
Wildlife & Heritage Division

ER# 2001.0082.aa
cc: K. McCarthy

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, MD 21401

RECEIVED
MAR 08 2001
Straughan Environmental Services, Inc.

March 6, 2001

Ms. Jennifer A. Bird
Environmental Scientist
Straughan Environmental Services, Inc.
3905 National Drive, Suite 370
Burtonsville, Maryland 20866

RE: Aviation Boulevard between Amtrak Way and Matheson Way
Anne Arundel County, MD

Dear Ms. Bird:

This responds to your January 15, 2000, request for information on the presence of species which are federally listed or proposed for listing as endangered or threatened within the above referenced project area. We have reviewed the information you enclosed and are providing comments in accordance with Section 7 of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*).

The federally threatened swamp pink *(Helonias bullata)* has been documented to occur in the vicinity of the project in Stony Run. Swamp pink is a perennial wildflower that inhabits a variety of freshwater wetlands, including spring seepages, swamps, bogs, wet meadows and margins of small streams. Even if no direct effects to potential swamp pink habitat are identified, any projects on this property must be designed to minimize impacts of hydrologic changes, siltation, and runoff (quantity and quality) on the Stony Run watershed. Any such potential impacts on swamp pink habitat should be analyzed as a part of your environmental assessment. If such impacts may occur, further Section 7 consultation with the U.S. Fish and Wildlife Service may be required.

Except for occasional transient individuals, no other federally proposed or listed endangered or threatened species are known to exist within the project impact area. Should project plans change, or if additional information on the distribution of listed or proposed species becomes available, this determination may be reconsidered.

This response relates only to federally protected threatened and endangered species under our jurisdiction. For information on the presence of other rare species, the Maryland Wildlife and Heritage Division should be contacted.

An additional concern of the Service is wetlands protection. Federal and state partners of the Chesapeake Bay Program have adopted an interim goal of no overall net loss of the Basin's remaining wetlands, and the long term goal of increasing the quality and quantity of the Basin's wetlands resource base. Because of this policy and the functions and values wetlands perform, the Service recommends avoiding wetland impacts. All wetlands within the project area should be identified, and if construction in wetlands is proposed, the U.S. Army Corps of Engineers, Baltimore District, should be contacted for permit requirements. They can be reached at (410) 962-3670.

We appreciate the opportunity to provide information relative to fish and wildlife issues, and thank you for your interest in these resources. If you have any questions or need further assistance, please contact Andy Moser at (410) 573-4537.

Sincerely,

Robert J. Pennington
Assistant Field Supervisor
Chesapeake Bay Field Office

cc:
Maryland Wildlife and Heritage Division, Annapolis, MD
(ATTN: Lori Byrne)

APPENDIX E

MARYLAND DEPARTMENT OF NATURAL RESOURCES CERTIFICATION

William Donald Schaefer
Governor

Maryland Department of Natural Resources

Public Lands and Forestry
Tawes State Office Building
580 Taylor Avenue
Annapolis, MD 21401

Torrey C. Brown, M.D
Secretary

February 10, 1994

Ms. Eileen K. Straughan
1912 Cradock Street
Silver Spring, MD 20905

Dear Ms. Straughan,

We of the Maryland Department of Natural Resources have reviewed your application for qualified professional status for the purpose of developing Forest Stand Delineations and Forest Conservation Plans. We are happy to inform you that our review found you met the requirements of COMAR 08.19.06.01 for this status. Your name will be included on a list of qualified professionals to be sent to jurisdictions with power to review Forest Stand Delineations and Forest Conservation Plans.

Participation by professionals like you is key to successful implementation of the Forest Conservation Act. Thank you for submitting your application.

Sincerely,

Eric C. Schwaab
Director, Forest Service

Telephone: (410) 974-3776

WETLAND IDENTIFICATION AND DELINEATION REPORT

Delineation of MAA Owned
Wetlands of Special State Concern (WSSC) at
Baltimore/Washington International Airport (BWI)

September 2005

Maryland Aviation Administration
P.O. Box 8766
BWI Airport, MD 21240-0766

Maryland Aviation Administration

Wetland Identification and Delineation Report

Delineation of MAA Owned Wetlands of Special State Concern (WSSC) at Baltimore/Washington International Airport (BWI)

Maryland Aviation Administration
P.O. Box 8766
BWI Airport, MD 21240-0766

September 2005

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Figure 4-B. Field Delineated Wetlands
Figure 4-C. Field Delineated Wetlands

Introduction

The Maryland Aviation Administration (MAA) has initiated a study to delineate the boundaries of the Wetland of Special State Concern (WSSC) located west of the Baltimore-Washington International Airport (BWI) on MAA-owned property. Only MAA-owned properties were investigated; access to private properties was not permitted.

Area of Review

The area of review for this wetland delineation is located immediately west of the BWI Airport (Appendix C: Figure 1). The area is bounded by the MARC/Amtrak railroad tracks to the east and extends from Old Stoney Run Road south to approximately 2,000 feet south of Stoney Run Road. The western boundary of the wetland forms the western edge of the area of review; no investigations were conducted beyond that point, because the project focuses on delineating only the contiguous wetland system known as the Wetland of Special State Concern.

Investigation

A. Secondary Data Review

The United States Geological Survey (USGS) 1:24,000 scale quadrangle map for Relay, MD indicates that Stony Run flows south to north through the center of the area of review along with three unnamed tributaries which flow into Stony Run (Appendix C: Figure 1). A review of the U.S. Fish and Wildlife Service's (USFWS) National Wetland Inventory (NWI) map shows Stony Run and a large wetland system classified as PFO1C, PFO1A, PFO1/SS1C, PEM1C and PEM1A within the area of review (Appendix C: Figure 2). The Maryland Department of Natural Resources (DNR) classifies a portion of this wetland system as a WSSC. According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps, the 100-year floodplain for Stony Run is located within the area of review along both banks of Stony Run (Appendix C: Figure 2). *The Soil Survey of Anne Arundel County, Maryland* (1973) reveals that soils within the area of review are Bibb silt loam (Bm), Evesboro and Galestown loamy sand (EsC, EoB) and Woodstown loam (WoB) (Appendix C: Figure 3). Bibb silt loam is poorly drained and Woodstown loam is moderately well drained. Evesboro and Galestown loamy sand is described as very deep and well drained to excessively drained. The Bibb series is listed in the *Hydric Soils of Maryland* and the *National List of Hydric Soils* by the Natural Resource Conservation Service (NRCS). Field investigations confirmed the presence of hydric soils within the wetland boundaries (see attached wetland data sheets 1-6, 8-10).

The DNR has classified this wetland as a WSSC due to the presence of rare, threatened, and endangered species. According to DNR correspondence dated October 27, 1999, five such species are known to occur in the project vicinity. Swamp pink (*Helonias bullata*) is federally-listed as threatened and state-listed as endangered. This species is somewhat shade tolerant and usually found within acidic forested wetlands with evergreen trees bordering small streams, meadows and spring seepage areas in

perennially saturated soils. The bog fern (*Thelypteris simulata*) is a state-listed threatened species found in moist acid shady woods. The giant cane (*Arundinaria gigantea*) is a state-listed rare species found in forested wetlands, bogs, riverbanks, and low woods. It is prevalent in moist, acid, shady woods. The state-listed threatened species, false china root (*Smilax pseudochina*), can be found in dry woods. The clammy weed (*Polanisia dodencandra*) is a state-listed endangered species, found in dry sandy alluvial soils along stream banks, sand bars and roadside waste ground. Since correspondence with DNR, the giant cane has been de-listed by the state, but is still considered rare. Investigations for these species occurred concurrent with the wetland delineation.

B. Detailed On-Site Investigation

A.D. Marble and Company (ADM) scientists conducted wetland delineations in April and May 2005 with a few visits in August to verify boundaries and survey wetland flags. Wetlands and other waters were flagged in the field and surveyed using a hand-held GPS unit. This memo documents the wetlands and other waters identified during the delineation, and provides a map indicating the locations.

Wetlands were identified in the field in accordance with the 1987 Corps of Engineers Wetland Delineation Manual and supplemental guidance papers issued by the U.S. Army Corps of Engineers (USACE), the Natural Resources Conservation Service (NRCS), and the USFWS. This method requires the positive identification of three wetland parameters during normal circumstances: hydrophytic vegetation, hydric soils, and wetland hydrology. After identification in the field, wetlands were then classified according to the Cowardin System, as described in *A Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979). Wetlands were classified and mapped as palustrine emergent (PEM), palustrine scrub-shrub (PSS) or palustrine forested (PFO) based on field observations of vegetative communities and supporting aerial photography. Upland and wetland sample plots were taken within each vegetative community to document the hydrologic, soil and vegetative characteristics. A line transect method was not specifically used to establish these vegetative communities within the wetlands because of understory density and difficulty of terrain. In addition, there was relative homogeneity of the vegetative communities recognizable from aerial photographs. The interior vegetative classifications were based on general walk-throughs and secondary data, thus interior boundary delineation was unnecessary.

Field investigations of the area of review were conducted on April 14, April 15, April 18, April 19, May 13, August 23, and August 26, 2005. Adequate observations were made to ensure accurate characterization of the entire area of review. This included the verification of preliminary wetlands identified from secondary source mapping, and delineation of wetlands not preliminarily identified. Photographs were taken of each wetland area and selected Waters of the US (Appendix A), and data on wetland vegetation, soils, and hydrology was recorded on standardized forms at representative points located both inside and outside the wetland area (Appendix B). Boundaries of WUS and wetlands identified within the area of review were flagged using pink and black striped ribbon for verification by the USACE, surveyed using mapping-grade

Trimble Global Positioning System (GPS) receivers, and placed onto project base mapping (Appendix C: Figures 4A-C).

1. Vegetation
Representative observation points were selected within each plant community throughout the area of review. Visual estimates of plant species abundance were made at each point, and dominant plants were identified to the species level wherever possible. Dominant species were recorded separately for each vegetative layer, to include herbs, shrubs, trees and woody vines. Plant species indicator status was determined according to the *National List of Plant Species that Occur in Wetlands: Northeast (Region 1)* (Reed 1988).

2. Soils
A bucket auger was used to determine if hydric soils were present at repetitive points. The colors of the soil matrix and of mottles were described using the Munsell Soil Color Charts. Soils were determined to be hydric if soil characteristics matched any of the indicators described in the *1987 Corps of Engineers Wetland Delineation Manual* or *Field Indicators of Hydric Soils in the Mid-Atlantic United States* (NRCS 1998).

3. Hydrology
Site hydrology was determined in the field based on the observed primary indicators such as inundation, soil saturation in the upper 12 inches, sediment deposits, drainage patterns, drift lines, and water marks. Wetland hydrology was also considered present if two or more secondary indicators were observed, including oxidized root zones and water stained leaves. Local survey data, the FAC-Neutral tests and "other" indicators such as topographic depressions and hummocks were also considered. Hydrology indicators are based upon the *1987 Corps of Engineers Wetland Delineation Manual* and subsequent guidance papers.

4. Functional Assessment
Wetland functions and values were determined using the USACE "*New England*" *Method* (USACE 1993, De Santo and Flieger 1995). This assessment provides a way of determining the presence and predominance of 13 generally accepted wetland functions. Included in this method are lists of statements supporting or rationalizing the presence or absence of each function. Best professional judgment was then used to identify the potential of the wetland to perform specific wetland functions.

Results

The field survey identified two wetlands and 14 other WUS, within the area of review (Appendix C: Figures 4A-4C). Wetlands were labeled as WETLAND 1 and WETLAND 2 and other WUS were labeled as WUS 1, WUS 2, etc. A key map is provided as Figure 4. Below is a description of the wetlands and other WUS identified.

A. WUS 1 (Stony Run)

WUS 1 (Stony Run) is a perennial stream flowing north through the center of the area of review and underneath Stoney Run Road (Appendix C: Figures 4A-C). WUS 1 north of Stoney Run Road has a well defined bank averaging eight feet in width and 2-3 feet in

height. The stream has a high water velocity with an average depth of 1.5 feet. Substrate consists of cobble and gravel and woody material in the deep pools. Immediately south of Stoney Run Road, stream width ranges from eight feet to 15 feet in some locations. Deep pools are more prevalent south of Stoney Run Road and the water depth averages two feet. The southern most reach of WUS 1 flowing through WETLAND 2 is 3-4 feet wide with approximately one foot of water. The stream banks are steep and average two feet in height.

B. WETLAND 1

WETLAND 1 is a wetland system that extends from Old Stoney Run Road, south under Stoney Run Road and ending at an upland berm that is associated with an access road to the light towers (FAA Light Line) for BWI (Appendix C: Figure 4B). Wetland data sheets 1 thru 6 and 10 thru 11 were completed in order to document the environmental and hydrological conditions of WETLAND 1 (see Appendix B). WETLAND 1 is approximately 50 acres in size. The northern portion is a palustrine forested (PFO) system (Wetland Data Point 1). The dominant vegetation is skunk cabbage (*Symplocarpus foetidus*), black gum (*Nyssa sylvatica*), red maple (*Acer rubrum*), sedge (*Carex sp.*), white oak (*Quercus alba*), tulip tree (*Liriodendron tulipifera*), highbush blueberry (*Vaccinium corymbosum*), red dogwood (*Cornus stolonifera*), common blue violets (*Viola papilionacea*), and sensitive fern (*Onoclea sensibilis*). The hydrophytic vegetation criterion is satisfied, as 82% of the macrophytic community is FAC or wetter. Soil borings in this wetland revealed the presence of hydric soil conditions indicated by a chroma one (10YR 4/1) and have a sulfidic odor. Hydrology in this portion of the wetland is indicated by saturated soils, the presence of drainage patterns, oxidized root channels and water stained leaves.

Immediately north and south of Stoney Run Road, the wetland is categorized as PEM (Wetland Data Point 3). The dominant vegetation is red maple, green ash (*Fraxinus pennsylvanica*), black gum, panic grass (*Panicum sp.*), tearthumb (*Polygonum sagittatum*), soft rush (*Juncus effusus*) and rice cut grass (*Leersia oryzoides*). There were many large snags present south of the bridge as well. The hydrophytic vegetation criterion is satisfied, as 88% of the macrophytic vegetation is FAC or wetter. Soil borings in this area revealed the presence of hydric soil conditions indicated by a chroma of one (10YR 3/1). Hydrology in this portion of the wetland is indicated by saturated soils, the presence of drainage patterns, oxidized root channels and water stained leaves.

South of Stoney Run Road, surrounding the PEM portion is PFO wetland, with significant areas that are flooded with standing water (Wetland Data Point 4). The dominant vegetation in this area is red maple, arrow-wood (*Viburnum dentatum*), tulip tree, river birch (*Betula nigra*), spice bush (*Lindera benzoin*), greenbriar (*Smilax rotundifolia*), cinnamon fern and Japanese honeysuckle (*Lonicera japonica*). The hydrophytic vegetation criterion is satisfied, as 70% of the macrophytic vegetation is FAC or wetter. Soil borings in this area revealed the presence of hydric soil conditions indicated by a chroma of two (10YR 4/2) and have a sulfidic odor. Hydrology in this portion of the wetland is indicated by saturation in the upper 12 inches and drainage patterns within the wetland. Field investigations identified populations of bog fern, giant

cane, false china root, and swamp pink within this wetland. The primary functions of this wetland system include groundwater discharge/recharge, flood flow alteration, wildlife habitat, uniqueness and endangered species habitat.

C. WUS 2
WUS 2 is an intermittent tributary which flows westward into WUS 1 (Appendix C: Figure 4A). The stream channel is 3-4 feet wide, 1-2 feet deep and contains approximately 6-8 inches of flowing water near its confluence. Closer to the headwaters the stream is mainly small pools with no defined channel.

D. WUS 2A
WUS 2A is an ephemeral drainage system connecting to WUS 1 to the east and dispersing into WETLAND 1 to the west (Appendix C: Figure 4A). The 50-foot long channel is approximately 2-3 feet wide and one foot deep. The substrate consists of stone pebble and sand.

E. WUS 3A
WUS 3A is a 1½-foot wide ephemeral drainage channel with sandy substrate. It connects to WUS 1 within WETLAND 1 (Appendix C: Figure 4A).

F. WUS 4A
WUS 4A is an ephemeral drainage system connecting to WUS 1, also within WETLAND 1 (Appendix C: Figure 4A). The drainage channel is approximately 50 ft in length, two feet wide and 2-4 inches deep with a gravel sandy substrate.

G. WUS 5A
WUS 5A is an intermittent stream system which flows into WUS 1 (Appendix C: Figure 4A). The stream channel is two feet deep and five feet wide with eight inches of flowing water. WUS 5A has a gravel sandy substrate.

H. WUS 6A
WUS 6A is an ephemeral drainage system which flows east into WUS 5A (Appendix C: Figure 4A). The channel is one foot wide and two inches deep.

I. WUS 7A
WUS 7A is an intermittent stream system which flows north under the Stoney Run Road bridge (within a man-made, rock-lined channel) and then east, parallel to Stoney Run Road and into WUS 1 (Appendix C: Figure 4A). The stream is three feet wide with one foot banks and contains eight inches of flowing water. The stream bottom consists of sand and gravel with some cobble and rock.

J. WUS 8A
WUS 8A is an intermittent stream system that flows east into WUS 7A (Appendix C: Figure 4A). The stream is one foot wide and three inches deep with a sandy bottom.

K. WUS 3
WUS 3 is an ephemeral drainage system that flows from east to west into WETLAND 1 (Appendix C: Figures 4A and 4B). WUS 3 is approximately two feet wide with approximately one inch of water.

L. WUS 4
WUS 4 is an intermittent stream system that originates from a 24" culvert and discharges into WETLAND 1 (Appendix C: Figure 4B). The channel width averages 3-4 feet and the westward flow contains six inches of water and a silty substrate.

M. WUS 11
WUS 11 is an ephemeral drainage system that originates from a culvert near the intersection of Stoney Run Road and New Ridge Road and flows east into WETLAND 1 (Appendix C: Figures 4A and 4B). The channel is rock-lined as it runs parallel to Stoney Run Road and is approximately two feet wide. There was no water in the rock-lined channel during the field investigations. As it veers away from the road, the channel becomes less defined and disperses into WET 1. There was surface water flow within this portion of WUS 11, approximately 1-2 feet wide with a silty substrate.

N. WUS 12
WUS 12 is an intermittent stream which originates within WETLAND 1 and flows east into WUS 1 (Appendix C: Figure 4B). It is approximately two feet wide with approximately 2-3 inches of water and a silty substrate.

O. WUS 13
WUS 13 is an intermittent stream which originates within WETLAND 1 and flows east into WUS 1 (Appendix C: Figure 4B). It is approximately two feet wide with variable water depths (2 inches to 3 feet). WUS 13 has a silty substrate.

P. WETLAND 2
WETLAND 2 is a PFO, PEM and PSS wetland system located in the southern portion of the area of review just south of WETLAND 1 (Appendix C: Figures 4B and 4C). WETLAND 2 is approximately 14 acres in size within the area of review and extends beyond the area investigated. The PEM and PSS portion of the wetland is dominated by highbush blueberry, cattails (*Typha latifolia*), arrow leaved tearthumb and soft rush (Wetland Data Point 9). The hydrophytic vegetation criterion is satisfied, as 100% of the macrophytic community is FAC or wetter. Soil borings in this portion of the wetland revealed the presence of hydric soil conditions by a chromo of one (7.5 YR 3/1 and 7.5 YR 2.5/1). Hydrology is indicated by inundation and saturation in the upper 12 inches.

The PFO portion of the wetland is dominated by red maple, highbush blueberry, sweet gum (*Liquidambar styraciflua*), stilt grass (*Microstegium viminea*), and soft rush (Wetland Data Point 8). The hydrophytic vegetation criterion is satisfied, as 100% of the macrophytic community is FAC or wetter. Soil borings in this wetland revealed the presence of hydric soil conditions indicated by a chroma of one (5 YR 4/1 and 5 YR 5/1). Hydrology on this wetland is indicated by inundation, saturated soils in the upper 12

inches. WETLAND 2 is located in the floodplain of Stony Run. Field investigations identified populations of bog fern within this wetland. The primary functions of this wetland include flood alteration, sediment retention and endangered species habitat.

Q. WUS 9A

WUS 9A is an intermittent stream system that flows east into WUS 1 in the northern portion of WETLAND 2 (Appendix C: Figure 4C). This stream is approximately two feet wide with one foot banks on each side. There is approximately four inches of flowing water with a stream bottom consisting of sand and gravel.

R. WUS 10

WUS 10 is an intermittent stream system that flows northwest into WUS 1 in the northern portion of WET 2 (Appendix C: Figure 4C). This stream is approximately two feet wide with one foot banks on each side. There is approximately four inches of water with a stream bottom consisting of sand and silt.

S. Rare, Threatened and Endangered Species

During the wetland delineation, communities of the bog fern, giant cane, false china root, and swamp pink were located within the wetland systems described above. Since these are rare species, we have not documented their location on the attached maps.

Appendix A

Photographs

PHOTO 1. WUS 1 looking downstream (North) (April 15, 2005).

PHOTO 2. WUS 1 looking upstream (South) (April 15, 2005).

PHOTO 3. WUS 1 looking downstream (North) south of Stoney Run Road (April 19, 2005)

PHOTO 4. WUS 1 looking upstream (South) south of Stoney Run Road (April 19, 2005)

PHOTO 5. Wetland 1 (Data Point 1) looking north near flag WET1-19
(April 14, 2005)

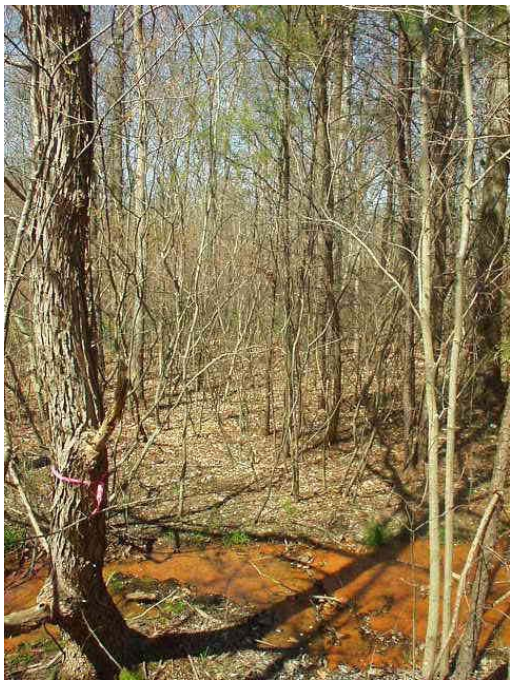


PHOTO 6. Wetland 1(Data Point 2) looking north near flag WET1-59
(April 14, 2005)

PHOTO 7. Wetland 1(Data Point 3) looking south from the Stoney Run Road Bridge (April 14, 2005)

PHOTO 8. Wetland 1 (Data Point 3) looking south near flag WET1-75 (April 14, 2005).

PHOTO 9. Wetland 1 (Data Point 3) (September 16, 2005)

PHOTO 10. Wetland 1 (Data Point 4) (September 16, 2005)

PHOTO 11. Wetland 1 (Data Point 5) (September 16, 2005)

PHOTO 12. Wetland 1 (Data Point 6) (August 23, 2005)

PHOTO 13. Wetland 1 (Data Point 10) (September 16, 2005)

PHOTO 14. WUS 2 looking upstream (East) (April 15, 2005).

PHOTO 15. WUS 2 looking downstream (West) (April 15, 2005)

PHOTO 16. WUS 2A facing west (September 16, 2005)

PHOTO 17. WUS 3A (September 16, 2005)

PHOTO 18. WUS 4A facing west (September 16, 2005)

PHOTO 19. WUS 5A (September 16, 2005)

PHOTO 20. WUS 6A (September 16, 2005)

PHOTO 21. WUS 7A facing west taken from north of Stoney Run Road (August 23, 2005)

PHOTO 22. WUS 7A looking south taken from south of Stoney Run Road (August 26, 2005)

PHOTO 23. WUS 8A (September 16, 2005)

PHOTO 24. WUS 3 looking downstream (west) (April 18, 2005).

PHOTO 25. WUS 4 looking downstream (west) from culvert outfall (April 18, 2005).

PHOTO 26. WUS 11 facing west (August 23, 2005)

PHOTO 27. WUS 12 facing west. Stoney Run Road bridge is visible in the background (August 26, 2005)

PHOTO 28. WUS 13 facing west at its confluence with Stony Run in the foreground(August 26, 2005)

PHOTO 29. Wetland 2 (Data Point 8) (September 16, 2005)

PHOTO 30. Wetland 2 (Data Point 9) (August 23, 2005)

PHOTO 31. WUS 9A facing east (August 23, 2005)

PHOTO 32. WUS 10 (September 16, 2005)

PHOTO 33. View of Upland Forest (April 14, 2005)

Appendix B

Wetland Data Sheets and Functional Assessments

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	WSSC Delineation/BWI Airport	Date:	4/14/05
Applicant/Owner:	Maryland Aviation Administration	County:	Anne Arundel
Investigator:	Nic Patterson, Barbara Sulon, Adrianna Clemens	State:	Maryland
Do Normal Circumstances exist on the site?	☒Yes ☐No	Community ID:	Wetland 1
Is the site significantly disturbed (Atypical Situation)?	☐Yes ☒No	Transect ID:	
Is the area a potential Problem Area?	☐Yes ☒No	Plot ID:	Wetland Data Point 1
(If needed, explain on reverse.)			

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Symplocarpus foetidus*	H	OBL	9. *Viola papilionacea*	H	FAC
2. *Nyssa sylvatica*	T	FAC	10. *Viburnum dentatum*	S/S	FAC
3. *Acer rubrum*	T	FAC	11. *Onoclea sensibilis*	H	FACW
4. *Carex spp.*	H	Unknown	12.		
5. *Quercus alba*	T	FACU-	13.		
6. *Liriodendron tulipifera*	T	FACU	14.		
7. *Vaccinium corymbosum*	S/S	FACW-	15.		
8. *Cornus stolonifera*	S/S	FACW+	16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 75%+

Remarks: Unable to positively identify Carex to species level due to lack of inflorescence, indicator unknown
Area dominated by Hydrophytic Vegetation

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water in Pit: 12 (in.)

Depth to Saturated Soil: 2 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☒ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☒ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☒ Oxidized Root Channels in Upper 12 Inches
- ☒ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: Wetland Hydrology present.

SOILS

Map Unit Name (Series and Phase): Bibb silt loam

Drainage Class: Poorly Drained

Field Observations

Taxonomy (Subgroup): Typic Haplaquents

Confirm Mapped Type? ☒Yes ☐ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-5	A	10 YR 4/6			Loam
5-16	B	10 YR 4/1			Loam

Hydric Soil Indicators: Yes

- ☐ Histosol
- ☐ Histic Epipedon
- ☒ Sulfidic Odor
- ☒ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☒ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Hydric soils present.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒Yes ☐No (Check)

Wetland Hydrology Present? ☒Yes ☐No

Hydric Soils Present? ☒Yes ☐No

(Check)

Is this Sampling Point Within a Wetland? ☒Yes ☐No

Remarks:PFO1

Positive indicators were present for all 3 parameters and this area was therefore determined to be wetland.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	WSSC Delineation/BWI Airport	Date:	4/14/05
Applicant/Owner:	Maryland Aviation Administration	County:	Anne Arundel
Investigator:	Nic Patterson, Barbara Sulon, Adrianna Clemens	State:	Maryland
Do Normal Circumstances exist on the site?	☒Yes ☐No	Community ID:	Wetland 1
Is the site significantly disturbed (Atypical Situation)?	☐Yes ☒No	Transect ID:	
Is the area a potential Problem Area?	☐Yes ☒No	Plot ID:	Upland Data Point 1
(If needed, explain on reverse.)			

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Lonicera japonica*	WV	FAC-	9.		
2. *Cornus stolonifera*	S/S	FACW+	10.		
3. *Acer negundo*	S/S	FAC+	11.		
4. *Quercus alba*	T	FACU-	12.		
5. *Impatiens capensis*	H	FACW	13.		
6. *Glechoma hederacea*	H	FACU	14.		
7. *Solidago sp.*	H	Unknown	15.		
8. *Lonicera japonica*	H	FAC-	16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 43% or less

Remarks: The golden rod (Solidago) was not positively identified to the species level due to lack of inflorescence. The indicator status is therefore unknown, but believed to be FAC or dryer based on its occurrence in the landscape and familiarity with common golden rods that are FAC or wetter. Area not dominated by Hydrophytic Vegetation.

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water in Pit: NA (in.)

Depth to Saturated Soil: NA (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: No indicators of wetland hydrology were observed. Aerial Photo: MDOT 1-Meter Digital Orthophoto September 2004

SOILS

Map Unit Name (Series and Phase): Bibb silt loam

Drainage Class: Poorly Drained

Field Observations: Disturbed soil

Taxonomy (Subgroup): Typic Haplaquents

Confirm Mapped Type? ☐Yes ☒No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-1	O	10YR 3/2			Leaf Litter
1-14+	A	5 YR 6/6			Sandy

Hydric Soil Indicators: None

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Soils are disturbed, fill material near parking area.
Based on the soil profile description from a hand augured boring and the lack of hydric soil indicators, the soils at this data point were determined not to be Hydric.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☐Yes ☒No (Check)

Wetland Hydrology Present? ☐Yes ☒No

Hydric Soils Present? ☐Yes ☒No

(Check)

Is this Sampling Point Within a Wetland? ☐Yes ☒No

Remarks: Data Point was taken near a parking area which could account for the disturbed soil. All three wetland criteria were absent, therefore the area was classified as upland.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	WSSC Delineation/BWI Airport	Date:	4/14/05
Applicant/Owner:	Maryland Aviation Administration	County:	Anne Arundel
Investigator:	Nic Patterson, Barbara Sulon, Adrianna Clemens	State:	Maryland
Do Normal Circumstances exist on the site?	☒Yes ☐No	Community ID:	Wetland 1
Is the site significantly disturbed (Atypical Situation)?	☐Yes ☒No	Transect ID:	
Is the area a potential Problem Area?	☐Yes ☒No	Plot ID:	Wetland Data Point 2
(If needed, explain on reverse.)			

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Acer rubrum*	T	FAC	9.		
2. *Symplocarpus foetidus*	H	OBL	10.		
3. *Vaccinium corymbosum*	S/S	FACW-	11.		
4. *Pinus taeda*	T	FAC-	12.		
5. *Osmunda cinnamomea*	H	FACW	13.		
6. *Acer rubrum*	S/S	FAC	14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 83%

Remarks: Mature forested area.
Area dominated by Hydrophytic Vegetation

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water in Pit: 10 (in.)

Depth to Saturated Soil: 3 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☒ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: Wetland Hydrology present.

SOILS

Map Unit Name (Series and Phase): Bibb silt loam

Drainage Class: Poorly Drained

Field Observations

Taxonomy (Subgroup): Typic Haplaquents

Confirm Mapped Type? ☐Yes ☒No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-3	O	10 YR 2/1			Organic Loam
3-7	A	10 YR 3/2			Sandy
7-14+	B	10 YR 3/1			Sandy

Hydric Soil Indicators: Yes

- ☐ Histosol
- ☐ Histic Epipedon
- ☒ Sulfidic Odor
- ☒ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☒ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Hydric soils present. Note that sample soil profile does not match Bibb silt loam profile described in soil survey, and probably represents an unmapped inclusion area.

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☒Yes ☐No (Check)	(Check)
Wetland Hydrology Present?	☒Yes ☐No	
Hydric Soils Present?	☒Yes ☐No	Is this Sampling Point Within a Wetland? ☒Yes ☐No

Remarks: Data Point was taken inside flag Wet 1-49 in a forested wetland associated with groundwater.

PFO1/4

Positive indicators were present for all 3 parameters and this area was therefore determined to be wetland.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	WSSC Delineation/BWI Airport	Date:	4/14/05
Applicant/Owner:	Maryland Aviation Administration	County:	Anne Arundel
Investigator:	Nic Patterson, Barbara Sulon, Adrianna Clemens	State:	Maryland
Do Normal Circumstances exist on the site?	☒Yes ☐No	Community ID:	Wetland 1
Is the site significantly disturbed (Atypical Situation)?	☐Yes ☒No	Transect ID:	
Is the area a potential Problem Area?	☐Yes ☒No	Plot ID:	Upland Data Point 2
(If needed, explain on reverse.)			

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Acer rubrum*	T	FAC	9.		
2. *Liriodendron tulipifera*	T	FACU	10.		
3. *Viburnum dentatum*	S/S	FAC	11.		
4. *Lonicera japonica*	WV	FAC-	12.		
5. *Pteridium aquilinum*	H	FACU	13.		
6. *Acer rubrum*	S/S	FAC	14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 50%

Remarks: Mature forested area.
50% dominated by FAC Vegetation, and 33% FACU. Vegetation is more strongly upland than hydrophytic.

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water in Pit: NA (in.)

Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☒ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: Area was saturated throughout. An indicator of wetland hydrology was observed.
Aerial Photo: MDOT 1-Meter Digital Orthophoto September 2004

SOILS

Map Unit Name (Series and Phase): Evesboro loamy sand

Drainage Class: Well Drained to Excessively Drained

Taxonomy (Subgroup): Typic Quartzipsamments

Field Observations Confirm Mapped Type? ☒Yes ☐ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-10	A	10 YR 3/3			Sandy Loam
10-14+	B	10 YR 4/6			Sandy

Hydric Soil Indicators: None

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks:
Based on the soil profile description from a hand augured boring and the lack of hydric soil indicators, the soils at this data point were determined not to be Hydric.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☐Yes ☒No (Check)
Wetland Hydrology Present? ☒Yes ☐No
Hydric Soils Present? ☐Yes ☒No

(Check)
Is this Sampling Point Within a Wetland? ☐Yes ☒No

Remarks: Data Point was taken in a forested upland area south of Flag Wet 1-52. Topology was gradual. One primary indicator of wetland hydrology was noted. The criteria for hydrophytic vegetation was interpreted in favor of the FACU veg. because it is weighted more strongly toward upland than FAC is toward wetland. The soils did not exhibit any hydric characteristics. This sampling point was determined to be upland because only 1 of 3 wetland parameters was satisfied.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	WSSC Delineation/BWI Airport	Date:	4/14/05
Applicant/Owner:	Maryland Aviation Administration	County:	Anne Arundel
Investigator:	Nic Patterson, Barbara Sulon, Adrianna Clemens	State:	Maryland
Do Normal Circumstances exist on the site?	☒Yes ☐No	Community ID:	Wetland 1
Is the site significantly disturbed (Atypical Situation)?	☐Yes ☒No	Transect ID:	
Is the area a potential Problem Area?	☐Yes ☒No	Plot ID:	Wetland Data Point 3
(If needed, explain on reverse.)			

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Acer rubrum*	T	FAC	9.		
2. *Fraxinus pennsylvanica*	T	FACW	10.		
3. *Nyssa sylvatica*	T	FAC	11.		
4. *Panicum sp.*	H	Unknown	12.		
5. *Polygonum sagittatum*	H	OBL	13.		
6. *Juncus effusus*	H	FACW+	14.		
7. *Leersia oryzoides*	H	OBL	15.		
8. *Acer rubrum*	S/S	FAC	16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 88% or more

Remarks: Open area with many snags. There are a few living red maples, black gums, and green ash but most were snags due to beaver activity. The Panicum was not positively identified to the species level due to lack of inflorescence. The indicator status is therefore unknown but believed to be FAC or wetter based on its occurrence in the landscape and familiarity with other Panicum species that are FAC or wetter. Area dominated by Hydrophytic Vegetation

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water in Pit: 11 (in.)

Depth to Saturated Soil: 1 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☒ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☒ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☒ Oxidized Root Channels in Upper 12 Inches
- ☒ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks Area is saturated throughout. An upland berm bisects the wetland changing the hydrology within the immediate area of the berm.
Aerial Photo: MDOT 1-Meter Digital Orthophoto September 2004
Wetland Hydrology present.

SOILS

Map Unit Name (Series and Phase): Bibb silt loam

Drainage Class: Poorly Drained

Field Observations

Taxonomy (Subgroup): Typic Haplaquents

Confirm Mapped Type? ☐Yes ☒ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-12	A	7.5 YR 3/2			Loam
12-15+	B	10 YR 3/1			Sandy

Hydric Soil Indicators: Yes

- ☐ Histosol
- ☐ Histic Epipedon
- ☒ Sulfidic Odor
- ☒ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☒ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Hydric soils present. Note that sample soil profile did not match typical Bibb silt loam profile, and may represent an unmapped unmapped inclusion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒Yes ☐No (Check)

Wetland Hydrology Present? ☒Yes ☐No

Hydric Soils Present? ☒Yes ☐No

(Check)

Is this Sampling Point Within a Wetland? ☒Yes ☐No

Remarks: PEM1. Wetland characterized by an open canopy containing a lot of snags with surface ponding and flowing water. Area not interpreted as PFO despite the presence of trees & shrubs because they were dying or mostly dead and did not constitute the dominant stratum. Great habitat wildlife. A lot of beaver activity observed.

Positive indicators were present for all 3 parameters and this area was therefore determined to be wetland.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	WSSC Delineation/BWI Airport	Date:	4/14/05
Applicant/Owner:	Maryland Aviation Administration	County:	Anne Arundel
Investigator:	Nic Patterson, Barbara Sulon, Adrianna Clemens	State:	Maryland
Do Normal Circumstances exist on the site?	☒Yes ☐No	Community ID:	Wetland 1
Is the site significantly disturbed (Atypical Situation)?	☐Yes ☒No	Transect ID:	
Is the area a potential Problem Area?	☐Yes ☒No	Plot ID:	Upland Data Point 3
(If needed, explain on reverse.)			

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Acer rubrum*	T	FAC	9.		
2. *Prunus serotina*	S/S	FACU	10.		
3. *Liriodendron tulipifera*	S/S	FACU	11.		
4. *Rosa multiflora*	S/S	FACU	12.		
5. *Acer rubrum*	S/S	FAC	13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 40%

Remarks: Data point was taken outside the wetland boundary on a graded roadside. Wetland in this area is bordered by road way. Area not dominated by Hydrophytic Vegetation.

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water in Pit: NA (in.)

Depth to Saturated Soil: NA (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks No Hydrology.
Aerial Photo: MDOT 1-Meter Digital Orthophoto September 2004

SOILS

Map Unit Name (Series and Phase): Bibb silt loam

Drainage Class: Poorly Drained

Field Observations

Taxonomy (Subgroup): Typic Haplaquents

Confirm Mapped Type? ☐ Yes ☒ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-3	A	10YR 4/3			SL, fr
3-20+	B	10YR 4/4	5YR 4/6	c (10), 2, p	SL, very gravely, fr
			10YR 7/3	c (7), 1, p	
			10YR 8/1	c (10), 1-2, p	

Hydric Soil Indicators: None

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Disturbed soils, contain fill material for road bank.
Based on the soil profile from a hand augured boring and the lack of hydric soil indicators, the soils at this data point were determined not to be Hydric.

WETLAND DETERMINATION

			(Check)
Hydrophytic Vegetation Present?	☐ Yes	☒ No	(Check)
Wetland Hydrology Present?	☐ Yes	☒ No	
Hydric Soils Present?	☐ Yes	☒ No	

Is this Sampling Point Within a Wetland? ☐ Yes ☒ No

Remarks: Determined to be upland because none of the 3 parameters were satisfied.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	WSSC Delineation/BWI Airport	Date:	4/14/05
Applicant/Owner:	Maryland Aviation Administration	County:	Anne Arundel
Investigator:	Nic Patterson, Barbara Sulon, Adrianna Clemens	State:	Maryland
Do Normal Circumstances exist on the site?	☒Yes ☐No	Community ID:	Wetland 1
Is the site significantly disturbed (Atypical Situation)?	☐Yes ☒No	Transect ID:	
Is the area a potential Problem Area?	☐Yes ☒No	Plot ID:	Wetland Data Point 4
(If needed, explain on reverse.)			

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Acer rubrum*	T	FAC	9. *Glechoma hederacea*	H	FACU
2. *Viburnum Dentatum*	S/S	FAC	10. *Acer rubrum*	S/S	FAC
3. *Liriodendron tulipifera*	S/S	FACU	11.		
4. *Lindera benzoin*	S/S	FACW-	12.		
5. *Smilax rotundifolia*	S/S	FAC	13.		
6. *Betula nigra*	T	FACW	14.		
7. *Osmunda cinnamomea*	H	FACW	15.		
8. *Lonicera japonica*	WV	FAC-	16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 70%

Remarks: Area is a young forested area.
Area dominated by Hydrophytic Vegetation

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water in Pit: 11 (in.)

Depth to Saturated Soil: 4 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☒ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☒ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks Aerial Photo: MDOT 1-Meter Digital Orthophoto September 2004
Wetland Hydrology present.

SOILS

Map Unit Name (Series and Phase): Bibb silt loam

Drainage Class: Poorly Drained

Field Observations

Taxonomy (Subgroup): Typic Haplaquents

Confirm Mapped Type? ☐ Yes ☒ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-4	A	7.5 YR 4/2			Sandy Loam
4-10	B1	10 YR 4/2			Sandy
10-16	B2	2.5 Y 4/4			Sandy

Hydric Soil Indicators: Yes

- ☐ Histosol
- ☐ Histic Epipedon
- ☒ Sulfidic Odor
- ☒ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☒ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Hydric soils determined to be present based on indicators. Note that sample soils profile did not match typical Bibb silt loam profile, and thus likely represents an unmapped inclusion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☒ Yes ☐ No (Check)	(Check)
Wetland Hydrology Present?	☒ Yes ☐ No	
Hydric Soils Present?	☒ Yes ☐ No	Is this Sampling Point Within a Wetland? ☒ Yes ☐ No

Remarks: PFO1

Positive indicators were present for all 3 parameters and this area was therefore determined to be wetland.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	WSSC Delineation/BWI Airport	Date:	4/14/05
Applicant/Owner:	Maryland Aviation Administration	County:	Anne Arundel
Investigator:	Nic Patterson, Barbara Sulon, Adriana Clemens	State:	Maryland
Do Normal Circumstances exist on the site?	☒Yes ☐No	Community ID:	Wetland 1
Is the site significantly disturbed (Atypical Situation)?	☐Yes ☒No	Transect ID:	
Is the area a potential Problem Area?	☐Yes ☒No	Plot ID:	Upland Data Point 4
(If needed, explain on reverse.)			

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Acer rubrum*	T	FAC	9.		
2. *Nyssa sylvatica*	T	FAC	10.		
3. *Allium canadense*	H	FACU	11.		
4. *Lindera benzoin*	S/S	FACW-	12.		
5. *Toxicodendron radicans*	WV	FAC	13.		
6. *Glechoma hederacea*	H	FACU	14.		
7. *Lonicera japonica*	WV	FAC-	15.		
8. *Acer rubrum*	S	FAC	16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 63%

Remarks: Area dominated by Hydrophytic Vegetation.

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water in Pit: 12 (in.)

Depth to Saturated Soil: 10 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☒ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks Aerial Photo: MDOT 1-Meter Digital Orthophoto September 2004
Indicators of wetland hydrology were observed.

SOILS

Map Unit Name (Series and Phase): Bibb silt loam

Drainage Class: Poorly Drained

Field Observations

Taxonomy (Subgroup): Typic Haplaquents

Confirm Mapped Type? ☐Yes ☒No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-4	A	7.5 YR 4/2			Sandy Loam
4-14+	B	10 YR 4/2			Sandy

Hydric Soil Indicators: None

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Other than a shallow water table, no other evidence of hydric soils. No redoxymorphic features were present in the chroma 2 matrix. Based on the soil profile description from a hand augured boring and the lack of other hydric soil indicators, the soils at this data point were determined not to be Hydric.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒Yes ☐No (Check)

Wetland Hydrology Present? ☒Yes ☐No

Hydric Soils Present? ☐Yes ☒No

(Check)

Is this Sampling Point Within a Wetland? ☐Yes ☒No

Remarks: The dominant vegetation was hydrophytic.
Indicators of wetland hydrology were present. The soils were not Interpreted as hydric because there were no redoxymorphic features in the chroma 2 matrix. Only 2 of the 3 wetland parameters were present and this area was therefore determined to be upland.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	WSSC Delineation/BWI Airport			Date:	4/15/05
Applicant/Owner:	Maryland Aviation Administration			County:	Anne Arundel
Investigator:	Nic Patterson, Barbara Sulon			State:	Maryland
Do Normal Circumstances exist on the site?		☒Yes	☐No	Community ID:	Wetland 1
Is the site significantly disturbed (Atypical Situation)?		☐Yes	☒No	Transect ID:	
Is the area a potential Problem Area?		☐Yes	☒No	Plot ID:	Wetland Data Point 5
(If needed, explain on reverse.)					

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Acer rubrum*	T	FAC	9. *Quercus palustris*	S/S	FACW
2. *Quercus palustris*	T	FACW	10. *Nyssa sylvatica*	S/S	FAC
3. *Nyssa sylvatica*	T	FAC	11.		
4. *Magnolia virginiana*	S/S	FACW+	12.		
5. *Symplocarpus foetidus*	H	OBL	13.		
6. *Viola papilionacea*	H	FAC	14.		
7. *Veratrum viride*	H	FACW+	15.		
8. *Acer rubrum*	S/S	FAC	16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks: Area is a young forested area.
Area dominated by Hydrophytic Vegetation

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water in Pit: 6 (in.)

Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☒ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☒ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks Aerial Photo: MDOT 1-Meter Digital Orthophoto September 2004
Wetland Hydrology present.

SOILS

Map Unit Name (Series and Phase): Bibb silt loam

Drainage Class: Poorly Drained

Field Observations

Taxonomy (Subgroup): Typic Haplaquents

Confirm Mapped Type? ☐ Yes ☒ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-5	A	7.5 YR 3/2			Sandy Loam
5-9	Bt	7.5 YR 3/1			Loamy Clay
9-13	Bg	10 YR 2/1			Sandy
13+	BC	10 YR 5/2			Sand

Hydric Soil Indicators: Yes

- ☐ Histosol
- ☐ Histic Epipedon
- ☒ Sulfidic Odor
- ☒ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☒ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Hydric soils present. Note that observed sample profile does not match the standard Bibb silt loam profile, likely representing an unmapped inclusion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No (Check)

Wetland Hydrology Present? ☒ Yes ☐ No

Hydric Soils Present? ☒ Yes ☐ No

(Check)

Is this Sampling Point Within a Wetland? ☒ Yes ☐ No

Remarks: This is a forested wetland adjacent to Flag WUS 2-5 (Side Tributary to Main Stream). PFO1
Positive indicators were present for all 3 parameters and this area was therefore determined to be wetland.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	WSSC Delineation/BWI Airport	Date:	4/18/05
Applicant/Owner:	Maryland Aviation Administration	County:	Anne Arundel
Investigator:	Nic Patterson, Barbara Sulon	State:	Maryland
Do Normal Circumstances exist on the site?	☒Yes ☐No	Community ID:	Wetland 1
Is the site significantly disturbed (Atypical Situation)?	☐Yes ☒No	Transect ID:	
Is the area a potential Problem Area?	☐Yes ☒No	Plot ID:	Wetland Data Point 6
(If needed, explain on reverse.)			

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Acer rubrum*	T	FAC	9. *Acer rubrum*	S/S	FAC
2. *Carex trisperma*	H	OBL	10. *Nyssa sylvatica*	S/S	FAC
3. *Nyssa sylvatica*	T	FAC	11.		
4. *Impatiens pallida*	H	FACW	12.		
5. *Symplocarpus foetidus*	H	OBL	13.		
6. *Osmunda cinnamomea*	H	OBL	14.		
7. *Rumex spp.*	H	Unknown	15.		
8. *Juncus effusus*	H	FACW+	16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 90% or more

Remarks: The Rumex was not positively identified to the species level due to lack of inflorescence. The indicator status is therefore unknown, but believed to be FAC or wetter based on its occurrence in the landscape and tolerance of standing water.
Area dominated by Hydrophytic Vegetation

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: 6-12 (in.)

Depth to Free Water in Pit: 0 (in.)

Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☒ Inundated
- ☒ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☒ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☒ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks Aerial Photo: MDOT 1-Meter Digital Orthophoto September 2004
Wetland Hydrology present.

SOILS

Map Unit Name (Series and Phase): Bibb silt loam

Drainage Class: Poorly Drained

Field Observations

Taxonomy (Subgroup): Typic Haplaquents

Confirm Mapped Type? ☒Yes ☐ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-6	A	7.5 YR 3/2			Organics/ w Silt
6-14	B	10 YR 2/1			Silt Loam

Hydric Soil Indicators: Yes

- ☐ Histosol
- ☐ Histic Epipedon
- ☒ Sulfidic Odor
- ☒ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☒ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Hydric soils present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒Yes ☐No (Check)

Wetland Hydrology Present? ☒Yes ☐No

Hydric Soils Present? ☒Yes ☐No

(Check)

Is this Sampling Point Within a Wetland? ☒Yes ☐No

Remarks: Data point was taken near flag Wet 1-91. This is a PFO wetland.

Positive indicators were present for all 3 parameters and this area was therefore determined to be wetland.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	WSSC Delineation/BWI Airport	Date:	4/18/05
Applicant/Owner:	Maryland Aviation Administration	County:	Anne Arundel
Investigator:	Nic Patterson, Barbara Sulon	State:	Maryland
Do Normal Circumstances exist on the site?	☒Yes ☐No	Community ID:	Wetland 1
Is the site significantly disturbed (Atypical Situation)?	☐Yes ☒No	Transect ID:	
Is the area a potential Problem Area?	☐Yes ☒No	Plot ID:	Upland Data Point 6
(If needed, explain on reverse.)			

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Acer rubrum*	T	FAC	9. *Prunus serotina*	S/S	FACU
2. *Carex trisperma*	H	OBL	10. *Acer rubrum*	S/S	FAC
3. *Pinus taeda*	T	FAC-	11. *Betula nigra*	T	FACW
4. *Quercus palustris*	T	FACW	12. *Mitchella repens*	H	FACU
5. *Smilax rotundifolia*	S/S	FAC	13.		
6. *Liriodendron tulipifera*	T	FACU	14.		
7. *Maianthemum canadense*	H	FAC-	15.		
8. *Pinus rigida*	T	FACU	16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 50%

Remarks: 50% of area dominated by Hydrophytic Vegetation.

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: 0 (in.)

Depth to Free Water in Pit: 16 (in.)

Depth to Saturated Soil: 14 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks Aerial Photo: MDOT 1-Meter Digital Orthophoto September 2004
No indicators of wetland hydrology were observed.

SOILS

Map Unit Name (Series and Phase): Bibb silt loam

Drainage Class: Poorly Drained

Field Observations

Taxonomy (Subgroup): Typic Haplaquents

Confirm Mapped Type? ☒Yes ☐ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-8	A	10 YR 3/2			Gravely Silt Loam
8-16	B	10 YR 3/2			Silt Loam

Hydric Soil Indicators: None

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☒ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: No mottles were observed in the chroma 2 matrix.
Based on the soil profile description from a hand augured boring and the lack of hydric soil indicators, the soils at this data point were determined not to be Hydric.

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☒Yes ☐No (Check)	(Check)
Wetland Hydrology Present?	☐Yes ☒No	
Hydric Soils Present?	☐Yes ☒No	Is this Sampling Point Within a Wetland? ☐Yes ☒No

Remarks: Data point was taken 30 feet east of flag Wet 1-91.
All three wetland parameters were not present and this area was therefore determined to be upland.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	WSSC Delineation/BWI Airport			Date:	5/13/05
Applicant/Owner:	Maryland Aviation Administration			County:	Anne Arundel
Investigator:	Nic Patterson, Barbara Sulon			State:	Maryland
Do Normal Circumstances exist on the site?		☒Yes	☐No	Community ID:	Wetland 2
Is the site significantly disturbed (Atypical Situation)?		☐Yes	☒No	Transect ID:	
Is the area a potential Problem Area?		☐Yes	☒No	Plot ID:	Wetland Data Point 8
(If needed, explain on reverse.)					

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Acer rubrum*	T	FAC			
2. *Liquidambar styraciflua*	S/S	FAC			
3. *Microstegium viminea*	H	FAC			
4. *Juncus effusus*	H	FACW+			
5. *Vaccinium corymbosum*	S/S	FACW-			
6. *Acer rubrum*	S/S	FAC			
7.					
8.					

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks: Area dominated by Hydrophytic Vegetation

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: 0 (in.)

Depth to Free Water in Pit: 0 (in.)

Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☒ Inundated
- ☒ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks Area inundated, data point evaluated at edge of water. Wetland Hydrology present.

SOILS

Map Unit Name (Series and Phase): Bibb silt loam

Drainage Class: Poorly Drained

Field Observations

Taxonomy (Subgroup): Typic Haplaquents

Confirm Mapped Type? ☐Yes ☒No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-3	OA	2.5 YR 2/1			Organic
3-14	A	5 YR 4/1			Sand
14-15	AB	5 YR 5/1			Sand

Hydric Soil Indicators: Yes

- ☐ Histosol
- ☐ Histic Epipedon
- ☒ Sulfidic Odor
- ☒ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☒ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Hydric soils present. Note that the observed sample profile does not match the standard Bibb silt loam profile, likely representing an unmapped inclusion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒Yes ☐No (Check)

Wetland Hydrology Present? ☒Yes ☐No

Hydric Soils Present? ☒Yes ☐No

(Check)

Is this Sampling Point Within a Wetland? ☒Yes ☐No

Remarks: PFO1, adjacent to wet 2-26.

Positive indicators were present for all 3 parameters and this area was therefore determined to be wetland.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	WSSC Delineation/BWI Airport	Date:	5/13/05
Applicant/Owner:	Maryland Aviation Administration	County:	Anne Arundel
Investigator:	Adrianna Clemens, Barbara Sulon	State:	Maryland
Do Normal Circumstances exist on the site?	☒Yes ☐No	Community ID:	Wetland 2
Is the site significantly disturbed (Atypical Situation)?	☐Yes ☒No	Transect ID:	
Is the area a potential Problem Area?	☐Yes ☒No	Plot ID:	Upland Data Point 8
(If needed, explain on reverse.)			

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Pinus taeda*	T	FAC-			
2. *Quercus alba*	T	FACU-			
3. *Fagus grandifolia*	T	FACU			
4. *Maianthemum canadense*	H	FAC-			
5. *Parthenocissus quinquefolia*	H	FACU			
6. *Pinus taeda*	S/S	FAC-			
7.					
8.					

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 0%

Remarks: Area not dominated by Hydrophytic Vegetation.

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water in Pit: NA (in.)

Depth to Saturated Soil: NA (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks Aerial Photo: MDOT 1-Meter Digital Orthophoto September 2004
No indicators of wetland hydrology were observed.

SOILS

Map Unit Name (Series and Phase): Evesboro loamy sand

Drainage Class: Well Drained to Excessively Drained

Taxonomy (Subgroup): Typic Quartzipsamments

Field Observations Confirm Mapped Type? ☒Yes ☐ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-6	A	7.5 YR 3/1			Sand
6-8	AB	10 YR 4/1			Sand
8-14	B	2.5 Y 6/8			Sand

Hydric Soil Indicators: Yes

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: The data point was taken in a mid-successional forest approximately 15 feet upslope of the wetland boundary. Charcoal was observed in the upper 8 inches of the profile which may be contributing to soil color. The soil was very dry and very sandy with a bright colored B horizon. Based on the soil profile description from a hand augured boring and the lack of hydric soil indicators or soil moisture, the soils at this data point were determined not to be Hydric.

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☐Yes ☒No (Check)		(Check)
Wetland Hydrology Present?	☐Yes ☒No		
Hydric Soils Present?	☐Yes ☒No	Is this Sampling Point Within a Wetland?	☐Yes ☒No

Remarks: Data point is east of flag wet 2-26 in an evergreen upland.
Area determined to be upland because none of the 3 wetland parameters were present.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	WSSC Delineation/BWI Airport			Date:	5/13/05
Applicant/Owner:	Maryland Aviation Administration			County:	Anne Arundel
Investigator:	Adrianna Clemens, Barbara Sulon			State:	Maryland
Do Normal Circumstances exist on the site?		☒Yes	☐No	Community ID:	Wetland 2
Is the site significantly disturbed (Atypical Situation)?		☐Yes	☒No	Transect ID:	
Is the area a potential Problem Area?		☐Yes	☒No	Plot ID:	Wetland Data Point 9
(If needed, explain on reverse.)					

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Vaccinium corymbosum*	S/S	FACW-			
2. *Typha latifolia*	H	OBL			
3. *Polygonum sagittatum*	H	OBL			
4. *Juncus effusus*	H	FACW+			
5.					
6.					
7.					
8.					

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks: Area dominated by Hydrophytic Vegetation

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: 2-4 (in.)

Depth to Free Water in Pit: 10 (in.)

Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☒ Inundated
- ☒ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☒ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks Data point next to a drainage channel with 2-4 inches of water. Water standing on surface and what may be ruts. Wetland Hydrology present.

SOILS

Map Unit Name (Series and Phase): Bibb silt loam

Drainage Class: Poorly Drained

Field Observations

Taxonomy (Subgroup): Typic Haplaquents

Confirm Mapped Type? ☒Yes ☐ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-3	A	7.5 YR 4/3			Silt
3-8	AB	7.5 YR 3/1			Silt Loam
8-14	B	7.5 YR 2.5/1			Silt Loam

Hydric Soil Indicators: Yes

- ☐ Histosol
- ☐ Histic Epipedon
- ☒ Sulfidic Odor
- ☒ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☒ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Soils are disturbed. Hydric soils present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒Yes ☐No (Check)

Wetland Hydrology Present? ☒Yes ☐No

Hydric Soils Present? ☒Yes ☐No

(Check)

Is this Sampling Point Within a Wetland? ☒Yes ☐No

Remarks: PSS1/EM wetland on south side of the lighting towers. The data point is located along the west side of Stony Run Creek inside flag wet 2-69/70.

Positive indicators were present for all 3 parameters and this area was therefore determined to be wetland.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	WSSC Delineation/BWI Airport			Date:	5/13/05
Applicant/Owner:	Maryland Aviation Administration			County:	Anne Arundel
Investigator:	Adrianna Clemens, Barbara Sulon			State:	Maryland
Do Normal Circumstances exist on the site?		☒Yes	☐No	Community ID:	Wetland 2
Is the site significantly disturbed (Atypical Situation)?		☐Yes	☒No	Transect ID:	
Is the area a potential Problem Area?		☐Yes	☒No	Plot ID:	Upland Data Point 9
(If needed, explain on reverse.)					

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Brassica rapa*	H	NI			
2. *Phalaris canariensis*	H	FACU			
3.					
4.					
5.					
6.					
7.					
8.					

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 0%

Remarks: Area not dominated by Hydrophytic Vegetation.

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water in Pit: NA (in.)

Depth to Saturated Soil: NA (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks Aerial Photo: MDOT 1-Meter Digital Orthophoto September 2004
No indicators of wetland hydrology were observed.

SOILS

Map Unit Name (Series and Phase): Bibb silt loam

Drainage Class: Poorly Drained

Field Observations

Taxonomy (Subgroup): Typic Haplaquents

Confirm Mapped Type? ☐ Yes ☒ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-16	A	Mixed Fill			Mixed Fill

Hydric Soil Indicators: None

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☒ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Soils are disturbed, mixed fill material

Based on the soil profile from a hand augured boring and the lack of hydric soil indicators or soil moisture, the soils at this data point were determined not to be Hydric.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☐ Yes ☒ No (Check)

Wetland Hydrology Present? ☐ Yes ☒ No

Hydric Soils Present? ☐ Yes ☒ No

Is this Sampling Point Within a Wetland? (Check) ☐ Yes ☒ No

Remarks: Data point taken on the road beneath the lighting tower.

Area determined to be upland because none of the 3 wetland parameters were present.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	WSSC Delineation/BWI Airport	Date:	8-26-05
Applicant/Owner:	Maryland Aviation Administration	County:	Anne Arundel
Investigator:	Jessica Klinefelter, Erik Schwenke	State:	Maryland
Do Normal Circumstances exist on the site?	☒Yes ☐No	Community ID:	Wetland 1
Is the site significantly disturbed (Atypical Situation)?	☐Yes ☒No	Transect ID:	
Is the area a potential Problem Area?	☐Yes ☒No	Plot ID:	Wetland Data Point 10
(If needed, explain on reverse.)			

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Acer rubrum*	T	FAC	9.		
2. *Fraxinus pennsylvanica*	T	FACW	10.		
3. *Smilax rotundifolia*	S/S	FAC	11.		
4. *Lindera benzoin*	S/S	FACW-	12.		
5. *Smilax rotundifolia*	H	FAC	13.		
6. *Impatiens capensis*	H	FACW	14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks:
Area dominated by Wetland Vegetation

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water in Pit: 6 (in.)

Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☒ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☒ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☒ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks Aerial Photo: MDOT 1-Meter Digital Orthophoto September 2004
Wetland Hydrology present.

SOILS

Map Unit Name (Series and Phase): Bibb silt loam

Drainage Class: Poorly Drained

Field Observations

Taxonomy (Subgroup): Typic Haplaquents

Confirm Mapped Type? ☒Yes ☐ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-16	A/B	10 YR 3/1			Sandy Loam

Hydric Soil Indicators: Yes

- ☐ Histosol
- ☐ Histic Epipedon
- ☒ Sulfidic Odor
- ☒ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☒ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Hydric soils present

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒Yes ☐No (Check)

Wetland Hydrology Present? ☒Yes ☐No

Hydric Soils Present? ☒Yes ☐No

(Check)

Is this Sampling Point Within a Wetland? ☒Yes ☐No

Remarks: PFO

Positive indicators were present for all 3 parameters and this area was therefore determined to be wetland.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	WSSC Delineation/BWI Airport			Date:	4/18/05
Applicant/Owner:	Maryland Aviation Administration			County:	Anne Arundel
Investigator:	Jessica Klinefelter, Erik Schwenke			State:	Maryland
Do Normal Circumstances exist on the site?		☒Yes	☐No	Community ID:	Wetland 1
Is the site significantly disturbed (Atypical Situation)?		☐Yes	☒No	Transect ID:	
Is the area a potential Problem Area?		☐Yes	☒No	Plot ID:	Upland Data Point 10
(If needed, explain on reverse.)					

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Ilex opaca*	T	FACU+	9.		
2. *Smilax rotundifolia*	S/S	FAC	10.		
3. *Liriodendron tulipifera*	S/S	FACU	11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 33%

Remarks: Area not dominated by Hydrophytic Vegetation.

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water in Pit: NA (in.)

Depth to Saturated Soil: NA (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks Aerial Photo: MDOT 1-Meter Digital Orthophoto September 2004
No indicators of wetland hydrology were observed.

SOILS

Map Unit Name (Series and Phase): Evesboro & Galestown loamy sands

Drainage Class: Well Drained to Excessively Drained

Taxonomy (Subgroup): Typic Quartzipsamments

Field Observations Confirm Mapped Type? ☒Yes ☐ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-8	A	10 YR 2/2			Sandy
8-16	B	10 YR 5/4			Sandy

Hydric Soil Indicators: None

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks:

Based on the soil profile description from a hand augured boring and the lack of hydric soil indicators or soil moisture, the soils at this data point were determined not to be Hydric.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☐Yes ☒No (Check)

Wetland Hydrology Present? ☐Yes ☒No

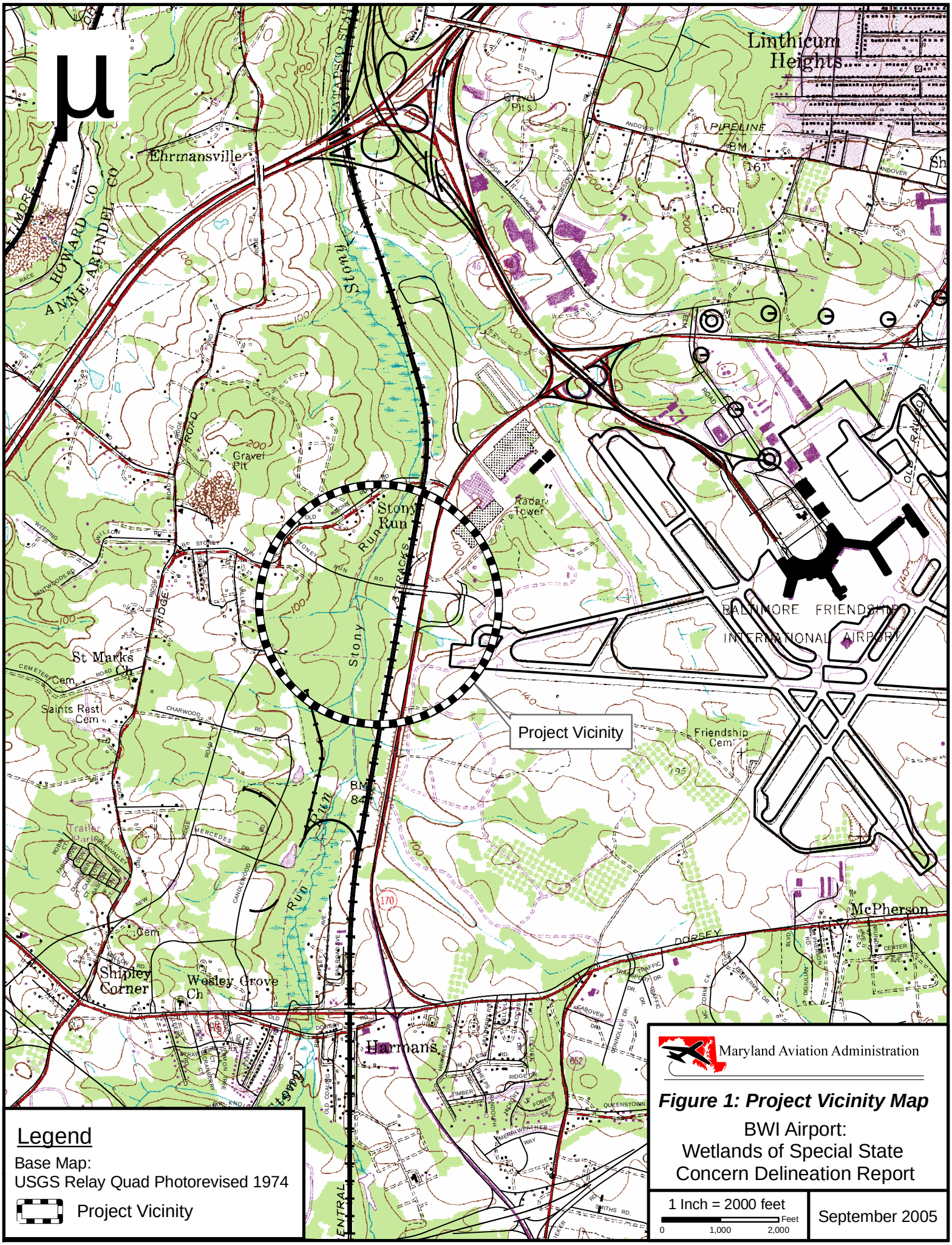
Hydric Soils Present? ☐Yes ☒No

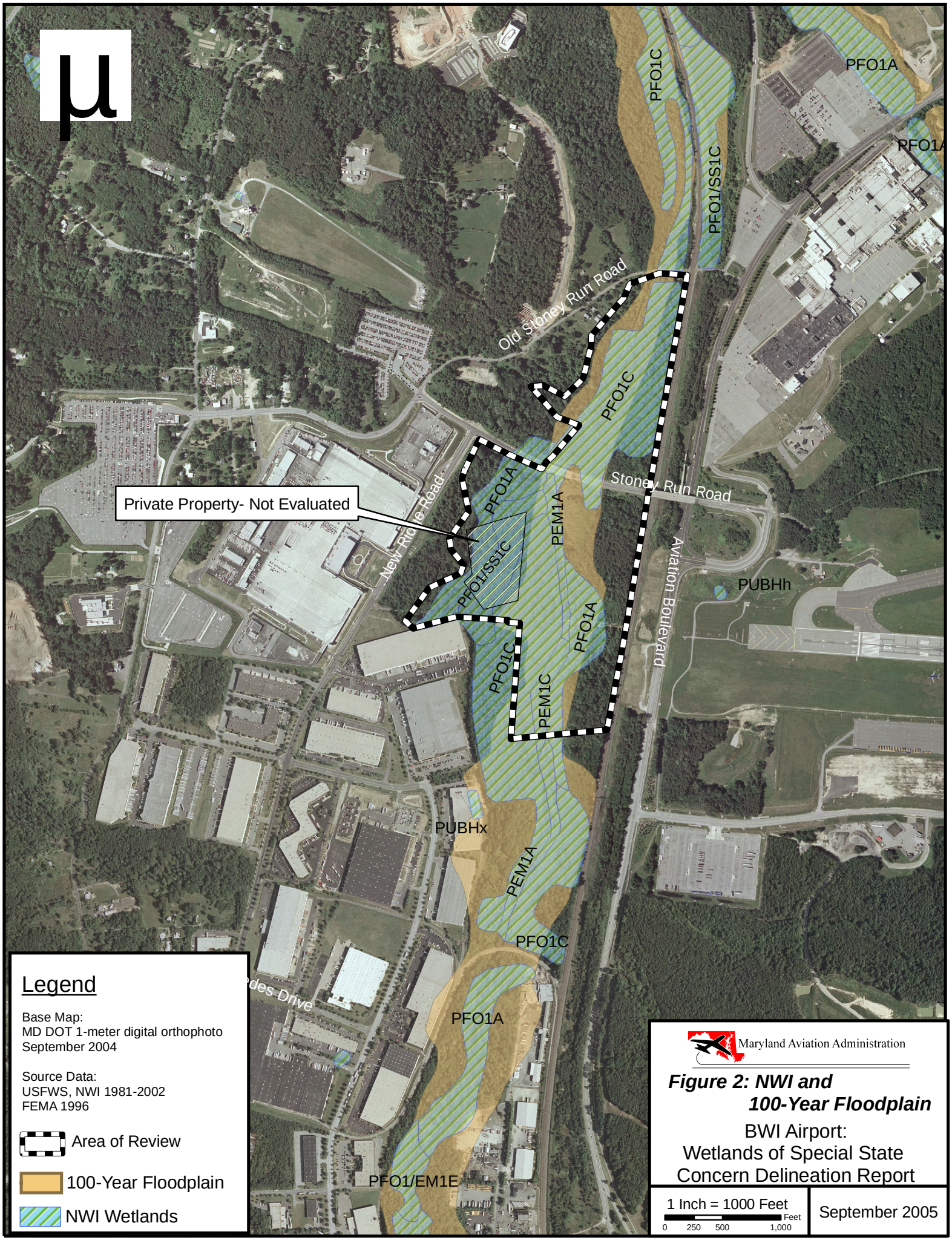
Is this Sampling Point Within a Wetland? (Check) ☐Yes ☒No

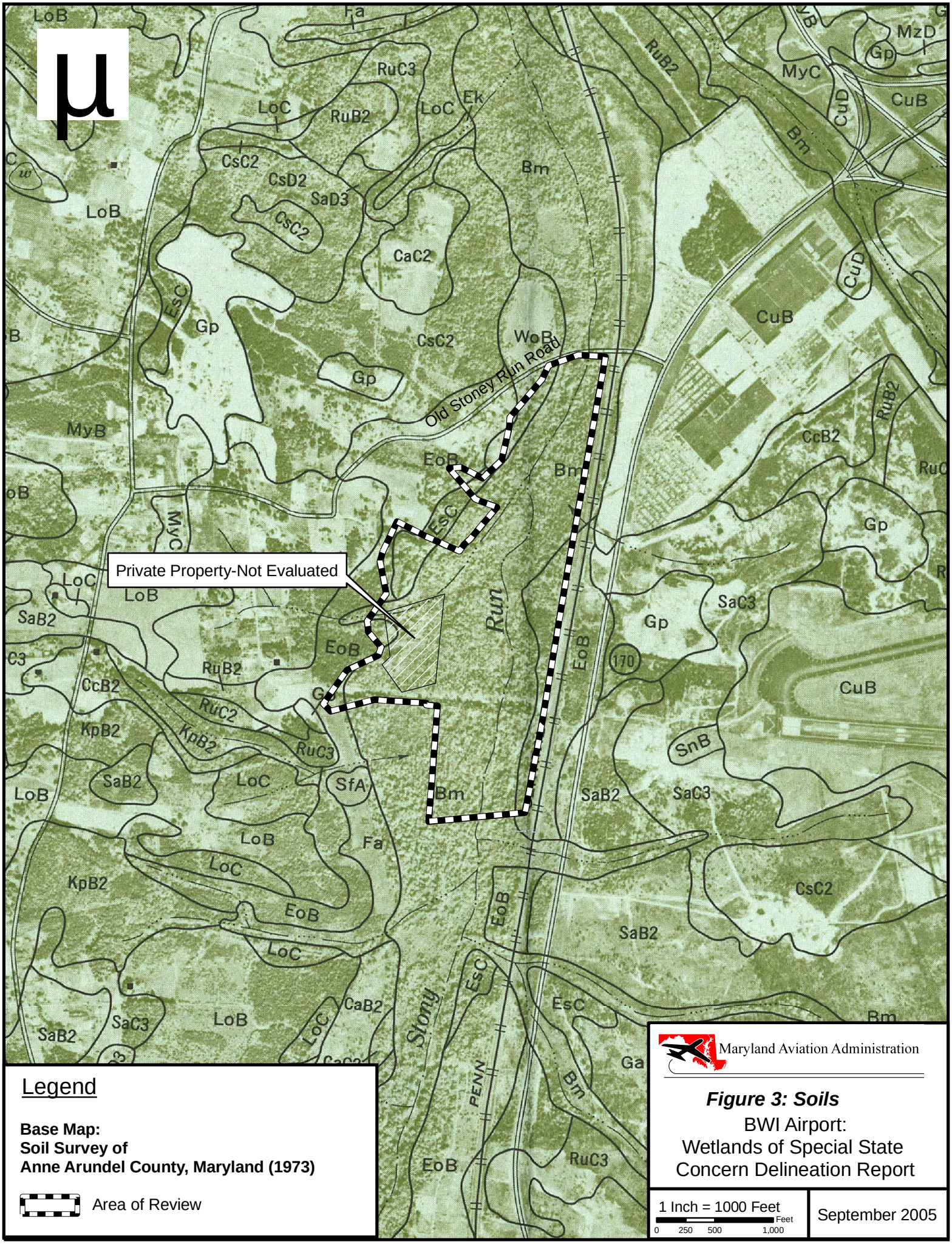
Remarks: Area determined to be upland because none of the 3 wetland parameters were present.

Appendix C

Figures


Linthicum Heights
Ehrmansville
Gravel Pits
PIPELINE
BM
161
Cem
Stony Run
Gravel Pit
Radar Tower
Stony Run
TRACKS
BALTIMORE FRIENDSHIP
INTERNATIONAL AIRPORT
Project Vicinity
St Marks Ch
Saints Rest Cem
Friendship Cem
BM
84
Run
Trailer Park
McPherson
Shipley Corner
Wesley Grove Ch
Harmans
Legend
Base Map:
USGS Relay Quad Photorevised 1974
Project Vicinity
Maryland Aviation Administration
Figure 1: Project Vicinity Map
BWI Airport:
Wetlands of Special State Concern Delineation Report
1 Inch = 2000 feet
Feet
0
1,000
2,000
September 2005


Private Property- Not Evaluated
Old Stoney Run Road
Stoney Run Road
New Ridge Road
Aviation Boulevard
PFO1C
PFO1/SS1C
PFO1A
PEM1A
PEM1C
PUBHh
PUBHx
PFO1/EM1E
Legend
Base Map:
MD DOT 1-meter digital orthophoto
September 2004
Source Data:
USFWS, NWI 1981-2002
FEMA 1996
Area of Review
100-Year Floodplain
NWI Wetlands
Maryland Aviation Administration
Figure 2: NWI and 100-Year Floodplain
BWI Airport:
Wetlands of Special State Concern Delineation Report
1 Inch = 1000 Feet
0 250 500 1,000 Feet
September 2005



Legend

Base Map:
Soil Survey of
Anne Arundel County, Maryland (1973)

Area of Review

Maryland Aviation Administration

Figure 3: Soils

BWI Airport:
Wetlands of Special State Concern Delineation Report

1 Inch = 1000 Feet

0 250 500 1,000 Feet

September 2005

FIGURE 4-A

FIGURE 4-B

FIGURE 4-C

Old Stoney Run Road

Stoney Run Road

New Ridge Rd

Aviation Boulevard

MARC/Amtrak

WUS 1A

WUS 2A

WUS 2

WUS 4A

WUS 6A

WUS 5A

WUS 8A

WUS 11

WUS 12

WUS 3

WUS 13

WUS 4

WUS 10

PFO

PEM

PSS

WETLAND 1

WETLAND 2

Private Property

N

Legend

Base Map:
MDOT 1-Meter Digital Orthophoto
September 2004

- Private Property (not delineated)
- WUS
- Delineated Wetland
- PEM — Wetland Classification
- Area of Review

Maryland Aviation Administration

Figure 4: Key to Field Delineated Wetlands

BWI Airport:
Wetlands of Special State Concern Delineation Report

1 Inch = 300 feet

0 150 300 Feet

September 2005

Old Stoney Run Road

Stoney Run Road

MARC/Amtrak

WUS 1

WUS 2A

WUS 3A

WUS 4

WUS 5

WUS 6A

WUS 7A

WUS 12

WUS 13

WUS 3

PFO

PEM

Wetland 1

Legend

Base Map: MDOT 1-Meter Digital Orthophoto September 2004

- Wetland Flag
- Sample Plots
- PEM Wetland Classification
- MAA Property Boundary
- 5 ft. Contour
- WUS
- Delineated Wetland
- Area of Review

Maryland Aviation Administration

Figure 4-A: Field Delineated Wetlands

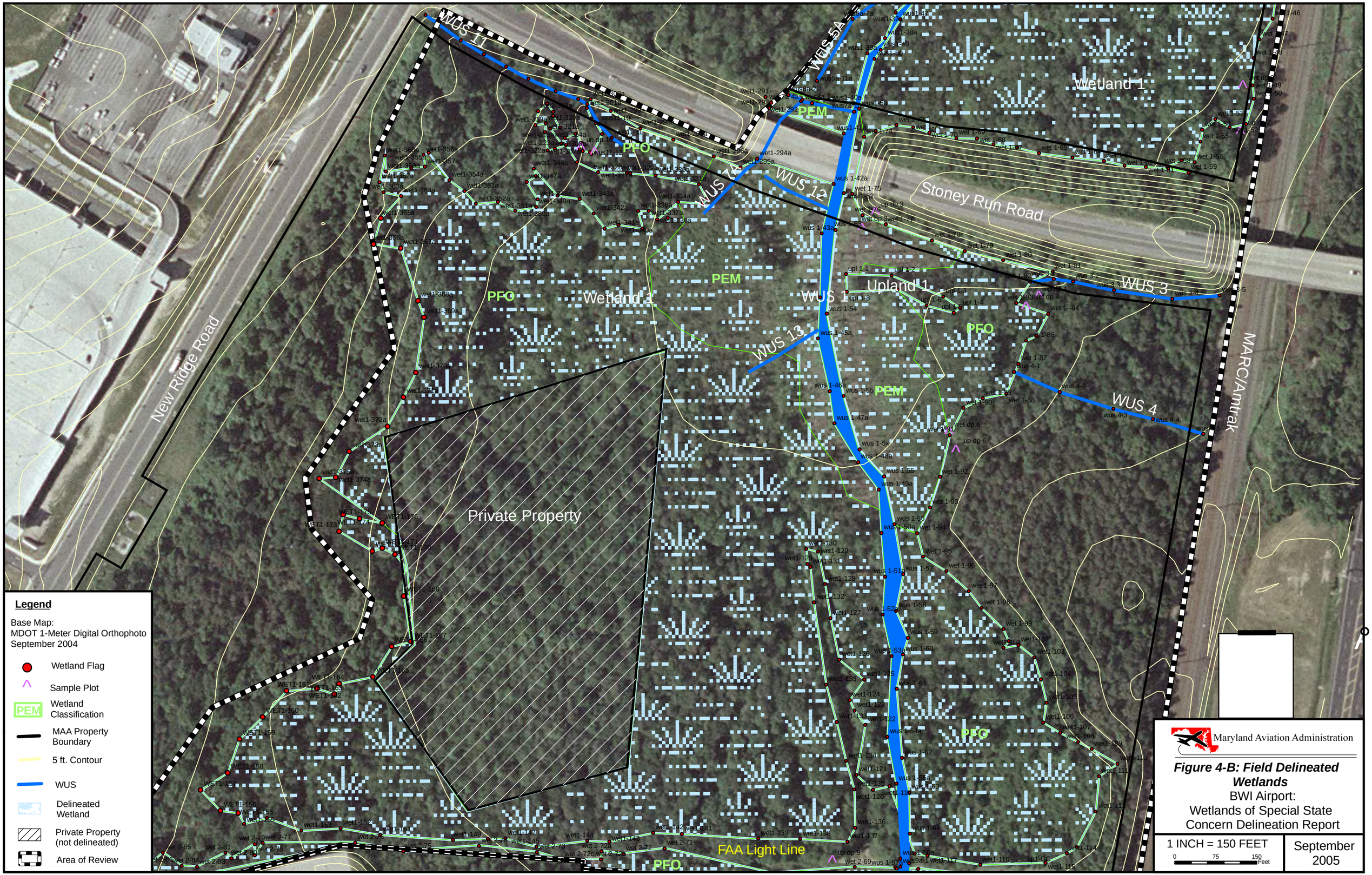
BWI Airport:

Wetlands of Special State Concern Delineation Report

1 INCH = 150 FEET

0 25 50 100 150 200 Feet

September 2005



Legend

Base Map:
MDOT 1-Meter Digital Orthophoto
September 2004

- Wetland Flag
- Sample Plot
- PEM — Wetland Classification
- MAA Property Boundary
- 5 ft. Contour
- WUS
- Delineated Wetland
- Private Property (not delineated)
- Area of Review

Maryland Aviation Administration

Figure 4-B: Field Delineated Wetlands
BWI Airport:
Wetlands of Special State Concern Delineation Report

1 INCH = 150 FEET
0 75 150 Feet

September 2005

FAA Light Line

Wetland 2

WUS 1

WUS 9A

WUS 1D

PFO

PEM

Continues Out of Area of Review

Continues Out of Area of Review

MARC/Amtrak

ation Boulevard

A

Legend

Base Map:
MDOT 1-Meter Digital Orthophoto
September 2004

- Sample Plot
- Wetland Flag
- PEM — Wetland Classification
- 5 ft. Contour
- WUS
- Delineated Wetland
- MAA Property Boundary
- Area of Review

Maryland Aviation Administration

Figure 4-C: Field Delineated Wetlands
BWI Airport:
Wetlands of Special State Concern Delineation Report

1 INCH = 150 FEET
0 25 50 100 150 200 Feet

September 2005

WETLAND IDENTIFICATION AND DELINEATION REPORT

Interim Airport Layout Plan Project Areas
Baltimore/Washington International
Thurgood Marshall Airport

MAA-AE-05-003
Task 12B

October 2008

Maryland Aviation Administration
P.O. Box 8766
BWI Airport, MD 21240-0766

Maryland Aviation Administration

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Appendix D: Wetland Function and Value Assessment Forms

I. Introduction

This Wetland Identification and Delineation Report summarizes the findings of a "Waters of the United States" investigation, including jurisdictional wetlands, for numerous areas of Maryland Aviation Administration (MAA) property associated with the Baltimore/Washington International Thurgood Marshall Airport (BWI Marshall). These areas are scheduled to be developed in association with the BWI Marshall Interim Airport Layout Plan (IALP). Details of the planned development for the areas investigated are provided in that plan.

II. Study Area

The overall study area contains numerous sections that make up the areas of proposed development (project areas) defined on the IALP. The study area includes portions within the secured area of BWI Marshall and some parcels outside the secured area. The majority of the project areas contain previously developed land, including buildings, paved areas, gravel-covered areas, and mowed areas. A few project areas contain forested areas.

III. Investigation

A. Preliminary Data Review

Before the field delineation was conducted, potential stream and wetland areas were identified using the Relay, Maryland (MD) United States Geologic Survey (USGS) 1:24,000 scale quad map (Figure 1); the Maryland Department of Natural Resources (DNR) wetland map (Figure 2) and the National Wetland Inventory (NWI) map for the Relay quadrangle (Figure 2); a previous wetland delineation report, "Comprehensive Wetland Inventory Baltimore/Washington International Airport," conducted for the Airport in July 2001 (Straughan Environmental Services, Inc.) (Figure 3); and the Soil Survey for Anne Arundel County, Maryland [Natural Resources Conservation Service (NRCS) 1973, 2005; Figure 4]. In addition, portions of one project area were already delineated by A.D. Marble & Company in 2007 as part of the Maryland State Highway Administration's (SHA) MD 295 Improvements Study ("Waters of the U.S." Identification and Delineation Report, May 2007). The data from these previous delineations were used where appropriate.

The USGS map identifies numerous intermittent and perennial streams on the Airport property; several segments of them are within the current project areas. Existing streams found within the current project areas include:

- an unnamed tributary to Sawmill Creek that was identified as Fork Branch in the previous wetland delineation. Fork Branch flows through two project areas in the south of the overall study area, and the previous delineation notes wetlands in both areas.
- an unnamed tributary to Stony Run that was identified as Signal Branch in the previous delineation. Signal Branch flows through one project area in the western portion of the study area, outside the secured Airport area, west of MD 170.
- a second unnamed tributary to Stony Run that was identified as Bowden Branch in the previous delineation. The previous delineation shows portions of Bowden Branch and two wetlands within project areas. One of these wetland areas appears on both the NWI and DNR mapping. The second wetland area appears on the DNR wetland mapping.

- a third unnamed tributary to Stony Run that was identified as Kitten Branch in the previous delineation. Kitten Branch is located in the northwestern portion of the Airport. One of the project areas crosses Kitten Branch near the northern edge of the Airport secured area. There is also an unnamed tributary to Kitten Branch noted on the previous delineation that flows through a project area east of the BWI Marshall terminals. This tributary is not shown on the USGS, NWI, or DNR mapping.
- an unnamed tributary to Kitten Branch that was identified as Sachs Branch in the previous delineation. Sachs Branch flows through one of the project areas north of the Airport secured area, but is culverted throughout the study area. The previous delineation notes a wetland associated with this tributary.

One additional wetland from the previous delineation is noted in the project area. This wetland is not found on USGS, DNR, or NWI mapping. It is a wetland associated with the headwaters of King Branch, located north of Bowden Branch. It is identified as Wetland-King 1 in the previous delineation (Figure 3).

The Anne Arundel County Soil Survey (NRCS 1973) was used initially to determine the soil types and classifications within the study area. These were compared to available Geographic Information System (GIS) soil survey mapping updated in 2005 (NRCS 2005). The NRCS Web Soil Survey application was used to check soil survey abbreviations and classifications. This report contains the most updated soil classifications. Additional NRCS web-based applications were also used to obtain soil information, including Soil Data Mart and the Soil Series Name Search Query Facility. One hydric soil unit is found within the study area: Zekiah and Issue soils, 0-2% slopes, frequently flooded (Table 1). It is found in several portions of the study area (Figure 4).

B. Detailed On-site Investigation

The wetland boundaries were delineated by A.D. Marble & Company from November of 2007 through January of 2008 with additional work being conducted in August of 2008. Each of the project areas was field viewed and wetlands and waterways within them delineated and documented. Wetland determinations were made in accordance with the *U.S. Army Corps of Engineers Wetlands Delineation Manual*, *Technical Report Y-87-1* (Environmental Laboratory 1987). This method requires the positive identification of three wetland parameters during normal circumstances: hydrophytic vegetation, hydric soils, and wetland hydrology. After identification and delineation in the field, wetlands and waterways were then classified according to the Cowardin System, as described in *A Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979).

Wetlands boundaries within the study area were flagged with pink and black striped survey ribbon or pink ground flags, while waterways were marked with blue survey ribbon or blue ground flags. Wetland and waterway boundaries were identified within the study area and flagged for verification by the US Army Corps of Engineers (USACE). The flag points were then collected by URS Corporation for inclusion on project mapping (Appendix A). A Trimble GeoXH hand-held GPS device with an external antenna capable of 20cm horizontal accuracy was used to collect the points. Photographs were taken of wetlands and waterways (Appendix B), and observations of vegetation, soils, and hydrology were recorded on USACE Routine Wetland

Determination data forms at representative points located both inside and outside the wetland areas (Appendix C). Wetland Function and Value Assessment Forms were completed for wetlands greater than 0.5 acre in size. These forms are included in Appendix D.

Table 1. Soils located within the Study Area

Soil Type	Symbol	Hydric (Y/N)	Drainage Class
Alloway-Sassafras complex, 2-5% slopes	AfB	N	moderately well to well
Downer-Hammonton complex, 2-5% slopes	DvB	N	moderately well to well
Downer-Hammonton complex, 5-10% slopes	DvC	N	moderately well to well
Downer-Hammonton-Urban land complex, 0-5% slopes	DwB	N	moderately well to well
Downer-Phalanx complex 5-10% slopes	DxC	N	well
Evesboro and Galestown soils, 5-10% slopes	EVC	N	somewhat excessively to excessively
Galestown loamy sand, 0-5% slopes	GaB	N	somewhat excessively
Patapsco, Evesboro, Fort Mott complex, 0-5% slopes	PeB	N	well to excessively
Patapsco-Fort Mott complex, 0-5% slopes	PfB	N	well to somewhat excessively
Patapsco-Fort Mott complex, 5-10% slopes	PfC	N	well to somewhat excessively
Patapsco-Fort Mott complex, 10-15% slopes	PfD	N	well to somewhat excessively
Patapsco,Fort Mott, Urban land complex, 0-5% slopes	PgB	N	well to somewhat excessively
Patapsco,Fort Mott, Urban land complex, 5-15% slopes	PgD	N	well to somewhat excessively
Sassafras fine sandy loam, 2-5% slopes	SaB	N	well
Sassafras fine sandy loam, 10-15% slopes	SaD	N	well
Sassafras-Urban land complex, 5-15% slopes	SnD	N	well
Udorthents, loamy, 0-5% slopes	UoB	N	well
Udorthents, loamy, 5-10% slopes	UoD	N	well
Udorthents, reclaimed gravel pits, 0-5% slopes	UpB	N	well
Urban land	Uz	N	well
Zekiah and Issue soils, 0-2% slopes, frequently flooded	ZBA	Y	poorly to somewhat poorly

Sources: *Anne Arundel County Soil Survey* (NRCS 1973) and the NRCS website

Portions of one of the project areas were investigated by A.D. Marble & Company in January of 2007 in association with the MD 295 Improvements Project. One wetland and two waterways were delineated in this area, and the information from that delineation has been included in this report, rather than duplicating the delineation. The original names given to these areas (Wetland 37, WUS 79, and WUS 80) have been retained in this report.

1. Vegetation

Representative observations of plant species were recorded at each wetland site. Visual estimates of dominant species were identified, along with their vegetative stratum as an herb, woody vine, sapling-shrub, or tree. Species indicator status was determined according to the *National List of Plant Species That Occur in Wetlands: Region 1, Northeast* (Sabine 1999). Hydrophytic vegetation is defined as a plant community with greater than 50 percent of the dominant plant species ranked as obligate wetland (OBL), facultative wetland (FACW), or facultative (FAC or

FAC+). Non-hydrophytic vegetation is defined as a plant community with greater than 50 percent of the dominant plant species ranked as facultative (FAC-), facultative upland (FACU), or upland (UPL). A ranking of no indicator (NI) was assigned to species for which insufficient information was available. Positive (+) or negative (-) modifiers indicate a greater or lesser occurrence in wetland conditions, respectively. An asterisk (*) following a regional indicator identifies a tentative assignment based on limited information from which to determine the indicator status.

2. Soils

A mud auger was used to dig soil test pits at wetland and upland data points to determine if hydric soils were present. The colors of the soil matrix and mottles were described using the Munsell Soil Color Charts (MacBeth Division 1994). Data sheets describing the soil within the project area can be found in Appendix C. Soils were determined to be hydric if soil characteristics matched any of the indicators described in the *U.S. Army Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987) or *Field Indicators of Hydric Soils in the Mid-Atlantic United States* (NRCS 1998). Several areas within the project were disturbed enough to be considered atypical situations. None of the disturbance is recent, but the standard soil horizon structure has been destroyed. In these areas, soils were not used to make a wetland/upland determination.

Hydric soil determinations were made by taking soil readings immediately below the A horizon of the profile or at ten inches, whichever was shallower. Field indicators of hydric soils are observable soil morphologies (redoximorphic features and other indicators) that have formed as a result of physical processes and chemical reactions caused by soil saturation and reducing conditions.

3. Hydrology

Site hydrology was determined during on-site visits conducted from November of 2007 through January of 2008. Hydrologic indicators are based on the *U.S. Army Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) and subsequent guidance papers. The term "wetland hydrology" encompasses all hydrologic characteristics or areas which are periodically inundated or have soils saturated to the surface at some time during the growing season. Primary indicators of wetland hydrology include inundation, saturation in the upper twelve inches of the soil, water marks, drift lines, sediment deposits, or drainage patterns. Secondary indicators of wetland hydrology include oxidized root channels in the upper 12 inches of the soil profile, water-stained leaves, local soil survey data, and FAC-Neutral test, among others. Wetland hydrology is considered present if one primary or two secondary indicators were observed.

C. Wetland Function and Values Assessment

An assessment of wetland functions and values was performed for all wetland systems greater than 0.5 acres in size using the "*New England*" *Method* (USACE 1999). This assessment provides a method of determining the presence and predominance of 13 generally accepted wetland functions. Included in this method are lists of statements supporting or rationalizing the presence or absence of each function. Best professional judgment was then used to identify the potential of

the wetland to perform specific wetland functions. Wetland Function and Value Assessment Forms are included in Appendix D.

IV. Results

The field survey identified 16 wetlands and 11 waterways. A discussion of these wetlands and waterways is provided in the following sections. Wetland and upland data sheets are included in Appendix C.

A. Wetlands

Wetland 1 (Figure 5, Sheet 1; Photos 1-3): Wetland 1 is a palustrine broad-leaved deciduous forested (PFO1) wetland with a small palustrine persistent emergent (PEM1) component. It is located outside the Airport security fence to the south of Dorsey Road. A portion of WUS 1 (Fork Branch) flows through the wetland. The wetland is 1.81 acres in size, of which 1.80 are within the study area. Wetland 1 receives hydrology from Fork Branch, surface water runoff, and groundwater. The dominant vegetation within the PFO1 portion of the wetland is red maple (*Acer rubrum*, FAC), willow (*Salix* sp.), sweetbay magnolia (*Magnolia virginiana*, FACW+), arrow-wood (*Viburnum dentatum*, FAC), northern spicebush (*Lindera benzoin*, FACW-), turtlehead (*Chelone* sp., FACW+ to OBL), sensitive fern (*Onoclea sensibilis*, FACW), netted chainfern (*Woodwardia areolata*, FACW+), and unidentified grasses. The dominant vegetation within the PEM1 portion of the wetland is broad-leaf cattail (*Typha latifolia*, OBL). The wetland was inundated in some areas and saturated to the surface in additional areas, as well as having drainage patterns and water marks. Soils in the PFO1 portion of the wetland had a matrix color of 2.5Y 5/2 with brighter (2.5Y 3/3) mottles at ten inches, while soils in the PEM1 section had a matrix color of 10YR 5/1 in the B-horizon. Wetland 1 performs the primary functions and values of floodflow alteration and sediment/toxicant retention.

Wetland 2 (Figure 5, Sheet 3; Photos 4-6): Wetland 2, formerly delineated as wetlands SB-1 and SB-2, is a PFO1 wetland located outside the Airport security fence, west of MD 170 and just north of its intersection with Mathison Way. The wetland is approximately 1.31 acres in size, of which 0.25 acre is located within the study area. The wetland is dominated by red maple (FAC) and cinnamon fern (*Osmunda cinnamomea*, FACW). It contains a narrow PEM1 portion located along the Amtrak/MARC lines; this area is significantly disturbed and contains a diverse vegetative community with no clearly dominant species. Wetland 2 receives hydrology from WUS 2 (Signal Branch), surface water runoff and groundwater. It continues beyond the study area to the south. At the time of the investigation, Wetland 2 was saturated to the surface; the B-horizon soils had a matrix color of 2.5Y 4/1 with 2.5Y 5/2 mottles. Wetland 2 surrounds a portion of WUS 2 and performs the primary functions and values of floodflow alteration and sediment/shoreline stabilization.

Wetland 3 (Figure 5, Sheet 4; Photo 7): Wetland 3 is a 0.02-acre PEM1 wetland located in a stormwater management ditch that empties into WUS 3. It receives hydrology from surface water runoff. The wetland is located outside the Airport security fence to the west of I-195, in the approach to Runway 15R, and is entirely within the study area. The dominant vegetation within the wetland is broadleaf cattail (OBL). At the time of the investigation, the wetland contained

areas of inundation as well as saturation to the surface. Water marks and sediment deposits were also present. Soils were disturbed during the creation of the ditch, but they met hydric criteria.

Wetland 4 (Figure 5, Sheet 4; Photo 8): Wetland 4 is approximately 0.1 acre in size with 0.01 acre being located in the study area. The wetland continues beyond the project area to the west, sloping down to an ephemeral tributary to WUS 3. It is a PEM1 wetland located approximately 200 feet southwest of Wetland 3, also in the approach to Runway 15R. The dominant vegetation within the wetland was unidentified grasses, soft rush (*Juncus effusus*, FACW+), wool-grass (*Cyperius strigosus*, FACW), swamp smartweed (*Polygonum hydropiperoides*, OBL), and an unidentified sedge (*Carex* sp.). The wetland also contained one willow and one silky dogwood (*Cornus amomum*, FACW). At the time of the field investigation, the area was saturated to the surface, contained drainage patterns, and there were oxidized root channels in the upper 12 inches. Soils of the B-horizon had a matrix color of 2.5Y 5/2 with brighter mottles (5YR 5/8 and 10YR 6/8). The portion of the wetland within the study area is part of a mowed field. Wetland 4 receives hydrology from surface water runoff and groundwater.

Wetland 5 (Figure 5, Sheet 4; Photos 9 and 10): Wetland 5 is 0.26 acre in size with 0.14 acre being located in the study area. It is approximately 125 feet south of Wetland 3, near the approach to Runway 15R. It is adjacent to WUS 3 and continues beyond the study area to the west. Within the study area, Wetland 5 is a palustrine scrub-shrub broad-leaved deciduous (PSS1) wetland with a small PEM1 portion in the center. The PSS1 area is dominated by arrow-wood (FAC), speckled alder (*Alnus rugosa*, FACW+), red maple (FAC), and cinnamon fern (FACW). The PEM1 area is dominated by narrow-leaved cattail (*Typha angustifolia*, OBL) and sensitive fern (FACW). At the time of the field investigation, the wetland was saturated to the surface and also contained water marks, drainage patterns, and water-stained leaves. The soils of the B-horizon had a matrix color of 10YR 4/2 with brighter mottles (5YR 5/8 and 2.5Y 6/3). Wetland 5 receives hydrology from surface water runoff and groundwater.

Wetland 6 (Figure 5, Sheet 5; Photo 11): Wetland 6 is a 0.02-acre PEM1 wetland located within a stormwater management channel. It is located outside the Airport security fence within the I-195/MD 170 interchange and entirely within the study area. The wetland is dominated by narrow-leaf cattails (OBL) but also contains one shrub willow. At the time of the investigation, the area was saturated to the surface and contained drift marks. It receives hydrology from surface water runoff. The wetland has a rip-rap substrate, so soils were not investigated; however, hydric soils were assumed due to the dominance of OBL vegetation. Wetland 6 is isolated.

Wetland 7 (Figure 5, Sheet 3; Photos 12 and 13): Wetland 7 is a 0.23-acre PFO1 wetland located west of MD 170, north of Mathison Way, and just north of Wetland 2. It was delineated because a portion of the wetland appeared to be in the study area, but once the mapping was complete, the wetland is entirely outside the project area. Wetland 7 is dominated by red maple (FAC) and cinnamon fern (FACW) and contains a very small PEM1 portion along the Amtrak/MARC lines. The PEM1 area is significantly disturbed and is dominated by Asiatic tearthumb (*Polygonum perfoliatum*, FAC*), deer-tongue witchgrass (*Dicanthelium clandestinum*, FAC+), goldenrod, and unidentified grasses. At the time of the field investigation the wetland contained areas that were inundated and saturated to the surface, as well as water-

stained leaves. Wetland 7 is a slight depression and receives hydrology from surface water runoff and, potentially, groundwater. Soils of the B-horizon had a matrix color of 10YR 3/2 with brighter mottles (2.5Y 4/3). Wetland 7 is isolated.

Wetland 8 (Figure 5, Sheet 1; Photo 14): Wetland 8, previously delineated as wetland FB-2, is a PEM1 wetland located inside the Airport security fence, just south of Runway 33L. The portion of Wetland 8 that is within the study area is 0.02 acre in size. It is dominated by soft rush (FACW+), straw-color flatsedge (*Cyperus strigosus*, FACW), dotted smartweed (*Polygonum punctatum*, OBL), broad-leaf cattail (OBL), and switchgrass (*Panicum virgatum*, FAC). It receives hydrology from surface water runoff and groundwater. Wetland 8 contains oxidized root channels and had a low chroma matrix color in the B-horizon (2.5Y 3/1). It joins Wetland 9 outside the study area and is part of the wetland/stream complex that also includes WUS 1 (Fork Branch), Wetland 1, and Wetland 17. A functional assessment was conducted for the Wetland 8/Wetland 9/Wetland 17 complex. As a unit, these wetlands perform the primary functions and values of groundwater discharge and floodflow alteration.

Wetland 9 (Figure 5, Sheet 1; Photo 15): Wetland 9, previously delineated as wetland FB-2, is a PEM1/PSS1 wetland that borders WUS 1 (Fork Branch). Wetland 9 is located inside the Airport security fence at the end of Runway 33L. The portion located within the study area is 0.02 acre in size. This wetland is dominated by soft rush (FACW+), dotted smartweed (OBL), broad-leaf cattails (OBL), sensitive fern (FACW), a sedge, unidentified grasses, and shrub-sized black willow (*Salix nigra*, FACW+). The soil was saturated to the surface and drainage patterns and water-stained leaves were present in the wetland. Wetland 9 receives hydrology from WUS 1 and groundwater. Soils within the B-horizon had a low chroma matrix color (10YR 4/2) with brighter mottles (7.5YR 4/6).

Wetland 10 (Figure 5, Sheet 6; Photos 16 and 17): Wetland 10, previously delineated as wetland B5, is a 0.31-acre PEM1 wetland located inside the Airport security fence, near the end of Runway 10. The portion of Wetland 10 located within the study area is 0.09 acre in size. The wetland is dominated by broad-leaf cattail (OBL) within the inundated area surrounded by a fringe of swamp smartweed (OBL). The majority of the wetland was inundated at the time of the investigation. The fringe was saturated to the surface and water marks and drift lines were noted. Wetland 10 receives hydrology from WUS 4 (Bowden Branch) and surface water runoff. Soils were sandy and a complete soil profile could not be obtained. However, due to the dominance of OBL vegetation, hydric soils were assumed. WUS 4 enters Wetland 10 from the east and exits from the southern portion of the wetland; its channel becomes diffuse and is lost within the wetland.

Wetland 11 (Figure 5, Sheet 7; Photo 18): Wetland 11, previously delineated as wetland King-1, is a 0.16-acre PFO1/PEM1 wetland located east of the MD 170/Stoney Run Road interchange inside the Airport security fence. The portion of Wetland 11 that is located within the study area is 0.02 acre in size. The wetland is a depressional area with minimal herbaceous vegetation in the center [cinnamon fern (FACW), a sedge, and unidentified grasses] with red maple (FAC) and persimmon (*Diospyros virginiana*, FAC-) on the edges. The area was saturated to the surface and water filled the soil pit to within 4 inches of its top. Water marks and oxidized root channels were also present. The soils of the B-horizon have a low-chroma soil color (10YR 5/2) with

brighter mottles (10YR 5/3 and 10YR 5/6). The wetland receives hydrology from surface water runoff and groundwater. Wetland 11 continues beyond the study area to the east and the west. To the west it is more channel-like. The wetland is interrupted by a service road within the study area. The wetland channelizes through fill slopes immediately adjacent to the road on both sides and flows are culverted under the road. This area was excluded from the delineated wetland.

Wetland 14 (Figure 5, Sheet 5; Photo 19): Wetland 14, previously delineated as wetland KB-3, is an approximately 1.43-acre PEM1 wetland outside the Airport security fence near the end of Runway 15R. Approximately 0.04 acre of this wetland is located within the study area. Wetland 14 had been recently mowed and contained little vegetation at the time of the investigation. Dominant species were primarily determined from stubble and other plant pieces present at the time of the investigation. The wetland was dominated by common reed (FACW), rough cocklebur (*Xanthium strumarium*, FAC), curly dock (*Rumex crispus*, FACU), a smartweed, and an unidentified sedge. Soils were saturated to the surface and inundated areas, drift lines, and water-stained mowed plant segments were present. Soils in the B-horizon had a low-chroma matrix color (10YR 5/2) with brighter mottles (10YR 3/6 and 10YR 5/4). Wetland 14 receives hydrology from surface water runoff, groundwater, and WUS 7 (Sachs Branch), which emerges from a culvert within the wetland. Wetland 14 continues beyond the study area to the west. It performs the function and value of floodflow alteration.

Wetland 15 (Figure 5, Sheet 6; Photo 20): Wetland 15, previously noted as a mowed wetland area identified as "Bowden Branch Tributary," is located in a ditch outside the Airport security fence. It continues beyond the fence, into the secured area, but that portion was not delineated because it is outside the study area. Approximately 0.01 acre of Wetland 15 are located within the study area. The wetland is dominated by straw-color flatsedge (FACW), swamp smartweed (OBL), barnyard grass (*Echinochloa crusgalli*, FACU), marsh seedbox (*Ludwigia palustris*, OBL), and soft rush (FACW+). Hydrology was evidenced by water marks. Soils were disturbed, presumably from past grading in the area, and were not utilized for the wetland determination. There is a pile of riprap in the wetland, which appears to be used as a way for small vehicles to cross the ditch. This area was not included in the wetland boundary, as it was vegetated with climbing nightshade (*Solanum dulcamara*, FAC-). Wetland 15 receives hydrology from stormwater runoff.

Wetland 16 (Figure 5, Sheet 8; Photo 21): Wetland 16 is located adjacent to Sanitary Sewer Manhole #7 between the proposed perimeter road and WUS 5 (Kitten Branch). It is approximately 0.04 acre in size and is not located within a project area. Wetland 16 was not identified during the previous delineation. Wetland 16 is dominated by swamp smartweed (OBL), straw-colored flat-sedge (FACW), and barnyard grass (FACU). Portions of the wetland were inundated, and there were sediment deposits in other areas. Soils in the B-horizon had a low-chroma matrix color (10YR 4/2) with brighter mottles (10YR 4/6 and 10YR 6/4).

Wetland 17 (Figure 5, Sheet 2; Photo 22): Wetland 17 begins where two culverts outlet from under Runway 15R-33L. It is the beginning of WUS 1 (Fork Branch). Only a small portion of Wetland 17, approximately 0.01 acre, is located within the study area. The wetland contains flow dissipaters and portions of it are concrete lined, portions are rip-rapped, and portions are natural. Vegetation within Wetland 17 is diverse and includes arrow-leaf tearthumb (*Polygonum*

sagittatum, OBL), Asiatic dayflower (*Commelina communis*, FAC-), rice cutgrass (*Leersia oryzoides*, OBL), Norwegian cinquefoil (*Potentilla norvegica*, FACU), swamp smartweed (OBL), late-flowering thorough-wort (*Eupatorium serotinum*, FAC-), trailing wildbean (*Strophostyles helvola*, FACU-), common greenbrier (*Smilax rotundifolia*, FAC), green bulrush (*Scirpus atrovirens*, OBL), poison ivy (*Toxicodendron radicans*, FAC), and a few shrub persimmon (FAC-). Evidence of hydrology included saturation to the surface, sediment deposits, and drainage patterns. Soils in the B-horizon had a low-chroma color (10YR 6/2) with brighter mottles (10YR 6/6).

Wetland 37 (Figure 5, Sheet 6; Photo 23): Wetland 37, previously delineated as wetland BB2, is a PEM1 wetland west of MD 170 and south of Stoney Run Road outside the Airport security fence. The wetland is 0.47 acre in size, with 0.16 acre located within the study area. It is a depressional area, receiving its hydrology from stormwater runoff. The northeastern portion of the wetland is a linear, channel-like feature that contained ponded water. It appears to have been dug as a stormwater channel. This feature outlets into WUS 80. The dominant vegetation of Wetland 37 consists of soft rush (FACW+), broad-leaf cattail (OBL), wool-grass (FACW+), and unidentified grasses. The wetland was inundated in some areas and saturated to the surface in other areas. Soils were disturbed, presumably from past grading activity, but meet hydric criteria. Several small upland areas were included in the wetland boundaries. They appear to have been created during the installation of the approach light system for Runway 10. This area was previously delineated by A.D. Marble & Company in January 2007 as part of a different project (SHA 2007).

B. Waterways

WUS 1 (Figure 5, Sheet 1; Photos 24 and 25): WUS 1, Fork Branch, is a stream that flows through or adjacent to several project areas within the study area. It begins as Wetland 17 at two culverts inside the Airport security fence and runs in a southeasterly direction along Runway 15R-33L. The channel picks up additional hydrology and becomes a perennial waterway before it exits the Airport security fence. One study area crosses the watercourse within the security fence near Dorsey Road. In this area, Fork Branch is a perennial stream from three to six feet wide and one foot deep. WUS 1 is culverted under Dorsey Road through two small pipe culverts. To the south of Dorsey Road, WUS 1 flows through Wetland 1. Fork Branch continues beyond the project area, paralleling it for a time. Within Wetland 1, WUS 1 is approximately five feet wide and contained approximately four inches of water at the time of the investigation. This water was primarily pooled, with little apparent flow. The channel is approximately one foot deep and four to six feet wide. It contains little vegetation and has a substrate of sandy silt. Fork Branch is a low-gradient stream with stable banks. According to the USGS map, WUS 1 is a tributary to Sawmill Creek. Approximately 535 linear feet of the stream are located within project areas, 15 linear feet of which are within a culvert.

WUS 2 (Figure 5, Sheet 3; Photo 26): WUS 2, Signal Branch, is a perennial stream that flows through Wetland 2. It begins within the Airport security fence but was not delineated in this area, as it was not within the study area. It is culverted under MD 170 and enters the study area on the western side of the road. It flows in a westerly direction through Wetland 2, then is culverted under the Amtrak/MARC lines before confluencing with Stony Run. Approximately 50 linear

feet of WUS 2 are located within the project area. Within the study area, Signal Branch is approximately three feet wide, with bank heights ranging from one to two feet. It contained approximately two inches of water at the time of the investigation. There was no evidence of flow at the culvert outlet, but there were signs of flow further downstream. The channel contained some algae. WUS 2 is a low-gradient stream with stable banks. On the USGS map it is a tributary to Stony Run.

WUS 3 (Figure 5, Sheet 4; Photo 27): WUS 3 is located west of I-195 outside the Airport security fence. It is a perennial stream that enters the study area through a culvert under the BWI Marshall bike trail. Within the study area, the watercourse flows in a southwesterly direction. It passes Wetland 3, from which it receives flow, is culverted under an access road, then flows adjacent to Wetland 5. There is a significant change in elevation downstream of the culvert under the access road. Following this drop, the stream is deeply incised with unstable banks. These banks range from six to more than eight feet high and are approximately six feet wide at the narrowest section but near thirty feet wide near the outlet of the culvert under the access road. The stream substrate is composed of small cobble, gravel, and sand. At the time of the investigation, the stream contained flow approximately two feet wide and one inch deep. Fish were observed within the stream. There are approximately 271 linear feet of WUS 3 located within the study area; of this length, 121 linear feet are located within culverts. The USGS map shows WUS 3 as an unnamed tributary to Stony Run. The previous delineation did not include this area.

WUS 4 (Figure 5, Sheet 6; Photos 28 and 29): WUS 4, Bowden Branch, supplies hydrology to Wetland 10. It enters the wetland from the east, after having been culverted under the Airport perimeter road. In this area, the watercourse is approximately six feet wide with banks of one to two feet. At the time of the investigation, it contained flow approximately four feet wide and several inches deep. The substrate is composed of rip-rap at the culvert outlet and a mixture of sand and gravel beyond that. The channel contained vegetation in areas, including algae, unidentified submergents, soft rush, common wintercress (*Barbarea vulgaris*), and unidentified grasses. The channel enters Wetland 10, becomes diffuse, and disappears within the wetland. There is an outlet channel at the far end of the wetland. This channel was not flowing at the time of the investigation, but it was flagged as a continuation of WUS 4. At the outlet, the channel ranges in size from several inches to several feet. At the wetland outlet, the substrate is sand and small gravel; further down the channel, there is a section of large rip-rap, and a portion of the channel is concrete lined. There are signs of significant flow during storm events. The watercourse turns and continues beyond the study area to the north. There are approximately 142 linear feet of WUS 4 located within the project area. The USGS map shows the watercourse as a tributary to Stony Run.

WUS 79 (Figure 5, Sheet 6; Photo 30): WUS 79 is a section of WUS 4 (Bowden Branch) that is located outside the Airport security fence west of MD 170 and south of Stoney Run Road. This section was previously delineated by A.D. Marble & Company in January 2007 as part of a different project (SHA 2007). It is an ephemeral channel that carries water from a culvert under MD 170 to a culvert under the Amtrack/MARK railway line, presumably emptying into the Wetland of Special State Concern located in that area. The waterway is approximately five feet wide at its eastern end, but narrows to approximately two feet at its western end. During the field

investigation, it contained approximately four inches of standing water at its eastern end, but was dry at its western end. There are approximately 155 linear feet of WUS 79 within the project area, 14 linear feet of which are within a culvert.

WUS 80 (Figure 5, Sheet 6; Photo 31): WUS 80 is an ephemeral channel that carries stormwater and overflow from Wetland 37 to WUS 79 (WUS 4, Bowden Branch), located outside the Airport security fence. WUS 80 is approximately three feet wide with a silt substrate. It is approximately 130 feet long and contained no water at the time of the survey. This channel appears to have been delineated as part of wetland BB2 during the previous delineation and was also delineated by A.D. Marble & Company in January 2007 as part of a different project (SHA 2007).

WUS 5 (Figure 5, Sheet 8; Photo 32): WUS 5, Kitten Branch, is a perennial watercourse that runs parallel to Runway 15R-33L inside the Airport security fence. Within the study area, WUS 5 ranges in width from 6 to 15 feet with banks approximately 4 feet in height. It was flowing approximately three feet wide and several inches deep at the time of the investigation; pooled areas reached several feet in depth. There was little vegetation in the channel, though some areas contained algae. The banks are well vegetated and stable, with some undercutting evident. The watercourse enters the project area from the southeast and exits to the northwest. There are approximately 67 linear feet of WUS 5 within the study area. The USGS map shows the watercourse as an unnamed tributary to Stony Run. In addition, a portion of Kitten Branch near its headwaters appears to be culverted under another project area. This portion of the watercourse was not delineated, as it was not visible within the project area, but is estimated to be 114 feet in length.

WUS 6 (Figure 5, Sheet 9; Photo 33): WUS 6 is located southeast of the portion of WUS 5 (Kitten Branch) that is within the study area. WUS 6 is located within the Airport security fence. It is a perennial stream that enters the study area through a culvert under Runway 15R-33L before emptying into WUS 5. Within the study area, the stream's substrate is rip-rap, though there is some natural gravel in evidence. The banks of the stream are approximately four feet wide and one foot high. At the time of the investigation, the stream was flowing approximately four feet wide and six inches deep. There is a small amount of vegetation in the channel (sedge and willow). The banks are rip-rapped, but they are vegetated with Japanese honeysuckle (*Lonicera japonica*) and bittersweet (*Celastrus orbiculata*). The watercourse does not appear on the USGS map and was considered part of Kitten Branch in the previous delineation. There are approximately 91 linear feet of WUS 6 located within the study area. Of this distance, an estimated 65 feet are carried by a culvert.

WUS 7 (Figure 5, Sheet 5; Photo 34): WUS 7, Sachs Branch, is a perennial stream that is culverted through the study area from within the southwestern loop ramp of the MD 170/I-195 interchange to south of the ramp from MD 170 to I-195, outside the Airport security fence. WUS 7 was delineated within a portion of Wetland 14. It exits a culvert that is located below ground level within the wetland. It forms a pool at the culvert outlet, but this soon becomes channelized flow. The stream is approximately four feet wide with banks two to three feet high. At the time of the investigation, it was flowing approximately one-and-one-half feet wide and three inches deep. The stream bed supported some algae. This watercourse is shown as a tributary to Stony

Run on the USGS map. There is an estimated 172 linear feet of WUS 7 within the study area, all of which are within a culvert.

WUS 8 (Figure 5, Sheet 8; Photo 35): WUS 8 is an ephemeral channel that carries runoff to WUS 5, Kitten Branch. It begins west of WUS 5 near the Northrop Grumman complex. WUS 8 is approximately two feet wide. It is deeply incised in areas, up to approximately 5 feet. There was no water in the channel at the time of the survey.

WUS 9 (Figure 5, Sheet 5; Photo 36) is an ephemeral channel that carries road runoff to WUS 7, Sachs Branch. The confluence with WUS 7 is outside the study area. WUS 9 is approximately two feet wide and four inches deep. Its channel appears to have been dug and seems to receive more water as overflow from WUS 7 than from upstream. An area adjacent to the channel that contained hydrophytic vegetation was investigated for wetland characteristics, but it did not meet the soils criteria (Plot 34).

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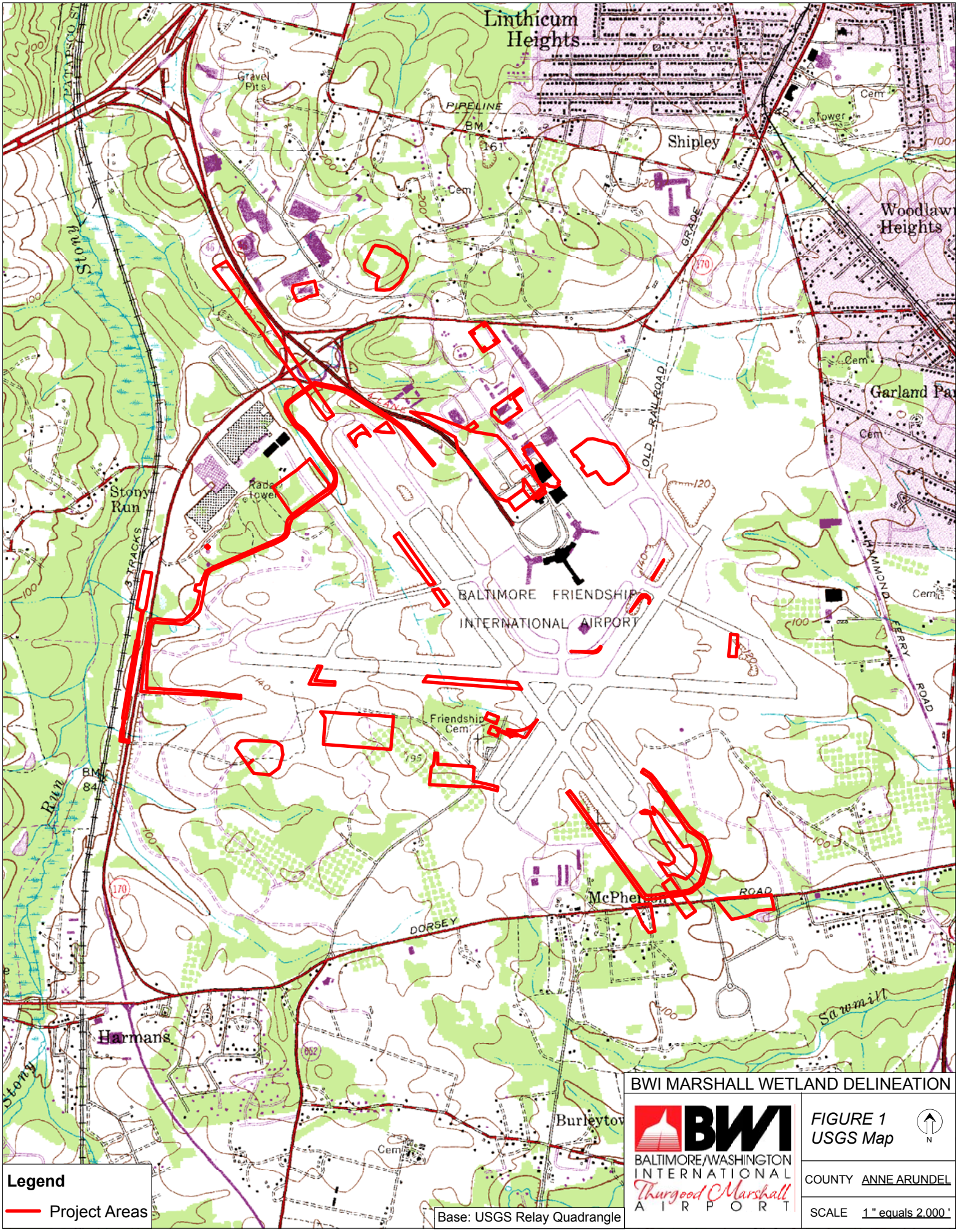
Appendix A:
Figures


Linthicum Heights
Gravel Pits
PIPELINE
BM 161
Shipley
Cem
Tower
Woodlawn Heights
GRADE
Stony Run
Garland Park
OLD RAILROAD
Radar Tower
TRACKS
BALTIMORE FRIENDSHIP INTERNATIONAL AIRPORT
HAMMOND FERRY ROAD
Friendship Cem
BM 84
McPherson
DORSEY ROAD
Harmans
Sawmill
Burleytown
Legend
Project Areas
Base: USGS Relay Quadrangle
BWI MARSHALL WETLAND DELINEATION
BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT
FIGURE 1
USGS Map
N
COUNTY ANNE ARUNDEL
SCALE 1 " equals 2,000 '

Legend
DNR Wetlands
NWI Wetlands
Project Areas
Aerial: MAA 2007
Wetlands: DNR - Relay Quadrangle,
NWI - Anne Arundel County
BWI MARSHALL WETLAND DELINEATION
BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT
FIGURE 2
DNR and NWI
Wetlands Map
N
COUNTY ANNE ARUNDEL
SCALE 1 " equals 1,400 '

Legend
Project Area
Stream
Wetland Mowing Area
COE Jurisdictional Pond
Stormwater Management Pond
Temporary Stormwater Facility
COE Jurisdictional Wetland
Wetland
Area of Special State Concern
TRIBUTARY OF SACHS BRANCH JD #200062835
WETLAND SAB-2 JD #200062835
SACHS BRANCH JD #200062835
WETLAND SAB-1 JD #200062835
WETLAND KB-4 JD #200062835
WETLAND KB-3 JD #200062835
KITTEN BRANCH JD #200062835
STONY RUN TRIBUTARY 2 JD #200260935
WETLAND J JD #200260935
WETLAND I JD #200260935
WATERWAY JD #200260935
STONY RUN TRIBUTARY 1 JD #200260935
WETLAND SR-7 JD #200260935
WETLAND H JD #200260935
WETLAND F JD #200260935
KING BRANCH JD #200260935
WETLAND D JD #200260935
WETLAND E JD #200260935
WETLAND C JD #200260935
KING BRANCH JD #200260935
EPHEMERAL CHANNEL TO BOWDEN BRANCH 1 (BB-EC1) JD #200260935
WETLAND KING-2 JD #200260935
KING BRANCH JD #200062835
WETLAND SR-6 JD #200260935
WETLAND KBT-3 JD #200062835
WETLAND KBT-4 JD #200062835
KITTEN BRANCH TRIBUTARY JD #200062835
WETLAND KING-1 JD #200062835
WETLAND KB-2 JD #200062835
KITTEN BRANCH JD #200062835
WETLAND KB-1 JD #200062835
WETLAND BB-1 JD #200260935
WETLAND A JD #200260935
WETLAND KBT-2 JD #200062835
WETLAND KBT-1 JD #200062835
WETLAND KB-5 JD #200062835
WETLAND B JD #200260935
WETLAND SR-3 JD #200260935
WETLAND KB-7 JD #200062835
WETLAND KB-6 JD #200062835
WETLAND SR-4 JD #200260935
WETLAND BB2 JD #200260935
EPHEMERAL CHANNEL TO BOWDEN BRANCH 3 (BB-EC3) JD #200260935
BOWDEN BRANCH TRIBUTARY JD #200062835
BOWDEN BRANCH
WETLAND SB-2 JD #200260935
WETLAND SB-1 JD #200260935
MATHISON WAY
SIGNAL BRANCH JD #200062835
HAWKINS BRANCH
STONY RUN
HAWKINS BRANCH
WETLAND HB-1 JD #200062835
CLARK BRANCH
WETLAND FB-1 JD #200062835
WETLAND FB-2 JD #200062835
FORK BRANCH JD #200062835
PHELPS BRANCH JD #200062835
WETLAND PB-1 JD #200062835
DORSEY ROAD
IRVING BRANCH
UNNAMED TRIBUTARY OF SAWMILL CREEK
MUDDY BRIDGE BRANCH JD #200062835
PALUSTRINE FORESTED/ EMERGENT WETLAND MAA/SHA MITIGATION SITE
CABIN BRANCH
B1
B2
B3
B4
B5
B6
B7
B8
B9
B10
B11
B12
B13
B15
B16
B17
B18
B19
BWI MARSHALL WETLAND DELINEATION
BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT
FIGURE 3 Previous Delineation Map
N
COUNTY ANNE ARUNDEL
SCALE 1 " equals 1,150 '
Aerial: MAA 2007
Features: Straughan Environmental Services

Legend
Soil Units
Hydric Soils
Project Areas
Aerial: MAA 2007
Soils: NRCS 2005
BWI MARSHALL WETLAND DELINEATION
BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT
FIGURE 4
Soils Map
N
COUNTY ANNE ARUNDEL
SCALE 1 " equals 1,400 '

WUS 3
WET 3
WET 4
WET 5
I-195
MD 170
Aviation Blvd.
Sheet 4
WET 6
WUS 9
Sheet 5
MD 170
Aviation Blvd.
WUS 7
WET 14
Runway 15R
WUS 8
WET 16
Sheet 8
WUS 5
Stoney Run Rd.
WET 11
Sheet 7
WUS 6
Sheet 9
WUS 79
WUS 80
WET 37
WET 15
Sheet 6
WUS 4
WET 10
WET 7
Sheet 3
WUS 2
WET 2
Mathison Way
WET 17
Sheet 2
WUS 1
WET 8
WET 9
Runway 33L
MD 170
Aviation Blvd.
MD 176
Dorsey Road
Sheet 1
WUS 1
WET 1
Legend
WUS
Wetland
Map Sheets
Project Areas
Aerial: MAA 2007
BWI MARSHALL WETLAND DELINEATION
FIGURE 5: Wetlands & Waterways Map
BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT
Overview Sheet
N
COUNTY ANNE ARUNDEL
SCALE 1 " equals 1,250 '

WUS 1-49
WUS 1-48
WET 9
WUS 1-47
WET 9-3
WET 9-2
WET 9-1
WUS 1-46
WET 9-4
WUS 1-50
WUS 1a-50
WET 9-5
WUS 1-45
1a-48
1a-49
WUS 1-44
15
9-16
9-17
9-18
WUS 1
WET 9-6
WET 9-7
9-15
1a-47
1a-46
WUS 1-43
9-14
WET 8-9
WUS 1-42
P16
1a-44
WET 8-10
WET 9-8
1a-43
WET 8-8
P15
WET 9-9
9-13
WET 8-7
WET 8-11
WET 8-12
WUS 1-41
24
1a-42
WUS 1-40
P17
WET 8-6
WET 9-10
1a-41
9-12
WET 8-13
WUS 1-39
9-11
WET 8-5
14
WUS 1-40a
WET 8-14
WET 8-4
WET 8-15
WET 8-3
WET 8-16
WET 8
WET 8-17
WET 8-2
WET 8-18
WET 8-1

Dorsey Road

Sheet 1

WET 1-50
WET 1-49
WET 1-48
P2
2
WET 1-1
WET 1-47
WET 1-44
WET 1-46
WUS 1-1
WET 1-45
WUS 1a-1
WET 1-2
WUS 1-2
WET 1-43
WUS 1

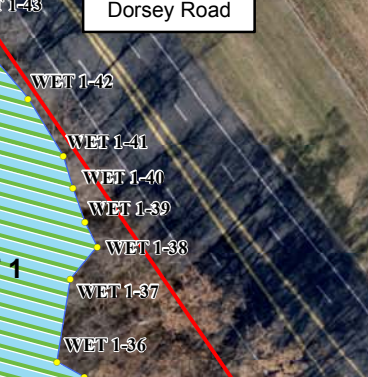
WUS 1 is culverted under Dorsey Road

WUS 1-3
WUS 1-4
WUS 1a-2
WET 1-42
WET 1-3
WUS 1a-3
WET 1-41
WUS 1-5
WUS 1a-4
WET 1-4
WET 1-40
WUS 1a-5
WET 1-39
WUS 1-6
WET 1-38
WET 1-5
WUS 1a-6
WET 1
P1
1
WET 1-37
WUS 1-7
WUS 1a-7
WET 1-6
WUS 1-8
WUS 1a-8
WET 1-36
WUS 1-9
WUS 1a-9
WET 1-7
WUS 1a-10
WET 1-35
WUS 1-10
WUS 1a-11
WET 1-34
WET 1-8
WUS 1-11
WUS 1a-12
P3
WUS 1-12
WET 1-33
3
WET 1-32
WUS 1a-13
WET 1-9
WUS 1-13
WUS 1a-14
WET 1-31
WET 1-10
WUS 1-14
WUS 1a-15
WET 1-30
WUS 1-15
WUS 1a-16
WET 1-15
WUS 1a-17
WET 1-11
WUS 1-16
WET 1-12
WUS 1-17
WET 1-29
WUS 1a-19
WET 1-13
1-18
WET 1-14
WUS 1a-20
WET 1-16
WET 1-28
WET 1-17
WET 1-18
WET 1-27
WET 1-19
WUS 1-19
WUS 1a-21
WET 1-20
WUS 1-20
WET 1-21
25
WUS 1a-22
WET 1-22
WET 1-23
WET 1-24
WET 1-25
WUS 1-21
WUS 1-23
WET 1-26
WUS 1-22

Legend

- Wetland
- Wetland Continues
- WUS
- WUS Continues
- WUS Flow Direction
- Data Point
- Flag
- Photo Location
- Project Areas

Aerial: MAA 2007



BWI MARSHALL WETLAND DELINEATION

FIGURE 5: Wetlands & Waterways Map

BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Sheet 1 of 9

N

COUNTY ANNE ARUNDEL

SCALE 1 " equals 100 '

WET 17

WET 17-1
WET 17-2
WET 17-3
WET 17-4
WET 17-5
WET 17-6
WET 17-7
WET 17-8
WET 17-9
WET 17-10
WET 17-11
WET 17-12
WET 17-13
WET 17-14
WET 17-15
WET 17-16
WET 17-17
WET 17-18
WET 17-19
WET 17-20
WET 17-21
WET 17-22
WET 17-23
WET 17-24
WET 17-25
WET 17-26

P32
P33
22

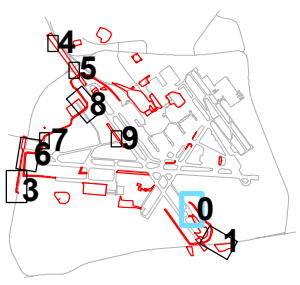
Sheet 2

Runway 33L

Legend

- Wetland
- Wetland Continues
- Data Point
- Flag
- Photo Location

Aerial: MAA 2007



BWI MARSHALL WETLAND DELINEATION

FIGURE 5: Wetlands & Waterways Map

BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Sheet 2 of 9

N

COUNTY ANNE ARUNDEL

SCALE 1 " equals 100 '

Sheet 6

Aviation Blvd.

MD 170

Mathison Way

Sheet 3

WET 7

WET 7-9
WET 7-8
WET 7-7
WET 7-9a
WET 7-10
WET 7-6
WET 7-11
WET 7-5
WET 7-13
WET 7-12
WET 7-4
WET 7-3
WET 7-14
WET 7-1
WET 7-2

P14
P13
12
13

WET 2

WET 2-30
WET 2-31
WET 2-29
WET 2-32
WET 2-28
WET 2-33
WET 2-27
WET 2-34
WET 2-26
WET 2-35
WET 2-25
WET 2-36
WET 2-24
WET 2-37
WET 2-23
WET 2-38
WET 2-22
WET 2-39
WET 2-21
WET 2-20
WET 2-40
WET 2-18B
WET 2-19
WET 2-18A
WET 2-41
WET 2-18
WET 2-17
WET 2-13
WET 2-42
WET 2-10
WET 2-12
WET 2-16
WET 2-9
WET 2-15
WET 2-8
WET 2-43
WET 2-7
WET 2-6
WET 2-11
WET 2-14
WET 2-44
WUS 2-19
WUS 2-18
WUS 2-20
WET 2-45
WUS 2a-19
WUS 2a-18
WUS 2a-16
WUS 2a-15
WET 2-46
WET 2-5
WET 2-63
WET 2-47
WET 2-4
WET 2-48
WET 2-48a
WET 2-3
WUS 2-2
WUS 2-1
WET 2-68
WUS 2a-1
WET 2-2
WET 2-49
WET 2-50
WET 2-51
WET 2-52
WET 2-53
WET 2-54
WET 2-55
WET 2-56
WET 2-57
WET 2-58
WET 2-59
WET 2-1
WET 2-72
WET 2-64
WET 2-65
WET 2-66
WET 2-67
WET 2-69
WET 2-69a
WET 2-70
WET 2-71
WET 2-60
WET 2-61
WET 2-62

WUS 2

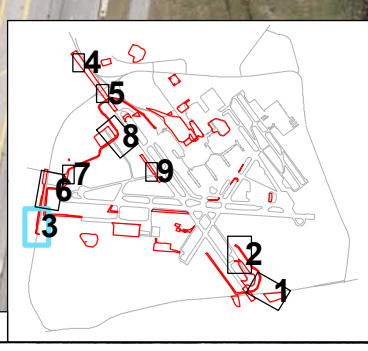
P4
P5
6
24

WUS 2-16
WUS 2-15
WUS 2-14
WUS 2-13
WUS 2-12
WUS 2-11
WUS 2-10
WUS 2-9
WUS 2-8
WUS 2-7
WUS 2-6
WUS 2-5
WUS 2-4
WUS 2-3
WUS 2-2a
WUS 2a-16
WUS 2a-15
WUS 2a-14
WUS 2a-13
WUS 2a-12
WUS 2a-11
WUS 2a-10
WUS 2a-9
WUS 2a-8
WUS 2a-7
WUS 2a-6
WUS 2a-5
WUS 2a-4
WUS 2a-3
WUS 2a-2

Legend

- Wetland
- Wetland Continues
- WUS
- WUS Continues
- WUS Flow Direction
- Data Point
- Flag
- Photo Location
- Project Areas

Aerial: MAA 2007



BWI MARSHALL WETLAND DELINEATION

FIGURE 5: Wetlands & Waterways Map

BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Sheet 3 of 9

N

COUNTY ANNE ARUNDEL

SCALE 1 " equals 100 '

BWI Trail

I-195

WUS 3 flows through culvert under I-195 and BWI trail

WUS 3 is culverted under the access road

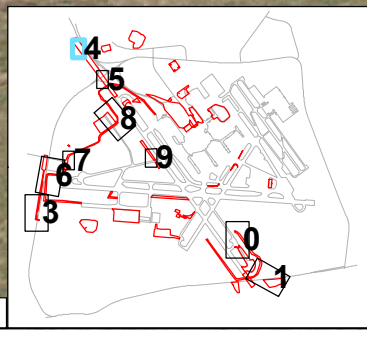
WET 3-12
WET 3-10
WET 3-9
WET 3-13
WET 3-8
WET 3-7
WET 3-14
WUS 3-1
WUS 3
WET 3-1
WUS 3-2
WET 3-2
WUS 3a-1
WET 3-3
WET 3-4
WET 3-6
WET 3-5
WUS 3a-2
WUS 3-3
WUS 3-4
WUS 3a-3
WUS 3-5
WUS 3-6
WET 4-7
WET 4-6
WET 4-8
WET 4-4
WET 4-9
WET 4-10
WET 4-3
WET 4-11
WET 4-2
WET 4-14
WET 4-1
WET 4-13
WET 4-12
WET 4
WET 4-15
WET 4-16
WUS 3-8
WUS 3-7
WUS 3a-4
WUS 3a-5
WUS 3-9
WUS 3-10
WUS 3a-6
WUS 3-11
WUS 3a-7
WUS 3-12
WUS 3a-8
WET 5-11
WET 5-13
WET 5-10
WUS 3-13
WUS 3-14
WUS 3a-9
WUS 3-15
WUS 3a-10
WET 5-12
WUS 3-16
WET 5-9
WUS 3-17
WUS 3-18
WUS 3a-11
WET 5-8
WUS 3-19
WUS 3-20
WUS 3a-12
WET 5-7
WUS 3-21
WUS 3a-13
WET 5-6
WUS 3a-14
WET 5
WET 5-5
WET 5-4
WET 5-3
WET 5-2
WET 5-1
P7
P8
P9
P10
6
27
8
10
Sheet 4

BWI Trail

Legend

- Wetland
- Wetland Continues
- WUS
- WUS Continues
- WUS Flow Direction
- Data Point
- Flag
- Photo Location
- Project Areas

Aerial: MAA 2007



BWI MARSHALL WETLAND DELINEATION

FIGURE 5: Wetlands & Waterways Map

BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Sheet 4 of 9

N

COUNTY ANNE ARUNDEL

SCALE 1 " equals 50 '

I-195

MD 170

Aviation Blvd.

11

WET 6-2

WET 6-1

WET 6-3

WET 6-10

WET 6-4

P11

P12

WET 6-5

WET 6-9

WET 6-6

WET 6-8

WET 6

WET 6-7

WUS 9

WUS 9 eminates from culvert

WUS 9-1

WUS 9-2

WUS 9-3

WUS 9-4

36

P34

Sheet 5

WUS 7 is culverted through the study area

WUS 7-1

WET 14-6

WUS 7-2

WUS 7-3

WUS 7-4

34

WET 14-5

WET 14-4

P27

WUS 7

P26

WET 14-3

WUS 7a-1

WUS 7a-2

WUS 7a-3

19

WET 14

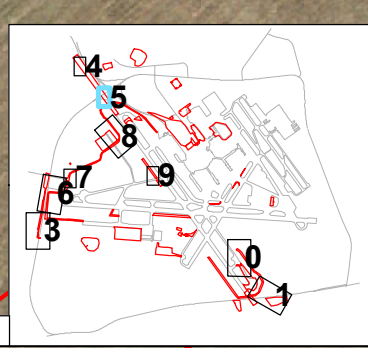
WET 14-2

WET 14-1

Legend

- Wetland
- Wetland Continues
- WUS
- WUS Continues
- WUS Flow Direction
- Data Point
- Flag
- Photo Location
- Project Areas

Aerial: MAA 2007



BWI MARSHALL WETLAND DELINEATION

FIGURE 5: Wetlands & Waterways Map

BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Sheet 5 of 9

N

COUNTY ANNE ARUNDEL

SCALE 1 " equals 50 '

Stoney Run Rd.

Sheet 7

Sheet 6

WUS 4/WUS 79

WUS 4/WUS 79 is culverted under Aviation Blvd.

WUS 79-8
WUS 79-7
WUS 79-6
WUS 79-5
WUS 79-4
WUS 79-3
WUS 79-2
WUS 79-1
WUS 79a-7
WUS 79a-6
WUS 79a-5
WUS 79a-4
WUS 79a-3
WUS 79a-2
WUS 79a-1
30
WUS 80-3
WUS 80-2
WUS 80-1
31
WUS 80a-3
WUS 80a-2
WUS 80a-1
WUS 80

WUS 4 is culverted under the Stoney Run Road interchange

WUS 4
WUS 4-19
WUS 4-18
WUS 4-17
WUS 4-16
WUS 4-15
WUS 4-14
WUS 4-13
WUS 4a-21
WUS 4a-20
WUS 4a-19
WUS 4a-18
WUS 4a-17
WUS 4a-16
WUS 4a-15
WUS 4a-14
WUS 4a-13
WUS 4a-12
WUS 4a-11
WUS 4a-10
WUS 4a-8
WUS 4-9
WUS 4-8
WUS 4-7
WUS 4-6
WUS 4-12
WUS 4-11
WUS 4-10
P19
29
WET 10-30
WET 10-31
WET 10-29
WET 10-28
WET 10-27
WET 10-26
WET 10-25
WET 10-24
WET 10-23
WET 10-22
WET 10-21
WUS 4-5
WUS 4-4
WUS 4-3
WUS 4-2
WUS 4-1
WUS 4
28
WET 10-32
WET 10-33
WET 10-34
WET 10-20
WET 10-19
WET 10-18
WET 10-17
P18
WET 10
WET 10-16
WET 10-15
WET 10-14
WET 10-13
WET 10-12
WET 10-11
WET 10-5
WET 10-6
WET 10-7
WET 10-8
WET 10-9
WET 10-10
WET 10-1
WET 10-3
WET 10-2
WET 10-4
16
17
WUS 4a-9
WUS 4a-8
WUS 4a-7
WUS 4a-6
WUS 4a-5
WUS 4a-4
WUS 4a-3A
WUS 4a-3
WUS 4a-2
WUS 4a-1

WUS 4 is culverted under the perimeter road

WET 15
WET 15-5a
WET 15-6
P28
P29
WET 15-5
WET 15-7
WET 15-4
20
WET 15-8
WET 15-3
WET 15-9
WET 15-2
WET 15-1

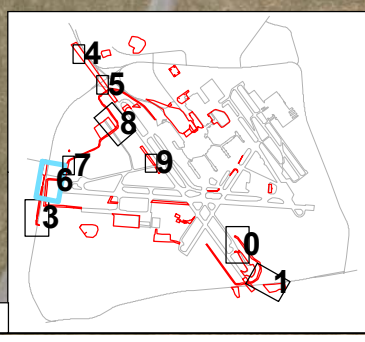
Aviation Blvd.
MD 170

WET 37-14
WET 37-13
WET 37-15
WET 37-16
WET 37-12
WET 37-17
WET 37-11
WET 37-10
WET 37-18
WET 37-20
WET 37-21
WET 37-22
WET 37-23
WET 37-24
WET 37-26
WET 37-27
WET 37-28
WET 37-29
WET 37-30
WET 37-31
WET 37-32
WET 37-33
WET 37-34
WET 37-35
WET 37-36
WET 37-37
WET 37-38
WET 37-39
WET 37-40
WET 37-41
WET 37-42
WET 37-43
WET 37-9
WET 37-19
WET 37-8
WET 37-7
WET 37
P74
WET 37-6
WET 37-5
WET 37-4
WET 37-3
WET 37-2
WET 37-1
P75
23

Legend

- Wetland
- Wetland Continues
- WUS
- WUS Continues
- WUS Flow Direction
- Data Point
- Flag
- Photo Location
- Project Areas

Aerial: MAA 2007



BWI MARSHALL WETLAND DELINEATION

FIGURE 5: Wetlands & Waterways Map

BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Sheet 6 of 9

N

COUNTY ANNE ARUNDEL

SCALE 1 " equals 100 '

Culvert

WET 11-15
WET 11-16
WET 11-17
WET 11-18
WET 11-19
WET 11-20
WET 11-21
WET 11-22
WET 11-23
WET 11-24
WET 11-25
WET 11-26
WET 11-27
WET 11-14
WET 11-13
WET 11
P18
P20
P21
WET 11
WET 11-12
WET 11-11
WET 11-10
WET 11-9
WET 11-8
WET 11-7
WET 11-6
WET 11-5
WET 11-4
WET 11-2
WET 11-3
WET 11-1

Sheet 7

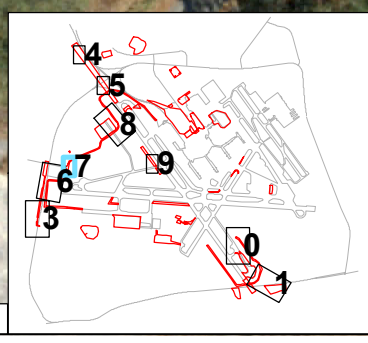
Stoney Run Rd.

Sheet 6

Legend

- Wetland
- Wetland Continues
- WUS
- WUS Continues
- WUS Flow Direction
- Data Point
- Flag
- Photo Location
- Project Areas

Aerial: MAA 2007



BWI MARSHALL WETLAND DELINEATION

FIGURE 5: Wetlands & Waterways Map

BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Sheet 7 of 9

N

COUNTY ANNE ARUNDEL

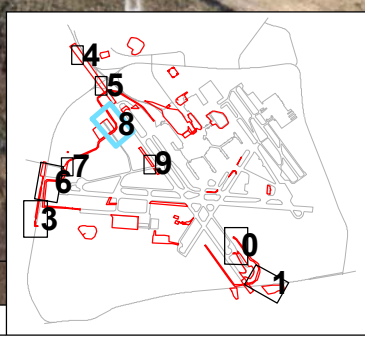
SCALE 1 " equals 50 '

WUS 5a-35
WUS 5-36
WUS 5a-34
WUS 8-2
WUS 8-1
WUS 8
WUS 5-35
WUS 8-3
35
WUS 5a-33
WUS 5-34
WUS 5-33
WUS 5a-32
WET 16-10
WET 16-11
WUS 5-32
WUS 5a-31
WET 16-5
P30
21
WUS 5a-30
WET 16-12
P31
WET 16-1
WET 16-2
WET 16
WUS 5-31
WUS 5a-29
WUS 5-30
WUS 5a-28
WUS 5-29
WUS 5a-27
WUS 5-28
WUS 5a-26
WUS 5-27
WUS 5a-25
WUS 5-26
P36
P35
WUS 5a-24
WUS 5-25
WUS 5-24
WUS 5a-23
WUS 5-23
Sheet 8
WUS 5a-22
WUS 5-22
WUS 5a-21
WUS 5-21
WUS 5-20
WUS 5a-20
WUS 5-19
WUS 5a-19
WUS 5-18
WUS 5a-18
WUS 5-17
WUS 5a-17
WUS 5-16
WUS 5a-16
WUS 5-15
WUS 5a-15
WUS 5a-14
WUS 5-14
WUS 5-13
WUS 5-12
WUS 5a-13
WUS 5a-12
WUS 5-11
WUS 5a-11
WUS 5-10
WUS 5a-10
WUS 5a-9
WUS 5a-8
WUS 5-9
WUS 5a-7
WUS 5-8
WUS 5a-6
WUS 5-7
WUS 5a-5
WUS 5-6
WUS 5-5
WUS 5a-4
WUS 5-4
WUS 5a-3
32
WUS 5a-2
WUS 5-3
WUS 5a-1
WUS 5-2
WUS 5-1
WUS 5

Legend

- Wetland
- Wetland Continues
- WUS
- WUS Continues
- WUS Flow Direction
- Data Point
- Flag
- Photo Location
- Project Areas

Aerial: MAA 2007



BWI MARSHALL WETLAND DELINEATION

FIGURE 5: Wetlands & Waterways Map

BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Sheet 8 of 9

N

COUNTY ANNE ARUNDEL

SCALE 1 " equals 100 '

Runway 15R

WUS 6 emanates from culvert

WUS 6

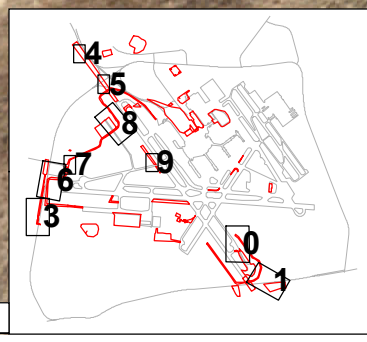
WUS 6-1
WUS 6-2
WUS 6-3
WUS 6-4
WUS 6-5
WUS 6-5
WUS 6a-1
WUS 6a-2
WUS 6a-3
WUS 6a-4
33

Sheet 9

Legend

- Wetland
- Wetland Continues
- WUS
- WUS Continues
- WUS Flow Direction
- Data Point
- Flag
- Photo Location
- Project Areas

Aerial: MAA 2007



BWI MARSHALL WETLAND DELINEATION

FIGURE 5: Wetlands & Waterways Map

BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Sheet 9 of 9

N

COUNTY ANNE ARUNDEL

SCALE 1 " equals 50 '

Appendix B:
Photographs

Photo 1: PFO1 portion of Wetland 1 (Nov. 2007)

Photo 2: PEM1 portion of Wetland 1 (Nov. 2007)

Photo 3: Upland forest adjacent to Wetland 1 (Nov. 2007)

Photo 4: PFO1 portion of Wetland 2 (Nov. 2007)

Photo 5: PEM1 portion of Wetland 2 (Nov. 2007)

Photo 6: Upland Forest adjacent to Wetland 2 (Nov. 2007)

Photo 7: Wetland 3 with surrounding uplands (Nov. 2007)

Photo 8: Wetland 4 (from inside the wetland looking past the flags into upland) (Nov. 2007)

Photo 9: Wetland 5 – both PEM1 and PSS1 portions visible (Nov. 2007)

Photo 10: Upland adjacent to Wetland 5 (Nov. 2007)

Photo 11: Wetland 6 with surrounding upland (Nov. 2007)

Photo 12: Wetland 7 (Nov. 2007)

Photo 13: Upland adjacent to Wetland 7 (Nov. 2007)

Photo 14: Wetland 8 with surrounding upland (Jan. 2008)

Photo 15: Wetland 9 with WUS 1 (marked by blue flags) flowing through the center and uplands to the far outside (Jan. 2008)

Photo 16: Wetland 10 (Jan. 2008)

Photo 17: Upland adjacent to Wetland 10 (Jan. 2008)

Photo 18: Wetland 11 with surrounding uplands (Jan. 2008)

Photo 19: Wetland 14 with surrounding uplands visible on the slope (Jan. 2008)

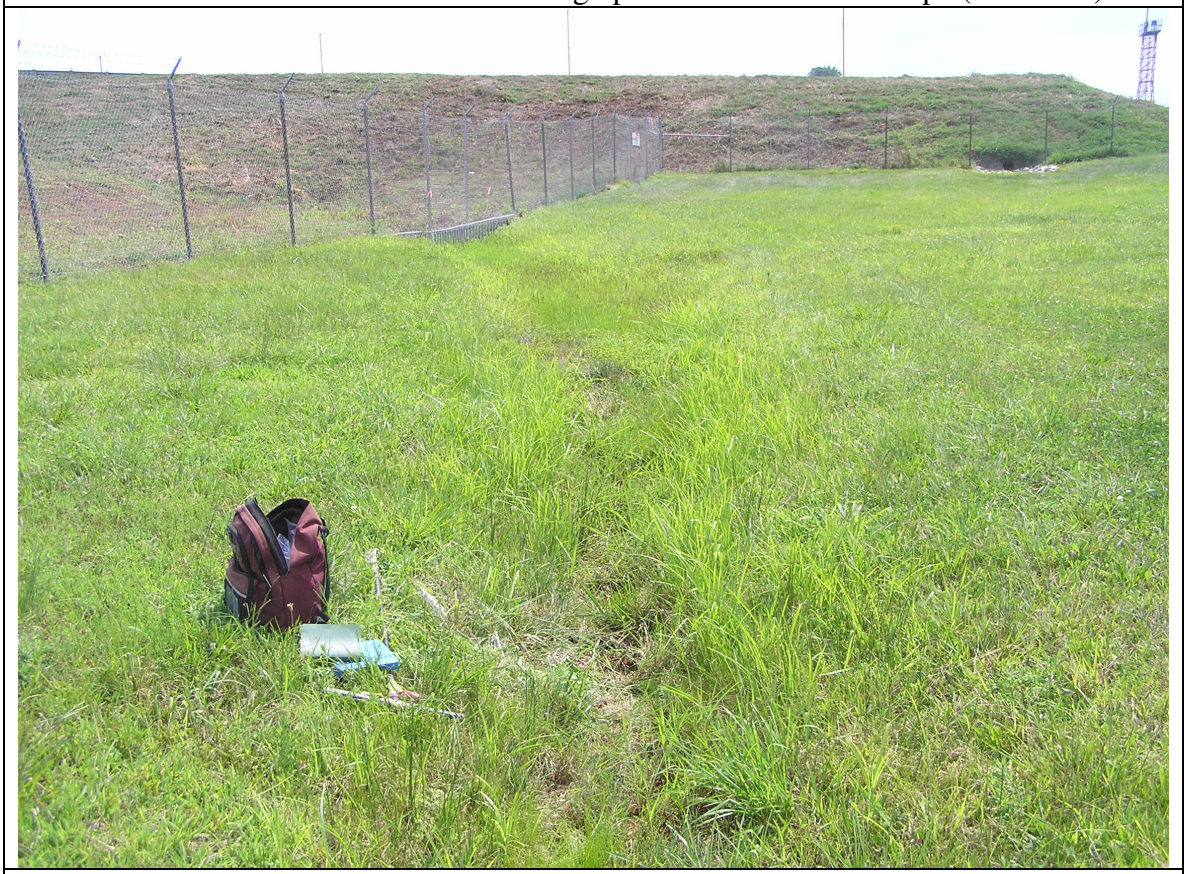


Photo 20: Wetland 15 with surrounding uplands. (Aug. 2008)

Photo 21: Wetland 16 with uplands in the background and to the far right. (Aug. 2008)

Photo 22: Wetland 17 with surrounding uplands. (Aug. 2008)

Photo 23: Wetland 37 and surrounding uplands (Jan. 2007)

Photo 24: WUS 1, Fork Branch, within Wetland 9 (Jan. 2008)

Photo 25: WUS 1, Fork Branch, within Wetland 1 (Nov. 2007)

Photo 26: WUS 2, Signal Branch (Nov. 2007)

Photo 27: WUS 3 showing the change in elevation that occurs downstream of the culvert under the access road (Nov. 2007)

Photo 28: WUS 4, Bowden Branch, entering Wetland 10 (Jan. 2008)

Photo 29: WUS 4, Bowden Branch, exiting Wetland 10 (Jan. 2008)

Photo 30: WUS 79, which is a portion of WUS 4 (Bowden Branch) (Jan. 2008)

Photo 31: WUS 80, an ephemeral channel associated with WUS 79/WUS 4 (Jan. 2008)

Photo 32: WUS 5, Kitten Branch (Jan. 2008)

Photo 33: WUS 6 (Jan. 2008)

Photo 34: WUS 7, Sachs Branch, where it exists the culvert, looking downstream (Jan. 2008)

Photo 35: WUS 8 (Aug. 2008)

Photo 36: WUS 9

Appendix C:
USACE Routine Determination Data Sheets

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	BWI Marshall			Date:	11/27/07
Applicant/Owner:	MAA			County:	Anne Arundel
Investigator:	A. McAninch, A. Stiffler: A.D. Marble & Co.			State:	MD
Do Normal Circumstances exist on the site?		☒Yes	☐No	Community ID:	Wetland 1 – PFO1
Is the site significantly disturbed (Atypical Situation)?		☐Yes	☒No	Transect ID:	
Is the area a potential Problem Area?		☐Yes	☒No	Plot ID:	P1
(If needed, explain on reverse.)					

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Chelone* sp.	H	FACW+ to OBL	9.		
2. *Woodwardia areolata*	H	FACW+	10.		
3. Unidentified grass	H	---	11.		
4. *Lindera benzoin*	S	FACW-	12.		
5. *Clethra alnifolia*	S	FAC+	13.		
6. *Viburnum dentatum*	T	FAC	14.		
7. *Acer rubrum*	T	FAC	15.		
8. *Salix* sp.	T	---	16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100

Remarks: Due to the delineation being conducted in late November, not all plants could be identified to species – inflorescence being absent. Area meets criterion for wetland vegetation.

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: ---* (in.)

Depth to Free Water in Pit: 3 (in.)

Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☒ Inundated
- ☒ Saturated in Upper 12 Inches
- ☒ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☒ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: Area meets criterion for wetland hydrology.
* no inundation in plot, but some adjacent to plot and in other areas of the wetland

SOILS

Data Point: P1

Map Unit Name (Series and Phase):	Zekiah and Issue soils, 0-2% slopes, frequently flooded (ZBA)	Drainage Class:	Poorly, somewhat poorly
Taxonomy (Subgroup):	Typic Fluvaquents, Fluvaquentic Dystrudepts	Field Observations Confirm Mapped Type?	☐Yes ☒ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-12	A	2.5Y 5/2	2.5Y 3/3	few, medium, faint	silty clay loam
12-20	B1	2.5Y 4/1	n/a		silty clay
20-26+	B2	2.5Y 2.5/1	n/a		silty clay loam

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Area meets criterion for hydric soils.

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☒Yes ☐No (Check)		(Check)
Wetland Hydrology Present?	☒Yes ☐No		
Hydric Soils Present?	☒Yes ☐No	Is this Sampling Point Within a Wetland?	☒Yes ☐No

Remarks: Area meets all three wetland criteria.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	BWI Marshall			Date:	11/27/07
Applicant/Owner:	MAA			County:	Anne Arundel
Investigator:	A. McAninch, A. Stiffler: A.D. Marble & Co.			State:	MD
Do Normal Circumstances exist on the site?		☒Yes	☐No	Community ID:	Wetland 1 – PEM1
Is the site significantly disturbed (Atypical Situation)?		☐Yes	☒No	Transect ID:	
Is the area a potential Problem Area?		☐Yes	☒No	Plot ID:	P2
(If needed, explain on reverse.)					

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Typha latifolia*	H	OBL	9.		
2. *Viburnum dentatum*	S	FAC	10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100

Remarks: Area meets criterion for wetland vegetation.

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: ---* (in.)

Depth to Free Water in Pit: 1 (in.)

Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☒ Saturated in Upper 12 Inches
- ☒ Water Marks
- ☐ Drift Lines
- ☒ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: * plot was not inundated, but wetland was inundated further from the edge

SOILS

Data Point: P2

Map Unit Name (Series and Phase):	Zekiah and Issue soils, 0-2% slopes, frequently flooded (ZBA)	Drainage Class:	Poorly, somewhat poorly
Taxonomy (Subgroup):	Typic Fluvaquents, Fluvaquentic Dystrudepts	Field Observations Confirm Mapped Type?	☐Yes ☒ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-4	A	10YR 2/1	n/a		clay loam
4-8	B	10YR 5/1	n/a		sandy loam

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Unable to obtain complete soil profile due to the sandy, saturated condition of the soil. Area meets criterion for hydric soils.

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☒Yes ☐No (Check)		(Check)
Wetland Hydrology Present?	☒Yes ☐No		
Hydric Soils Present?	☒Yes ☐No	Is this Sampling Point Within a Wetland?	☒Yes ☐No

Remarks: Area meets wetland criteria.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	BWI Marshall	Date:	11/27/07
Applicant/Owner:	MAA	County:	Anne Arundel
Investigator:	A. McAninch, A. Stiffler: A.D. Marble & Co.	State:	MD
Do Normal Circumstances exist on the site?	☒Yes ☐No	Community ID:	Upland forest (adjacent to Wet 1)
Is the site significantly disturbed (Atypical Situation)?	☐Yes ☒No	Transect ID:	
Is the area a potential Problem Area?	☐Yes ☒No	Plot ID:	P3
(If needed, explain on reverse.)			

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Quercus alba*	T	FACU-	9.		
2. *Quercus falcata*	T	FACU-	10.		
3. *Quercus rubra*	T	FACU-	11.		
4. *Liriodendron tulipifera*	T	FACU	12.		
5. *Ilex opaca*	S	FACU+	13.		
6. *Smilax rotundifolia*	WV	FAC	14.		
7. *Lonicera japonica*	WV	FAC-	15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 14

Remarks: Area does not meet criterion for wetland vegetation.

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: --- (in.)

Depth to Free Water in Pit: --- (in.)

Depth to Saturated Soil: --- (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: No indicators of wetland hydrology were noted during the field investigation. Area does not meet criterion for wetland hydrology.

SOILS

Data Point: P3

Map Unit Name (Series and Phase):	Patapsco-Evesboro-Fort Mott complex (PeB)	Drainage Class:	somewhat excessively, excessively, well
Taxonomy (Subgroup):	Grossarenic Paleudults, Lamellc Quartzipsamments, Arenic Hapludults	Field Observations Confirm Mapped Type?	☐Yes ☒ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-2	O				
2-9	A	10YR 3/2	n/a		sandy loam
10-14+	B	2.5Y 6/4	2.5Y 6/6	common, medium, faint	sandy loam

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Area does not meet criterion for hydric soils.

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☐Yes ☒No (Check)		(Check)
Wetland Hydrology Present?	☐Yes ☒No		
Hydric Soils Present?	☐Yes ☒No	Is this Sampling Point Within a Wetland?	☐Yes ☒No

Remarks: Area is upland – it does not meet the wetland criteria.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	BWI Marshall	Date:	11/29/07
Applicant/Owner:	MAA	County:	Anne Arundel
Investigator:	A. McAninch, A. Stiffler: A.D. Marble & Co.	State:	MD
Do Normal Circumstances exist on the site?	☒Yes ☐No	Community ID:	Wetland 2 – PFO1
Is the site significantly disturbed (Atypical Situation)?	☐Yes ☒No	Transect ID:	
Is the area a potential Problem Area? (If needed, explain on reverse.)	☐Yes ☒No	Plot ID:	P4

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Osmunda cinnamomea*	H	FACW	9.		
2. *Viburnum dentatum*	S	FAC	10.		
3. *Acer rubrum*	T	FAC	11.		
4. *Pinus taeda*	T	FAC-	12.		
5. *Liquidambar styraciflua*	T	FAC	13.		
6. *Quercus palustris*	T	FACW	14.		
7. *Smilax rotundifolia*	T	FAC	15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 86

Remarks: Area meets criterion for wetland vegetation.

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: --- (in.)

Depth to Free Water in Pit: --- (in.)

Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☒ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: Area meets criterion for wetland hydrology.

SOILS

Data Point: P4

Map Unit Name (Series and Phase):	Zekiah and Issue soils, 0-2% slopes, frequently flooded (ZBA)	Drainage Class:	Poorly, somewhat poorly
Taxonomy (Subgroup):	Typic Fluvaquents, Fluvaquentic Dystrudepts	Field Observations Confirm Mapped Type?	☒Yes ☐ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-1	O				
1-6	A	2.5Y 2/1	n/a		sandy loam, med. subangular
6-10	B1	2.5Y 4/1	2.5Y 5/2	few, fine, faint	sandy loam, med. subangular
10-17+	B2	2.5Y 5/2	2.5Y 4/1	common, medium, faint	sandy loam, med. subangular

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Area meets criterion for hydric soils.

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☒Yes ☐No (Check)		(Check)
Wetland Hydrology Present?	☒Yes ☐No		
Hydric Soils Present?	☒Yes ☐No	Is this Sampling Point Within a Wetland?	☒Yes ☐No

Remarks: Area meets wetland criteria.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	BWI Marshall	Date:	11/29/07
Applicant/Owner:	MAA	County:	Anne Arundel
Investigator:	A. McAninch, A. Stiffler: A.D. Marble & Co.	State:	MD
Do Normal Circumstances exist on the site?	☒Yes ☐No	Community ID:	Forested upland (adjacent to Wet 2)
Is the site significantly disturbed (Atypical Situation)?	☐Yes ☒No	Transect ID:	
Is the area a potential Problem Area?	☐Yes ☒No	Plot ID:	P5
(If needed, explain on reverse.)			

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Rubus flagellaris*	H	UPL	9.		
2. Unidentified grass	H	---	10.		
3. *Pinus virginiana*	T	UPL	11.		
4. *Acer rubrum*	T	FAC	12.		
5. *Prunus serotina*	T	FACU	13.		
6. *Liriodendron tulipifera*	T	FACU	14.		
7. *Populus grandidentata*	T	FACU-	15.		
8. Quercus rubra	T	FACU-	16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 14

Remarks: Due to the delineation being conducted in late November, not all plants could be identified to species – inflorescence being absent. Area does not meet criterion for wetland vegetation.

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: --- (in.)

Depth to Free Water in Pit: --- (in.)

Depth to Saturated Soil: --- (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: No indicators of hydrology were present at the time of the field investigation. Area does not meet criterion for wetland hydrology.

SOILS

Data Point: P5

Map Unit Name (Series and Phase): Sassafras fine sandy loam, 2-5% slopes (SaB)

Drainage Class: well

Taxonomy (Subgroup): Typic Hapludults

Field Observations Confirm Mapped Type? ☒Yes ☐ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-10	Ap	2.5Y 3/1			sandy loam, granular
10-12+	B	2.5Y 6/6	2.5Y 3/1	common, fine, prominent	sandy loam, med. subangular

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Area does not meet criterion for hydric soils.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☐Yes ☒No (Check)

Wetland Hydrology Present? ☐Yes ☒No

Hydric Soils Present? ☐Yes ☒No

(Check)

Is this Sampling Point Within a Wetland? ☐Yes ☒No

Remarks: Area does not meet wetland criteria.

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	BWI Marshall			Date:	11/28/07, 8/13/08
Applicant/Owner:	MAA			County:	Anne Arundel
Investigator:	A. McAninch, A. Stiffler: A.D. Marble & Co.			State:	MD
Do Normal Circumstances exist on the site?		☒Yes	☐No	Community ID:	Wetland 3 – PEM1
Is the site significantly disturbed (Atypical Situation)? SOILS		☒Yes	☐No	Transect ID:	
Is the area a potential Problem Area?		☐Yes	☒No	Plot ID:	P6
(If needed, explain on reverse.)					

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Typha latifolia*	H	OBL	9.		
2. *Polygonum hydropiperoides*	H	OBL	10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100

Remarks: Area meets criterion for hydrophytic vegetation.

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: --- (in.)

Depth to Free Water in Pit: --- (in.)

Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☒ Saturated in Upper 12 Inches
- ☒ Water Marks
- ☐ Drift Lines
- ☒ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: Area meets criterion for wetland hydrology.

SOILS

Data Point: P6

Map Unit Name (Series and Phase): Udorthents, loamy, 0-5% slopes (UoB)

Drainage Class: well

Taxonomy (Subgroup): n/a (fill)

Field Observations Confirm Mapped Type? ☒Yes ☐ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-2		10YR 6/3	10YR 6/4	common, large, faint	sand
2-14		10YR 5/2	10YR 5/3 10YR 3/1 10YR 4/6 10YR 6/4	common, coarse, faint few, coarse, faint few, fine, prominent few, coarse, distinct	sandy clay loam: this layer is a mixture of sand and soil which also contains organic materials
14-18		10YR 4/2	10YR 4/6	few, medium, prominent	sandy clay loam with organic materials
19-20		10YR 4/2	10YR 5/6	common, medium, prominent	silty clay

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Soils disturbed from past grading activitites – area is located at the end of a dug ditch and serves as an E&S control measure. Soils were considered hydric due to the dominant vegetation being obligate.

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☒Yes	☐No (Check)	
Wetland Hydrology Present?	☒Yes	☐No	
Hydric Soils Present?	☒Yes	☐No	Is this Sampling Point Within a Wetland? ☒Yes ☐No (Check)

Remarks: Area meets wetland criteria.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	BWI Marshall	Date:	11/28/07
Applicant/Owner:	MAA	County:	Anne Arundel
Investigator:	A. McAninch, A. Stiffler: A.D. Marble & Co.	State:	MD
Do Normal Circumstances exist on the site?	☒Yes ☐No	Community ID:	Wetland 4 – PEM1
Is the site significantly disturbed (Atypical Situation)?	☐Yes ☒No	Transect ID:	
Is the area a potential Problem Area? (If needed, explain on reverse.)	☐Yes ☒No	Plot ID:	P7

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Juncus effusus*	H	FACW+	9.		
2. *Cyperus strigosus*	H	FACW	10.		
3. *Polygonum hydropiperoides*	H	OBL	11.		
4. Unidentified grass	H	---	12.		
5. *Carex* sp.	H	---	13.		
6. *Cornus amomum*	S	FACW	14.		
7. *Salix* sp.	S	---	15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100

Remarks: Due to the delineation being conducted in late November and the area being mowed, not all plants could be identified to species – leaves and inflorescence being absent. Area meets criterion for hydrophytic vegetation.

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: --- (in.)

Depth to Free Water in Pit: --- (in.)

Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☒ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☒ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☒ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: Area meets criterion for wetland hydrology.

SOILS

Data Point: P7

Map Unit Name (Series and Phase): Udorthents, loamy, 0-5% slopes (UoB)

Drainage Class: well

Taxonomy (Subgroup): n/a (fill)

Field Observations Confirm Mapped Type? ☐Yes ☒No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-7	A	10YR 4/2	5YR 5/8	common, fine, prominent	clay loam, granular
7-16	B	2.5Y 4/2	5YR 5/8	common, medium, prominent	clay, blocky
			10YR 6/8	few, medium, prominent	

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Area meets criterion for hydric soils.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒Yes ☐No (Check)

Wetland Hydrology Present? ☒Yes ☐No

Hydric Soils Present? ☒Yes ☐No

Is this Sampling Point Within a Wetland? (Check) ☒Yes ☐No

Remarks: Area meets wetland criteria.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	BWI Marshall	Date:	11/28/07
Applicant/Owner:	MAA	County:	Anne Arundel
Investigator:	A. McAninch, A. Stiffler: A.D. Marble & Co.	State:	MD
Do Normal Circumstances exist on the site?	☒Yes ☐No	Community ID:	Mowed upland (between Wet 3 and Wet 4)
Is the site significantly disturbed (Atypical Situation)?	☐Yes ☒No	Transect ID:	
Is the area a potential Problem Area?	☐Yes ☒No	Plot ID:	P8
(If needed, explain on reverse.)			

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Rumex acetosella*	H	UPL	9.		
2. *Barbarea vulgaris*	H	FACU	10.		
3. *Rumex crispus*	H	FACU	11.		
4. *Oxalis* sp.	H	---	12.		
5. *Trifolium* sp.	H	---	13.		
6. Unidentified grasses	H	---	14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 0

Remarks: Due to the delineation being conducted in late November and the area being mowed, not all plants could be identified to species – inflorescence being absent. Area does not meet criterion for hydrophytic vegetation.

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: --- (in.)

Depth to Free Water in Pit: --- (in.)

Depth to Saturated Soil: --- (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: No indicators of hydrology present during field investigation. Area does not meet wetland criterion for hydrology.

SOILS

Data Point: P8

Map Unit Name (Series and Phase): Udorthents, loamy, 0-5% slopes (UoB)

Drainage Class: well

Taxonomy (Subgroup): n/a (fill)

Field Observations Confirm Mapped Type? ☐ Yes ☒ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-4	A	10YR 4/3	n/a		sandy loam
4-13	B	10YR 4/3	10YR 6/6	common, fine, distinct	sandy loam
			10YR 5/6	common, fine, distinct	

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Area does not meet criterion for hydric soils.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☐ Yes ☒ No (Check)

Wetland Hydrology Present? ☐ Yes ☒ No

Hydric Soils Present? ☐ Yes ☒ No

Is this Sampling Point Within a Wetland? (Check) ☐ Yes ☒ No

Remarks: Area does not meet wetland criteria.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	BWI Marshall			Date:	11/29/07
Applicant/Owner:	MAA			County:	Anne Arundel
Investigator:	A. McAninch, A. Stiffler: A.D. Marble & Co.			State:	MD
Do Normal Circumstances exist on the site?		☒Yes	☐No	Community ID:	Wetland 5 – PSS1/PEM1
Is the site significantly disturbed (Atypical Situation)?		☐Yes	☒No	Transect ID:	
Is the area a potential Problem Area?		☐Yes	☒No	Plot ID:	P9
(If needed, explain on reverse.)					

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Onoclea sensibilis*	H	FACW	9.		
2. *Lonicera japonica*	H	FAC	10.		
3. *Salix* sp.	S	---	11.		
4. *Viburnum dentatum*	S	FAC	12.		
5. *Acer rubrum*	S	FAC	13.		
6. *Platanus occidentalis*	T	FACW-	14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100

Remarks: Due to the delineation being conducted in late November, not all plants could be identified to species – leaves and inflorescence being absent. Area meets criterion for wetland vegetation.

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: ---* (in.)

Depth to Free Water in Pit: 11 (in.)

Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☒ Saturated in Upper 12 Inches
- ☒ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☒ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☒ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: * plot was not inundated but other areas of wetland did have minor inundation. Area meets criterion for wetland hydrology.

SOILS

Data Point: P9

Map Unit Name (Series and Phase): Udorthents, loamy, 0-5% slopes (UoB)

Drainage Class: well

Taxonomy (Subgroup): n/a (fill)

Field Observations Confirm Mapped Type? ☐Yes ☒ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-.5	O				
.5-4.5	A	10YR 3/2	10YR 5/3	few, medium, faint	silty clay loam
			5YR 6/6	common, fine, prominent	
4.5-6	B	10YR 4/2	5YR 5/8	few, fine, prominent	clay
			2.5Y 6/3	common, fine, prominent	
6-17	C1	2.5Y 6/3	2.5Y 5/3	common, medium, faint	sandy loam
			2.5Y 5/2	common, medium, faint	
			7.5YR 5/6	few, fine, prominent	
17-20	C2	10YR 5/1	n/a		sandy loam

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Area meets criterion for hydric soils.

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☒Yes ☐No (Check)	(Check)
Wetland Hydrology Present?	☒Yes ☐No	
Hydric Soils Present?	☒Yes ☐No	Is this Sampling Point Within a Wetland? ☒Yes ☐No

Remarks: Area meets wetland criteria.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	BWI Marshall	Date:	11/29/07
Applicant/Owner:	MAA	County:	Anne Arundel
Investigator:	A. McAninch, A. Stiffler: A.D. Marble & Co.	State:	MD
Do Normal Circumstances exist on the site?	☒Yes ☐No	Community ID:	Forested Upland (adjacent to Wet 5)
Is the site significantly disturbed (Atypical Situation)?	☐Yes ☒No	Transect ID:	
Is the area a potential Problem Area?	☐Yes ☒No	Plot ID:	P10
(If needed, explain on reverse.)			

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Alliaria petiolata*	H	FACU-	9.		
2. *Viburnum dentatum*	S	FAC	10.		
3. *Diospyros virginiana*	T	FAC-	11.		
4. *Celastrus orbiculata*	WV	UPL*	12.		
5. *Lonicera japonica*	WV	FAC	13.		
6. *Vitis* sp.	WV	---	14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 40

Remarks: Due to the delineation being conducted in late November, not all plants could be identified to species – leaves and inflorescence being absent. Area does not meet criterion for wetland vegetation.

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: --- (in.)

Depth to Free Water in Pit: --- (in.)

Depth to Saturated Soil: --- (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: No indicators of hydrology were present during the field investigation. The area does not meet the criterion for wetland hydrology.

SOILS

Data Point: P10

Map Unit Name (Series and Phase):	Zekiah and Issue soils, 0-2% slopes, frequently flooded (ZBA)	Drainage Class:	poorly, somewhat poorly
Taxonomy (Subgroup):	Typic Fluvaquents, Fluvaquentic Dystrudepts	Field Observations Confirm Mapped Type?	☐Yes ☒ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-3	A	10YR 3/2	n/a		clay loam, granular
3-6	B1	10YR 4/3	10YR 4/6	few, medium, distinct	clay loam, fine subangular
			10YR 5/2	few, medium, faint	
			5YR 4/6	common, fine, prominent	
6-14	B2	10YR 5/3	2.5Y 5/1	common, medium, distinct	clay loam, med. subangular
			10YR 6/3	few, medium, faint	

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Area does not meet criterion for hydric soils.

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☐Yes ☒No (Check)		(Check)
Wetland Hydrology Present?	☐Yes ☒No		
Hydric Soils Present?	☐Yes ☒No	Is this Sampling Point Within a Wetland?	☐Yes ☒No

Remarks: Area does not meet wetland criteria.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	BWI Marshall			Date:	11/29/07
Applicant/Owner:	MAA			County:	Anne Arundel
Investigator:	A. McAninch, A. Stiffler: A.D. Marble & Co.			State:	MD
Do Normal Circumstances exist on the site?		☒Yes	☐No	Community ID:	Wetland 6 – PEM1
Is the site significantly disturbed (Atypical Situation)?		☐Yes	☒No	Transect ID:	
Is the area a potential Problem Area?		☐Yes	☒No	Plot ID:	P11
(If needed, explain on reverse.)					

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Typha angustifolia*	H	OBL	9.		
2. *Salix* sp.	S	---	10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100

Remarks: Due to the delineation being conducted in late November, not all plants could be identified to species – leaves and inflorescence being absent. Area meets criterion for wetland vegetation.

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: --- (in.)

Depth to Free Water in Pit: n/a (in.)

Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☒ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☒ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: Area meets criterion for wetland hydrology.

SOILS

Data Point: P11

Map Unit Name (Series and Phase): Udorthents, loamy, 0-5% slopes (UoB)

Drainage Class: well

Taxonomy (Subgroup): n/a (fill)

Field Observations Confirm Mapped Type? ☐Yes ☒ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
			See remarks		

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☒ Other (Explain in Remarks)

Remarks: Area is in ditch with rip-rap. Hydric soils were assumed due to the dominant vegetation being obligate.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒Yes ☐No (Check)

Wetland Hydrology Present? ☒Yes ☐No

Hydric Soils Present? ☒Yes ☐No

Is this Sampling Point Within a Wetland? (Check) ☒Yes ☐No

Remarks: Area meets all three wetland criteria.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	BWI Marshall	Date:	11/29/07, 8/13/08
Applicant/Owner:	MAA	County:	Anne Arundel
Investigator:	A. McAninch, A. Stiffler: A.D. Marble & Co.	State:	MD
Do Normal Circumstances exist on the site?	☒Yes ☐No	Community ID:	Mowed upland (adjacent to Wet 6)
Is the site significantly disturbed (Atypical Situation)?	☐Yes ☒No	Transect ID:	
Is the area a potential Problem Area? (If needed, explain on reverse.)	☐Yes ☒No	Plot ID:	P12

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Plantago lanceolata*	H	UPL	9.		
2. *Taraxacum officinale*	H	FACU-	10.		
3. *Allium canadense*	H	FACU	11.		
4. Unidentified grasses	H	---	12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 0

Remarks: Due to the delineation being conducted in late November and the area having been mowed, not all plants could be identified to species – inflorescence being absent. Area does not meet criterion for wetland vegetation.

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: --- (in.)

Depth to Free Water in Pit: --- (in.)

Depth to Saturated Soil: --- (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: Area does not meet criterion for wetland hydrology.

SOILS

Data Point: P12

Map Unit Name (Series and Phase): Udorthents, loamy, 0-5% slopes (UoB)

Drainage Class: well

Taxonomy (Subgroup): n/a (fill)

Field Observations Confirm Mapped Type? ☐Yes ☒ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
			See Remarks		

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Soils were extremely hard due to being dry, so a soil profile could not be obtained. Area does not meet for vegetation or hydrology, so soils do not need to be examined.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☐Yes ☒No (Check)

Wetland Hydrology Present? ☐Yes ☒No

Hydric Soils Present? ☐Yes ☐No

(Check)

Is this Sampling Point Within a Wetland? ☐Yes ☒No

Remarks: Area does not meet wetland criteria.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	BWI Marshall			Date:	11/29/07
Applicant/Owner:	MAA			County:	Anne Arundel
Investigator:	A. McAninch, A. Stiffler: A.D. Marble & Co.			State:	MD
Do Normal Circumstances exist on the site?		☒Yes	☐No	Community ID:	Wetland 7 – PFO1
Is the site significantly disturbed (Atypical Situation)?		☐Yes	☒No	Transect ID:	
Is the area a potential Problem Area?		☐Yes	☒No	Plot ID:	P13
(If needed, explain on reverse.)					

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Osmunda cinnamomea*	H	FACW	9.		
2. Unidentifed grasses	H	---	10.		
3. *Acer rubrum*	T	FAC	11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100

Remarks: Due to the delineation being conducted in late November, not all plants could be identified to species – inflorescence being absent. Area meets criterion for wetland vegetation.

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: --- (in.)

Depth to Free Water in Pit: --- (in.)

Depth to Saturated Soil: --- (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☒ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☒ Other (Explain in Remarks)

Remarks: Plot was located near wetland boundary. Wetland was saturated to the surface in other areas. In addition, the wetland was hummocky and the trunks of the red maples were buttressed. Area meets criterion for wetland hydrology.

SOILS

Data Point: P13

Map Unit Name (Series and Phase):	Patapsco-Evesboro-Fort Mott complex (PeB)	Drainage Class:	somewhat excessively, excessively, well
Taxonomy (Subgroup):	Grossarenic Paleudults, Lamellc Quartzipsamments, Arenic Hapludults	Field Observations Confirm Mapped Type?	☐Yes ☒ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-.5	O				
.5-4	A	10YR 2/2	n/a		sandy loam, granular
4-9	B1	10YR 3/2	2.5Y 4/3	few, medium, faint	sandy loam, granular
9-16+	B2	2.5Y 4/3	10YR 3/2	common, medium, faint	sandy loam, granular

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Area meets criterion for hydric soils

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☒Yes ☐No (Check)		(Check)
Wetland Hydrology Present?	☒Yes ☐No		
Hydric Soils Present?	☒Yes ☐No	Is this Sampling Point Within a Wetland?	☒Yes ☐No

Remarks: Area meets all three wetland criteria.

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	BWI Marshall	Date:	11/29/07
Applicant/Owner:	MAA	County:	Anne Arundel
Investigator:	A. McAninch, A. Stiffler: A.D. Marble & Co.	State:	MD
Do Normal Circumstances exist on the site?	☒Yes ☐No	Community ID:	Forested upland (adjacent to Wet 7)
Is the site significantly disturbed (Atypical Situation)?	☐Yes ☒No	Transect ID:	
Is the area a potential Problem Area? (If needed, explain on reverse.)	☐Yes ☒No	Plot ID:	P14

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Lonicera japonica*	H	FAC-	9.		
2. *Sassafras albidum*	S	FACU-	10.		
3. *Prunus serotina*	T&H	FACU	11.		
4. *Quercus falcata*	T	FACU-	12.		
5. *Pinus taeda*	T	FAC-	13.		
6. *Liriodendron tulipifera*	T	FACU	14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 0

Remarks: Area does not meet wetland vegetation criterion.

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: --- (in.)

Depth to Free Water in Pit: --- (in.)

Depth to Saturated Soil: --- (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: No indicators of hydrology were noted during the field investigation. Area does not meet criterion for wetland hydrology.

SOILS

Data Point: P14

Map Unit Name (Series and Phase): Sassafras fine sandy loam, 2-5% slopes (SaB)

Drainage Class: well

Taxonomy (Subgroup): Typic Hapludults

Field Observations Confirm Mapped Type? ☒Yes ☐ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-7.5	A	2.5Y 4/3	n/a		sandy loam, granular
7.5-14+	B	2.5Y 5/4	2.5Y 6/6	many, fine, distinct	sandy loam, granular

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Area does not meet criterion for hydric soils.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☐Yes ☒No (Check)

Wetland Hydrology Present? ☐Yes ☒No

Hydric Soils Present? ☐Yes ☒No

Is this Sampling Point Within a Wetland? (Check) ☐Yes ☒No

Remarks: Area does not meet wetland criteria.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	BWI Marshall			Date:	1/10/2008
Applicant/Owner:	MAA			County:	Anne Arundel
Investigator:	E. Schwenke, A. Stiffler: A.D. Marble & Co.			State:	MD
Do Normal Circumstances exist on the site?		☒Yes	☐No	Community ID:	Wetland 8 – PEM1
Is the site significantly disturbed (Atypical Situation)?		☐Yes	☒No	Transect ID:	
Is the area a potential Problem Area?		☐Yes	☒No	Plot ID:	P15
(If needed, explain on reverse.)					

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Juncus effusus*	Herb	FACW+	9.		
2. *Cyperus strigosus*	Herb	FACW	10.		
3. *Polyganum punctatum*	Herb	OBL	11.		
4. *Typha latifolia*	Herb	OBL	12.		
5. *Panicum virgatum*	Herb	FAC	13.		
6. *Carex* sp.	Herb	UNK	14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100

Remarks: Due to the delineation being conducted in January and the area being mowed, not all plants could be identified to species – inflorescence being absent. Area appears to be regularly mowed except for small area near fence. Area meets criterion for hydrophytic vegetation.

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: N/A (in.)

Depth to Free Water in Pit: 18 (in.)

Depth to Saturated Soil: N/A (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☒ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☒ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: Area meets criterion for wetland hydrology.

SOILS

Data Point: P15

Map Unit Name (Series and Phase):	Zekiah and Issue soils, 0-2% slopes, frequently flooded (ZBA)	Drainage Class:	poorly, somewhat poorly
Taxonomy (Subgroup):	Typic Fluvaquents, Fluvaquentic Dystrudepts	Field Observations Confirm Mapped Type?	☒Yes ☐ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-3	O	7.5YR 3/2			Sandy loam
3-20	A	10YR 3/1			Sandy loam
20+	B	2.5Y 3/1			Silty loam

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Layer of organics in B horizon including wood, leaves, etc. Area meets criterion for hydric soils.

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☒Yes ☐No (Check)		(Check)
Wetland Hydrology Present?	☒Yes ☐No		
Hydric Soils Present?	☒Yes ☐No	Is this Sampling Point Within a Wetland?	☒Yes ☐No

Remarks: Area meets wetland criteria.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	BWI Marshall			Date:	1/10/2008, 8/15/08
Applicant/Owner:	MAA			County:	Anne Arundel
Investigator:	E. Schwenke , A. Stiffler, A. McAninch: A.D. Marble & Co.			State:	MD
Do Normal Circumstances exist on the site?		☒Yes	☐No	Community ID:	Wetland 9 – PEM1
Is the site significantly disturbed (Atypical Situation)?		☐Yes	☒No	Transect ID:	
Is the area a potential Problem Area?		☐Yes	☒No	Plot ID:	P16
(If needed, explain on reverse.)					

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Juncus effusus*	Herb	FACW+	9.		
2. *Polyganum punctatum*	Herb	OBL	10.		
3. *Typha latifolia*	Herb	OBL	11.		
4. *Onoclea sensibilis*	Herb	FACW	12.		
5. *Carex* sp.	Herb	UNK	13.		
6. *Salix nigra*	Shrub	FACW+	14.		
7. Unidentified Grasses	Herb	UNK	15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100

Remarks: Due to the delineation being conducted in January and the area having been mowed, not all plants could be identified to species – inflorescence being absent. Area meets criterion for hydrophytic vegetation.

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: N/A (in.)

Depth to Free Water in Pit: 4 (in.)

Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☒ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☒ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☒ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☒ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks:

Wetland area surrounding WUS 1 (Fork Branch). Area meets criterion for wetland hydrology.

SOILS

Data Point: P16

Map Unit Name (Series and Phase):	Zekiah and Issue soils, 0-2% slopes, frequently flooded (ZBA)	Drainage Class:	poorly, somewhat poorly
Taxonomy (Subgroup):	Typic Fluvaquents, Fluvaquentic Dystrudepts	Field Observations Confirm Mapped Type?	☒Yes ☐ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-6	A	10YR 4/3	n/a		sandy loam, medium subangular
6-13	B1	10YR 4/2	7.5YR 4/6	common, coarse, prominent	sandy loam, coarse subangular
13-20	B2	10YR 4/2	7.5YR 4/6	few, fine, prominent	sandy loam, blocky

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Area meets criteria for wetland soils.

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☒Yes ☐No (Check)		(Check)
Wetland Hydrology Present?	☒Yes ☐No		
Hydric Soils Present?	☒Yes ☐No	Is this Sampling Point Within a Wetland?	☒Yes ☐No

Remarks: Area meets wetland criteria.

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	BWI Marshall	Date:	1/10/2008
Applicant/Owner:	MAA	County:	Anne Arundel
Investigator:	E. Schwenke, A. Stiffler: A.D. Marble & Co.	State:	MD
Do Normal Circumstances exist on the site?	☒Yes ☐No	Community ID:	Mowed upland (for Wet 8 and Wet 9)
Is the site significantly disturbed (Atypical Situation)?	☐Yes ☒No	Transect ID:	
Is the area a potential Problem Area? (If needed, explain on reverse.)	☐Yes ☒No	Plot ID:	P17

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Unidentified Grasses	Herb	UNK	9.		
2. *Smilax rotundifolia*	Herb	FAC	10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100

Remarks: Mowed field upslope from stream and wetland area. Due to the delineation being conducted in January and the area having been mowed, not all plants could be identified to species – inflorescence being absent. Area meets criterion for hydrophytic vegetation.

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: N/A (in.)

Depth to Free Water in Pit: N/A (in.)

Depth to Saturated Soil: N/A (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: No indicators of hydrology were present during the field investigation. The area does not meet the criterion for wetland hydrology.

SOILS

Data Point: P17

Map Unit Name (Series and Phase):	Zekiah and Issue soils, 0-2% slopes, frequently flooded (ZBA)	Drainage Class:	poorly, somewhat poorly
Taxonomy (Subgroup):	Typic Fluvaquents, Fluvaquentic Dystrudepts	Field Observations Confirm Mapped Type?	☒Yes ☐ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-1	O	10YR 3/2	No mottles		Sandy loam
1-8	A	10YR 4/3	No mottles		Sandy loam
8+	B	10YR 6/6	No mottles		Sand

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Area does not meet criterion for hydric soils.

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☒Yes ☐No (Check)		(Check)
Wetland Hydrology Present?	☐Yes ☒No		
Hydric Soils Present?	☐Yes ☒No	Is this Sampling Point Within a Wetland?	☐Yes ☒No

Remarks: Upland plot- upslope from wetland 8, wetland 9, and stream. Area meets criterion for wetland vegetation but not for hydrology or soils. Area is not a wetland.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	BWI Marshall			Date:	1/15/08
Applicant/Owner:	MAA			County:	Anne Arundel
Investigator:	A. McAninch, A. Stiffler: A.D. Marble & Co.			State:	MD
Do Normal Circumstances exist on the site?		☒Yes	☐No	Community ID:	Wetland 10 – PEM1
Is the site significantly disturbed (Atypical Situation)?		☐Yes	☒No	Transect ID:	
Is the area a potential Problem Area?		☐Yes	☒No	Plot ID:	P18
(If needed, explain on reverse.)					

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Typha latifolia*	H	OBL	9.		
2. *Polygonum hydropiperoides*	H	OBL	10.		
3. *Salix* sp.	S	---	11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100

Remarks: Due to the delineation being conducted in January and the area having been mowed, not all plants could be identified to species – leaves and inflorescence being absent. Hydrophytic vegetation criterion met.

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: 0+ (in.)

Depth to Free Water in Pit: 4 (in.)

Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☒ Inundated
- ☒ Saturated in Upper 12 Inches
- ☒ Water Marks
- ☒ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: Maximum depth of inundation not determined. Area meets wetland criterion for hydrology.

SOILS

Data Point: P18

Map Unit Name (Series and Phase):	Udorthents, reclaimed gravel pits, 0-5% slope (UpB)	Drainage Class:	well
Taxonomy (Subgroup):	n/a (fill)	Field Observations Confirm Mapped Type?	☐ Yes ☒ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
			See Below		

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☒ Other (Explain in Remarks)

Remarks: Soils were sandy and saturated, so a full profile could not be obtained. Due to the dominance of OBL species, hydric soils are assumed.

Area meets criterion for hydric soils.

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☒ Yes ☐ No (Check)		(Check)
Wetland Hydrology Present?	☒ Yes ☐ No		
Hydric Soils Present?	☒ Yes ☐ No	Is this Sampling Point Within a Wetland?	☒ Yes ☐ No

Remarks: Area meets wetland criteria.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	BWI Marshall	Date:	1/15/07
Applicant/Owner:	MAA	County:	Anne Arundel
Investigator:	A. McAninch, A. Stiffler: A.D. Marble & Co.	State:	MD
Do Normal Circumstances exist on the site?	☒Yes ☐No	Community ID:	Mowed upland (adjacent to Wet 10)
Is the site significantly disturbed (Atypical Situation)?	☐Yes ☒No	Transect ID:	
Is the area a potential Problem Area?	☐Yes ☒No	Plot ID:	P19
(If needed, explain on reverse.)			

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Verbascum blattaria*	H	UPL	9.		
2. *Rhus glabra*	H	UPL	10.		
3. *Barbarea vulgaris*	H	FACU	11.		
4. *Lonicera japonica*	H	FAC-	12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 0

Remarks: Area is mowed. Criterion for hydrophytic vegetation not met.

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: --- (in.)

Depth to Free Water in Pit: --- (in.)

Depth to Saturated Soil: --- (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: No indicators of hydrology present during field investigation. Area does not meet wetland hydrology criterion.

SOILS

Data Point: P19

Map Unit Name (Series and Phase):	Udorthents, reclaimed gravel pits, 0-5% slope (UpB)	Drainage Class:	well
Taxonomy (Subgroup):	n/a (fill)	Field Observations Confirm Mapped Type?	☐Yes ☒ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-8	A	2.5Y 3/3			loamy sand
8-16+	B	10YR 4/4			loamy sand

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Soils do not meet wetland criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☐Yes ☒No (Check)		(Check)
Wetland Hydrology Present?	☐Yes ☒No		
Hydric Soils Present?	☐Yes ☒No	Is this Sampling Point Within a Wetland?	☐Yes ☒No

Remarks: Area does not meet wetland criteria.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	BWI Marshall			Date:	1/15/08
Applicant/Owner:	MAA			County:	Anne Arundel
Investigator:	A. McAninch, A. Stiffler: A.D. Marble & Co.			State:	MD
Do Normal Circumstances exist on the site?		☒Yes	☐No	Community ID:	Wetland 11 – PEM1/PFO1
Is the site significantly disturbed (Atypical Situation)?		☐Yes	☒No	Transect ID:	
Is the area a potential Problem Area?		☐Yes	☒No	Plot ID:	P20
(If needed, explain on reverse.)					

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Osmunda cinnamomea*	H	FACW	9.		
2. *Carex* sp.	H	---	10.		
3. Unidentified grasses	H	---	11.		
4. *Acer rubrum*	T	FAC	12.		
5. *Diospyros virginiana*	T	FAC-	13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 67

Remarks: Due to the delineation being conducted in January, not all plants could be identified to species – inflorescence being absent. Area meets criterion for hydrophytic vegetation.

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: --- (in.)

Depth to Free Water in Pit: 4 (in.)

Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☒ Saturated in Upper 12 Inches
- ☒ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☒ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: Area meets criterion for wetland hydrology.

SOILS

Data Point: P20

Map Unit Name (Series and Phase): Downer-Phalanx complex (DxC)

Drainage Class: well

Taxonomy (Subgroup): Typic Hapludults

Field Observations Confirm Mapped Type? ☐Yes ☒ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-1	O				
1-7	A	10YR 5/1	10YR 5/6	common, medium, prominent	silty clay
7-20	B	10YR 5/2	10YR 5/3	many, medium, faint	silty clay loam
			10YR 5/6	few, fine, prominent	

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: soft iron and manganese masses throughout A horizon

Area meets wetland soils criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☒Yes ☐No (Check)	(Check)
Wetland Hydrology Present?	☒Yes ☐No	
Hydric Soils Present?	☒Yes ☐No	Is this Sampling Point Within a Wetland? ☒Yes ☐No

Remarks: Area meets wetland criteria.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	BWI Marshall	Date:	1/15/07
Applicant/Owner:	MAA	County:	Anne Arundel
Investigator:	A. McAninch, A. Stiffler: A.D. Marble & Co.	State:	MD
Do Normal Circumstances exist on the site?	☒Yes ☐No	Community ID:	Forested upland (adjacent to Wet 11)
Is the site significantly disturbed (Atypical Situation)?	☐Yes ☒No	Transect ID:	
Is the area a potential Problem Area?	☐Yes ☒No	Plot ID:	P21
(If needed, explain on reverse.)			

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Unidentified grasses	H	---	9.		
2. *Smilax rotundifolia*	WV	FAC	10.		
3. *Acer rubrum*	T	FAC	11.		
4. *Nyssa sylvatica*	T	FAC	12.		
5. *Diospyros virginiana*	T	FAC-	13.		
6. *Pinus virginiana*	T	UPL	14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 60

Remarks: Due to the delineation being conducted in January, not all plants could be identified to species – inflorescence being absent. Area meets criteria for wetland vegetation.

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: --- (in.)

Depth to Free Water in Pit: --- (in.)

Depth to Saturated Soil: --- (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: No indicators of hydrology were present at the time of the investigation.

SOILS

Data Point: P21

Map Unit Name (Series and Phase): Downer-Phalanx complex (DxC)

Drainage Class: well

Taxonomy (Subgroup): Typic Hapludults

Field Observations Confirm Mapped Type? ☐Yes ☒ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-7	A	2.5YR 3/4			loam
7-20	B	7.5YR 4/3			clay loam

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Area does not meet criterion for hydric soils.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒Yes ☐No (Check)

Wetland Hydrology Present? ☐Yes ☒No

Hydric Soils Present? ☐Yes ☒No

Is this Sampling Point Within a Wetland? (Check) ☐Yes ☒No

Remarks: Area meets criteria for hydrophytic vegetation, but not hydrology or soils. Area is not wetland

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	BWI Marshall			Date:	1/23/2008
Applicant/Owner:	MAA			County:	Anne Arundel
Investigator:	A. McAninch, A. Stiffler: A.D. Marble & Co.			State:	MD
Do Normal Circumstances exist on the site?		☒Yes	☐No	Community ID:	Wetland 14 – PEM1
Is the site significantly disturbed (Atypical Situation)?		☐Yes	☒No	Transect ID:	
Is the area a potential Problem Area?		☐Yes	☒No	Plot ID:	P26
(If needed, explain on reverse.)					

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Phragmites australis*	Herb	FACW	9.		
2. *Xanthium strumarium*	Herb	FAC	10.		
3. *Carex* sp.	Herb	UNK	11.		
4. *Rumex crispus*	Herb	FACU	12.		
5. *Polyganum* sp.	Herb	UNK	13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 66

Remarks: Due to the delineation being conducted in January and the area having been mowed, not all plants could be identified to species – inflorescence being absent. Area meets criterion for wetland vegetation.

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: N/A (in.)

Depth to Free Water in Pit: 15 (in.)

Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☒ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☒ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☒ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: Areas of inundation present, but not at plot. Area meets criterion for wetland hydrology.

SOILS

Data Point: P26

Map Unit Name (Series and Phase):	Zekiah and Issue soils, 0-2% slopes, frequently flooded (ZBA)	Drainage Class:	poorly, somewhat poorly
Taxonomy (Subgroup):	Typic Fluvaquents, Fluvaquentic Dystrudepts	Field Observations Confirm Mapped Type?	☐Yes ☒ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-6.5	A	10YR 4/2	10YR 3/6	Common, medium, prominent	Silty clay loam
6.5-17	B1	10YR 5/2	10YR 3/6	Few, medium, prominent	Clay
			10YR 5/4	Few, medium, distinct	
17-19+	B2	2.5Y 6/3			Sandy clay loam

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Signs of disturbance in B2 horizon. Area meets criterion for hydric soils.

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☒Yes ☐No (Check)		(Check)
Wetland Hydrology Present?	☒Yes ☐No		
Hydric Soils Present?	☒Yes ☐No	Is this Sampling Point Within a Wetland?	☒Yes ☐No

Remarks: Area meets wetland criteria.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	BWI Marshall	Date:	1/23/2008
Applicant/Owner:	MAA	County:	Anne Arundel
Investigator:	A. McAninch, A. Stiffler: A.D. Marble & Co.	State:	MD
Do Normal Circumstances exist on the site?	☒Yes ☐No	Community ID:	Mowed upland (adjacent to Wet 14)
Is the site significantly disturbed (Atypical Situation)?	☐Yes ☒No	Transect ID:	
Is the area a potential Problem Area?	☐Yes ☒No	Plot ID:	P27
(If needed, explain on reverse.)			

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Unidentified Grasses	Herb	UNK	9.		
2. *Lonicera japonica*	Herb	FAC-	10.		
3. *Plantago lanceolata*	Herb	UPL	11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 0

Remarks: Due to the delineation being conducted in January and the area having been mowed, not all plants could be identified to species – inflorescence being absent. Area does not meet the criterion for wetland vegetation.

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: ____ - ____ (in.)

Depth to Free Water in Pit: ____ - ____ (in.)

Depth to Saturated Soil: ____ - ____ (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: No indicators of hydrology were present during the field investigation. The area does not meet the criterion for wetland hydrology.

SOILS

Data Point: P27

Map Unit Name (Series and Phase): Udorthents, loamy, 0-5% slopes (UoB)

Drainage Class: well

Taxonomy (Subgroup): n/a (fill)

Field Observations Confirm Mapped Type? ☐Yes ☒ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-5	A	10YR 4/3			Clay loam
5-13.5	B1	10YR 5/4			Loam
13.5-15+	B2	10YR 6/4			Loamy sand

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Area does not meet criterion for hydric soils

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☐Yes ☒No (Check)

Wetland Hydrology Present? ☐Yes ☒No

Hydric Soils Present? ☐Yes ☒No

Is this Sampling Point Within a Wetland? (Check) ☐Yes ☒No

Remarks: Area does not meet wetland criteria.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	BWI Airport			Date:	8/13/08
Applicant/Owner:	MAA			County:	Anne Arundel
Investigator:	A. McAninch: A.D. Marble & Co.			State:	MD
Do Normal Circumstances exist on the site?		☒Yes	☐No	Community ID:	Wetland 15 – PEM1
Is the site significantly disturbed (Atypical Situation)? Soils		☒Yes	☐No	Transect ID:	
Is the area a potential Problem Area?		☐Yes	☒No	Plot ID:	P28
(If needed, explain on reverse.)					

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Cyperus strigosus*	H	FACW	9.		
2. *Polygonum hydropiperoides*	H	OBL	10.		
3. *Echinochloa crusgalli*	H	FACU	11.		
4. *Ludwigia palustris*	H	OBL	12.		
5. *Juncus effusus*	H	FACW+	13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 80%

Remarks: Area meets criterion for wetland vegetation

HYDROLOGY

☐ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☐ Aerial Photographs
- ☐ Other

☒ No Recorded Data Available

Field Observations:

Depth of Surface Water: --- (in.)

Depth to Free Water in Pit: --- (in.)

Depth to Saturated Soil: --- (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☒ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: Area meets criterion for wetland hydrology.

SOILS

Data Point: P28

Map Unit Name (Series and Phase):	Udorthents, reclaimed gravel pits, 0-5% slopes (UpB)	Drainage Class:	well
Taxonomy (Subgroup):	n/a (fill)	Field Observations Confirm Mapped Type?	☒Yes ☐ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-1	O				
1-3		10YR 6/3	10YR 6/4 10YR 5/8	common, coarse, faint few, fine, prominent	sandy clay loam, medium subangular
3-5		7.5YR 4/2	7.5 YR 4/6	common, coarse, prominent	clay loam, medium subangular
5-9		10YR 4/2	2.5Y 6/6 10YR 4/6	few, fine, prominent few, fine, prominent	clay loam, medium subangular
9-15		10YR 6/4	10YR 5/2	few, coarse, distinct	sand with chunk of clay*, fine granular
15-20		7.5YR 8/1	10YR 6/8 7.5 YR 6/6 10YR 5/2	few, medium, prominent few, coarse, prominent few, coarse, distinct	sandy loam with some clay mixed in, medium granular
*	chunk of clay in 9-15 inch layer	2.5 Y 5/2	2.5Y 5/3 10YR 5/8	outside layer of clay, faint few, medium, prominent	clay, blocky

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Soils were disturbed from past grading/fill activities and were not used for the wetland determination.

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☒Yes ☐No (Check)		(Check)
Wetland Hydrology Present?	☒Yes ☐No		
Hydric Soils Present?	☐Yes ☐No	Is this Sampling Point Within a Wetland?	☒Yes ☐No

Remarks: Area meets wetland criteria for vegetation and hydrology. Soils were disturbed and were not used in the wetland determination.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	BWI Airport	Date:	8/13/08
Applicant/Owner:	MAA	County:	Anne Arundel
Investigator:	A. McAninch: A.D. Marble & Co.	State:	MD
Do Normal Circumstances exist on the site?	☒Yes ☐No	Community ID:	mowed upland (adjacent to Wet 15)
Is the site significantly disturbed (Atypical Situation)?	☐Yes ☒No	Transect ID:	
Is the area a potential Problem Area?	☐Yes ☒No	Plot ID:	P29
(If needed, explain on reverse.)			

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Trifolium repens*	H	FACU-	9.		
2. *Taraxacum officinale*	H	FACU-	10.		
3. *Setaria glauca*	H	FAC	11.		
4. *Plantago major*	H	FACU	12.		
5. unidentified grasses	H	---	13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 25%

Remarks: Mowed area, most grasses without inflorescence. Area does not meet criterion for hydrophytic vegetation.

HYDROLOGY

☐ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☐ Aerial Photographs
- ☐ Other

☒ No Recorded Data Available

Field Observations:

Depth of Surface Water: --- (in.)

Depth to Free Water in Pit: --- (in.)

Depth to Saturated Soil: --- (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: No indicators of hydrology were present during the field investigation. Area does not meet criterion for wetland hydrology.

SOILS

Data Point: P29

Map Unit Name (Series and Phase):	Udorthents, reclaimed gravel pits, 0-5% slopes (UpB)	Drainage Class:	well
Taxonomy (Subgroup):	n/a (fill)	Field Observations Confirm Mapped Type?	☐Yes ☒ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
			see remarks		

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Soils extremely dry and hard, unable to obtain profile. Profile unnecessary as area does not meet for vegetation or hydrology.

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☐Yes ☒No (Check)		(Check)
Wetland Hydrology Present?	☐Yes ☒No		
Hydric Soils Present?	☐Yes ☐No	Is this Sampling Point Within a Wetland?	☐Yes ☒No

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	BWI Airport			Date:	8/22/08
Applicant/Owner:	MAA			County:	Anne Arundel
Investigator:	A. McAninch, A. Stiffler: A.D. Marble & Co.			State:	MD
Do Normal Circumstances exist on the site?		☒Yes	☐No	Community ID:	Wetland 16 – PEM1
Is the site significantly disturbed (Atypical Situation)?		☐Yes	☒No	Transect ID:	
Is the area a potential Problem Area?		☐Yes	☒No	Plot ID:	P30
(If needed, explain on reverse.)					

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Polygonum hydropiperoides*	H	OBL	9.		
2. *Cyperus strigosus*	H	FACW	10.		
3. *Echinochloa crusgalli*	H	FACU	11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 66%

Remarks: Area meets hydrophytic vegetation criterion.

HYDROLOGY

☐ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☐ Aerial Photographs
- ☐ Other

☒ No Recorded Data Available

Field Observations:

Depth of Surface Water: --- (in.)

Depth to Free Water in Pit: --- (in.)

Depth to Saturated Soil: --- (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☒ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: Some areas of standing water outside plot. Area meets wetland hydrology criterion.

SOILS

Data Point: P30

Map Unit Name (Series and Phase):	Zekiah and Issue soils, 0-2% slopes, frequently flooded (ZBA)	Drainage Class:	Poorly, somewhat poorly
Taxonomy (Subgroup):	Typic Fluvaquents, Fluvaquentic Dystrudepts	Field Observations Confirm Mapped Type?	☐Yes ☒ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-2	A	10YR 4/2	10YR 4/6	few, coarse, prominent	clay loam, medium subangular
2-10	B	10YR 4/2	10YR 4/6	common, medium, prominent	clay loam, medium subangular
			10YR 6/4	common, medium, distinct	

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Auger refusal at 10 inches. Coarse fragments throughout profile. Area meets hydric soils criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☒Yes ☐No (Check)		(Check)
Wetland Hydrology Present?	☒Yes ☐No		
Hydric Soils Present?	☒Yes ☐No	Is this Sampling Point Within a Wetland?	☒Yes ☐No

Remarks: Area meets wetland criteria.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	BWI Airport	Date:	8/22/08
Applicant/Owner:	MAA	County:	Anne Arundel
Investigator:	A. McAninch, A. Stiffler: A.D. Marble & Co.	State:	MD
Do Normal Circumstances exist on the site?	☒Yes ☐No	Community ID:	Mowed upland (adjacent to Wet 16)
Is the site significantly disturbed (Atypical Situation)?	☐Yes ☒No	Transect ID:	
Is the area a potential Problem Area?	☐Yes ☒No	Plot ID:	P31
(If needed, explain on reverse.)			

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Trifolium repens*	H	FACU-	9.		
2. *Taraxacum officinale*	H	FACU-	10.		
3. *Plantago lanceolata*	H	UPL	11.		
4. Unidentified grasses	H	---	12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 0%

Remarks: Area is mowed, so grasses did not have inflorescence and could not be identified to species. Area does not meet hydrophytic vegetation criterion.

HYDROLOGY

☐ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☐ Aerial Photographs
- ☐ Other

☒ No Recorded Data Available

Field Observations:

Depth of Surface Water: --- (in.)

Depth to Free Water in Pit: --- (in.)

Depth to Saturated Soil: --- (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: No indicators of hydrology were present at the time of the field investigation. Area does not meet criterion for wetland hydrology.

SOILS

Data Point: P31

Map Unit Name (Series and Phase):	Zekiah and Issue soils, 0-2% slopes, frequently flooded (ZBA)	Drainage Class:	Poorly, somewhat poorly
Taxonomy (Subgroup):	Typic Fluvaquents, Fluvaquentic Dystrudepts	Field Observations Confirm Mapped Type?	☐Yes ☒ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
			see remarks		

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Soils could not be obtained because they were extremely hard due to being extremely dry. Soil profile unnecessary because area does not meet vegetation or hydrology criteria.

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☐Yes ☒No (Check)		(Check)
Wetland Hydrology Present?	☐Yes ☒No		
Hydric Soils Present?	☐Yes ☐No	Is this Sampling Point Within a Wetland?	☐Yes ☒No

Remarks: Area does not meet wetland criteria.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	BWI Airport			Date:	8/15/08
Applicant/Owner:	MAA			County:	Anne Arundel
Investigator:	A. McAninch: A.D. Marble & Co.			State:	MD
Do Normal Circumstances exist on the site?		☒Yes	☐No	Community ID:	Wetland 17 – PEM1
Is the site significantly disturbed (Atypical Situation)?		☐Yes	☒No	Transect ID:	
Is the area a potential Problem Area?		☐Yes	☒No	Plot ID:	P32
(If needed, explain on reverse.)					

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Polygonum sagittatum*	H	OBL	9. *Scirpus atrovirens*	H	OBL
2. *Commelina communis*	H	FAC-	10. *Toxicodendron radicans*	H	FAC
3. *Leersia oryzoides*	H	OBL	11. *Diospyros virginiana*	S	FAC-
4. *Potentilla norvegica*	H	FACU	12.		
5. *Polygonum hydropiperoides*	H	OBL	13.		
6. *Eupatoriem serotinum*	H	FAC-	14.		
7. *Strophostyles helvola*	H	FACU-	15.		
8. *Smilax rotundifolia*	H	FAC	16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 55%

Remarks: Area meets hydrophytic vegetation criterion.

HYDROLOGY

☐ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☐ Aerial Photographs
- ☐ Other

☒ No Recorded Data Available

Field Observations:

Depth of Surface Water: --- (in.)

Depth to Free Water in Pit: --- (in.)

Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☒ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☒ Sediment Deposits
- ☒ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: Area meets criterion for wetland hydrology.

SOILS

Data Point: P32

Map Unit Name (Series and Phase): Udorthents, loam, 5-15% slopes (UoD)

Drainage Class: well

Taxonomy (Subgroup): n/a (fill)

Field Observations Confirm Mapped Type? ☐ Yes ☒ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-11	A	10YR 4/2	10YR 4/6	few, fine, prominent	sandy clay loam, coarse subangular
11-20	B	10YR 6/2	10YR 6/6	few, coarse, prominent	sandy clay loam, some chunks of clay, coarse subangular
	clay chunks in B	10YR 7/2	10YR 7/8	few, fine, prominent	organic material mixed in

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Area meets criterion for hydric soils.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No (Check)

Wetland Hydrology Present? ☒ Yes ☐ No

Hydric Soils Present? ☒ Yes ☐ No

Is this Sampling Point Within a Wetland? (Check) ☒ Yes ☐ No

Remarks: Area meets wetland criteria.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	BWI Airport	Date:	8/15/08
Applicant/Owner:	MAA	County:	Anne Arundel
Investigator:	A. McAninch: A.D. Marble & Co.	State:	MD
Do Normal Circumstances exist on the site?	☒Yes ☐No	Community ID:	Upland (adjacent to Wet 17)
Is the site significantly disturbed (Atypical Situation)?	☐Yes ☒No	Transect ID:	
Is the area a potential Problem Area?	☐Yes ☒No	Plot ID:	P33
(If needed, explain on reverse.)			

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Toxicodendron radicans*	H	FAC	9.		
2. *Lonicera japonica*	H	FAC-	10.		
3. *Oxalis europaea*	H	UPL	11.		
4. *Centaurea stoebe*	H	UPL	12.		
5. *Rubus flagellaris*	H	UPL	13.		
6. Unidentified grasses	H	---	14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 20%

Remarks: Grasses could not be identified due to lack of inflorescence. Area does not meet hydrophytic vegetation criterion.

HYDROLOGY

☐ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☐ Aerial Photographs
- ☐ Other

☒ No Recorded Data Available

Field Observations:

Depth of Surface Water: --- (in.)

Depth to Free Water in Pit: --- (in.)

Depth to Saturated Soil: --- (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: No indicators of hydrology were present during the field investigation. Area does not meet criterion for wetland hydrology.

SOILS

Data Point: P33

Map Unit Name (Series and Phase): Udorthents, loam, 5-15% slopes (UoD)

Drainage Class: well

Taxonomy (Subgroup): n/a (fill)

Field Observations Confirm Mapped Type? ☐Yes ☒ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-6	A	10YR 4/3	n/a		loamy sand, fine granular
6-11	B	10YR 4/3	10YR 6/4	many, fine, faint	loamy sand, fine granular

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Auger refusal at 11 inches. Area does not meet criterion for wetland soils.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☐Yes ☒No (Check)

Wetland Hydrology Present? ☐Yes ☒No

Hydric Soils Present? ☐Yes ☒No

(Check)

Is this Sampling Point Within a Wetland? ☐Yes ☒No

Remarks: Area does not meet wetland criteria.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	BWI Airport			Date:	8/26/08
Applicant/Owner:	MAA			County:	Anne Arundel
Investigator:	A. McAninch: A.D. Marble & Co.			State:	MD
Do Normal Circumstances exist on the site?		☒Yes	☐No	Community ID:	adjacent to WUS 9
Is the site significantly disturbed (Atypical Situation)?		☐Yes	☒No	Transect ID:	
Is the area a potential Problem Area?		☐Yes	☒No	Plot ID:	P34
(If needed, explain on reverse.)					

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Polygonum hydropiperoides*	H	OBL	9.		
2. *Cyperus strigosus*	H	FACW	10.		
3. *Parthenocisus quinquefolia*	H	FACU	11.		
4. *Echinochloa muricata*	H	FACW+	12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 75%

Remarks:

HYDROLOGY

☐ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☐ Aerial Photographs
- ☐ Other

☒ No Recorded Data Available

Field Observations:

Depth of Surface Water: --- (in.)

Depth to Free Water in Pit: --- (in.)

Depth to Saturated Soil: --- (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☒ Drift Lines
- ☒ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: Area meets criterion for wetland hydrology.

SOILS

Data Point: P34

Map Unit Name (Series and Phase): Udorthents, loam, 5-15% slopes (UoD)

Drainage Class: well

Taxonomy (Subgroup): n/a (fill)

Field Observations Confirm Mapped Type? ☐Yes ☒ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-5	A	10 YR 3/2	none		clay loam, fine granular
5-8	B	10YR 5/4	10YR 5/3	many, coarse, faint	clay loam, fine granular

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: coarse fragments in B

Area does not meet criterion for wetland soils.

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☒Yes ☐No (Check)	(Check)
Wetland Hydrology Present?	☒Yes ☐No	
Hydric Soils Present?	☐Yes ☒No	Is this Sampling Point Within a Wetland? ☐Yes ☒No

Remarks: Area does not meet wetland criteria.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	BWI Airport			Date:	8/15/08
Applicant/Owner:	MAA			County:	Anne Arundel
Investigator:	A. McAninch: A.D. Marble & Co.			State:	MD
Do Normal Circumstances exist on the site?		☒Yes	☐No	Community ID:	Upland swale
Is the site significantly disturbed (Atypical Situation)?		☐Yes	☒No	Transect ID:	
Is the area a potential Problem Area?		☐Yes	☒No	Plot ID:	P35
(If needed, explain on reverse.)					

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Dicanthelium acuminatum*	H	FAC	9.		
2. *Juncus tenuis*	H	FAC-	10.		
3. *Holcus lanatus*	H	FACU	11.		
4. *Solanum carolinense*	H	UPL	12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 25%

Remarks: Area does not meet hydrophytic vegetation criterion.

HYDROLOGY

☐ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☐ Aerial Photographs
- ☐ Other

☒ No Recorded Data Available

Field Observations:

Depth of Surface Water: --- (in.)

Depth to Free Water in Pit: --- (in.)

Depth to Saturated Soil: --- (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☒ Other (Explain in Remarks)

Remarks: swale

Area does not meet hydrology criterion.

SOILS

Data Point: P35

Map Unit Name (Series and Phase):	Downer-Hammonton complex 10-15% slopes (DvC)	Drainage Class:	well, moderately well
Taxonomy (Subgroup):	Typic Hapludults, Aquic Hapludults	Field Observations Confirm Mapped Type?	☒Yes ☐ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-1	A	7.5YR 4/4	none		sandy loam, fine subangular
1-10	B	5YR 4/6	none		sandy loam, fine subangular

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Area does not meet criterion for hydric soils.

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☐Yes ☒No (Check)		(Check)
Wetland Hydrology Present?	☐Yes ☒No		
Hydric Soils Present?	☐Yes ☒No	Is this Sampling Point Within a Wetland?	☐Yes ☒No

Remarks: Area does not meet wetland criteria.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	BWI Airport			Date:	8/15/08
Applicant/Owner:	MAA			County:	Anne Arundel
Investigator:	A. McAninch: A.D. Marble & Co.			State:	MD
Do Normal Circumstances exist on the site?		☒Yes	☐No	Community ID:	Upland swale (forested)
Is the site significantly disturbed (Atypical Situation)?		☐Yes	☒No	Transect ID:	
Is the area a potential Problem Area?		☐Yes	☒No	Plot ID:	P36
(If needed, explain on reverse.)					

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Acer rubrum*	T	FAC	9.		
2. *Linderia benzoin*	S	FACW-	10.		
3. *Juncus effusus*	H	FACW+	11.		
4. *Dicanthelium acuminatum*	H	FAC	12.		
5. *Parthenocissus quinquefolia*	H	FACU	13.		
6. *Lonicera japonica*	H	FAC-	14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 67%

Remarks: Area meets criterion for hydrophytic vegetation.

HYDROLOGY

☐ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☐ Aerial Photographs
- ☐ Other

☒ No Recorded Data Available

Field Observations:

Depth of Surface Water: --- (in.)

Depth to Free Water in Pit: --- (in.)

Depth to Saturated Soil: --- (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☒ Drift Lines
- ☐ Sediment Deposits
- ☒ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: Area meets hydrology criterion.

SOILS

Data Point: P36

Map Unit Name (Series and Phase):	Downer-Hammonton complex 10-15% slopes (DvC)	Drainage Class:	well, moderately well
Taxonomy (Subgroup):	Typic Hapludults, Aquic Hapludults	Field Observations Confirm Mapped Type?	☐Yes ☒ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-12	A	10YR 5/3	none		clay loam, fine granular
12-14	B	7.5YR 5/8	none		sandy clay loam, fine subangular

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Area does not meet hydric soils criterion.

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☒Yes ☐No (Check)		(Check)
Wetland Hydrology Present?	☒Yes ☐No		
Hydric Soils Present?	☐Yes ☒No	Is this Sampling Point Within a Wetland?	☐Yes ☒No

Remarks: Area does not meet wetland criteria.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	MD 295	Date:	1/31/07, 8/13/08
Applicant/Owner:	MD SHA	County:	Anne Arundel
Investigator:	A. McAninch, M. Zimmerman – A.D. Marble & Company	State:	MD
Do Normal Circumstances exist on the site?	☒Yes ☐No	Community ID:	Wetland 37 – PEM1
Is the site significantly disturbed (Atypical Situation)?	☐Yes ☒No	Transect ID:	
Is the area a potential Problem Area?	☐Yes ☒No	Plot ID:	P74
(If needed, explain on reverse.)			

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Scirpus cyperinus*	H	FACW+	9.		
2. *Juncus effusus*	H	FACW+	10.		
3. *Ludwigia palustris*	H	OBL	11.		
4. Unidentified grasses	H	---	12.		
5. Unidentified submergents	H	---	13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100

Remarks: Due to the delineation being conducted in January, not all plants could be identified to species – inflorescence being absent. Hydrophytic vegetation is present

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: 3 (in.)

Depth to Free Water in Pit: --- (in.)

Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☒ Inundated
- ☒ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: Indicators of wetland hydrology were present during the field investigation.

SOILS

Data Point: P74

Map Unit Name (Series and Phase):	Patapsco-Evesboro-Fort Mott complex (PeB)	Drainage Class:	somewhat excessively, excessively, well
Taxonomy (Subgroup):	Grossarenic Paleudults, Lamellc Quartzipsamments, Arenic Hapludults	Field Observations Confirm Mapped Type?	☐Yes ☒ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0-1	O				
1-2	A	7.5YR 4/1	n/a		sandy loam
2-7	B1	7.5YR 5/1	2.5YR 4/1	few, fine, prominent	
			10YR 5/8	few, fine, prominent	sand
			10YR 6/6	common, coarse, prominent	
7-11	B2	10YR 4/2	10YR 4/1	common, medium, faint	sand
			10YR 5/8	few, fine, prominent	

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☒ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Pebbles throughout, getting lager and more frequent lower in the profile. Auger refusal at 11 inches.

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☒Yes ☐No (Check)		(Check)
Wetland Hydrology Present?	☒Yes ☐No		
Hydric Soils Present?	☒Yes ☐No	Is this Sampling Point Within a Wetland?	☒Yes ☐No

Remarks: Area meets wetland criteria.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	MD 295	Date:	1/31/07, 8/13/08
Applicant/Owner:	MD SHA	County:	Anne Arundel
Investigator:	A. McAninch, M. Zimmerman – A.D. Marble & Company	State:	MD
Do Normal Circumstances exist on the site?	☒Yes ☐No	Community ID:	Mowed upland field (adjacent to Wet 37)
Is the site significantly disturbed (Atypical Situation)?	☐Yes ☒No	Transect ID:	
Is the area a potential Problem Area?	☐Yes ☒No	Plot ID:	P75
(If needed, explain on reverse.)			

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Unidentified, mowed grasses	H	---	9.		
2. *Lamium purpureum*	H	UPL	10.		
3. *Rumex acetosella*	H	UPL	11.		
4. *Cerastium vulgatum*	H	FACU-	12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 0

Remarks: Due to the delineation being conducted in January and the area having been mowed, not all plants could be identified to species – inflorescence being absent. Hydrophytic vegetation criterion not met.

HYDROLOGY

☒ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: --- (in.)

Depth to Free Water in Pit: --- (in.)

Depth to Saturated Soil: --- (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: No indicators of hydrology were observed during the field investigation

SOILS

Data Point: P75

Map Unit Name (Series and Phase):	Patapsco-Evesboro-Fort Mott complex (PeB)	Drainage Class:	somewhat excessively, excessively, well
Taxonomy (Subgroup):	Grossarenic Paleudults, Lamellc Quartzipsamments, Arenic Hapludults	Field Observations Confirm Mapped Type?	☐Yes ☒ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
			See remarks		

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Soils were extremely dry and hard, a soil profile could not be obtained. Soils did not need to be examined – neither rvegetation nor hydrology criterion met.

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☐Yes ☒No (Check)		(Check)
Wetland Hydrology Present?	☐Yes ☒No		
Hydric Soils Present?	☐Yes ☐No	Is this Sampling Point Within a Wetland?	☐Yes ☒No

Remarks: Area does not meet wetland criteria: hydrophytic vegetation and wetland hydrology not present.

Appendix D:
Wetland Function and Value Assessment Forms

Wetland Function-Value Evaluation Form

Total Area of Wetland: about 2 acres | Human made?: No | Is wetland part of a wildlife corridor?: Yes | or a "habitat island"?: No

Adjacent land use: urban | Distance to nearest roadway or other development: 3'

Dominant wetland systems present: PFO | Contiguous undeveloped buffer zone present: no

Is the wetland a separate hydraulic system?: no | If not, where does the wetland lie in the drainage basin?: low

How many tributaries contribute to the wetland?: one | Wildlife & vegetation diversity/abundance: see data sheet for dominant vegetation list

Wetland I.D.: Wetland 1
Latitude: | Longitude:
Prepared by: AM, AS
Wetland Impact: | Date:
Type: | Area:
Evaluation based on:
Office: | Field: X
Corps manual wetland delineation completed? Y X N

Function/Value	Occurrence Yes	Occurrence No	Rationale (Reference #)*	Principal Functions(s)/ Values	Comments
Groundwater Recharge/Discharge	☒		2, 5, 7, 9, 13, 15		
Floodflow Alteration	☒		5, 6, 7, 8, 9, 10, 13, 15, 16, 18	☒	
Fish and Shellfish Habitat	☒		4, 8, 14, 16, 17		
Sediment/Toxicant Retention	☒		2, 3, 4, 5, 7, 9, 10, 12, 13, 14, 16	☒	
Nutrient Removal	☒		3, 5, 7, 8, 10, 11, 14		
Production Export	☒		1, 2, 4, 7, 10, 12, 13		
Sediment/Shoreline Stabilization	☒		3, 7, 9, 12, 13		
Wildlife Habitat	☒		1, 3, 6, 7, 8, 17, 19, 21		
Recreation		☒	7, 11		
Educational Scientific Value		☒	2, 3, 4, 8, 11, 12		
Uniqueness/Heritage	☒		1, 7, 9, 11, 12, 14, 19, 22		
Visual Quality/Aesthetics	☒		1, 2, 3, 6, 9		
Endangered Species					
Other					

Notes: *Refer to back up list of numbered rational factors. Any rational factors that were answered with a “Yes” were recorded in the Rationale (Reference #) column of this data form.

Wetland Function-Value Evaluation Form

Total Area of Wetland: about 1.5 acres | Human made?: no | Is wetland part of a wildlife corridor?: yes | or a "habitat island"?: no

Adjacent land use: transportation/forest | Distance to nearest roadway or other development: 0 ft

Dominant wetland systems present: PFO1 | Contiguous undeveloped buffer zone present: no

Is the wetland a separate hydraulic system?: no | If not, where does the wetland lie in the drainage basin?: low

How many tributaries contribute to the wetland?: 1 | Wildlife & vegetation diversity/abundance: see COE sheet

Wetland I.D.: Wetland 2
Latitude: | Longitude:
Prepared by: AM, AS
Wetland Impact: | Date:
Type: | Area:
Evaluation based on:
Office: | Field: X
Corps manual wetland delineation completed? Y X N

Function/Value	Occurrence Yes	Occurrence No	Rationale (Reference #)*	Principal Functions(s)/ Values	Comments
Groundwater Recharge/Discharge	☒		5, 7, 15		
Floodflow Alteration	☒		5, 6, 7, 8, 9, 10, 13, 15	☒	
Fish and Shellfish Habitat		☒	8, 14, 15, 16, 17		culverts up- and downstream
Sediment/Toxicant Retention	☒		2, 3, 4, 5, 7, 9, 10		
Nutrient Removal	☒		3, 5, 10, 11, 13		
Production Export	☒		1, 2, 4, 10, 12		
Sediment/Shoreline Stabilization	☒		1, 2, 3, 4, 7, 9, 13, 14, 15	☒	
Wildlife Habitat	☒		6, 7, 8, 15, 17, 19, 21		
Recreation		☒			
Educational Scientific Value		☒	2, 14		
Uniqueness/Heritage		☒	7, 19		
Visual Quality/Aesthetics		☒	3, 6, 11		
Endangered Species		☒			
Other		☒			

Notes: *Refer to back up list of numbered rational factors. Any rational factors that were answered with a “Yes” were recorded in the Rationale (Reference #) column of this data form.

Wetland Function-Value Evaluation Form

Total Area of Wetland: about 0.5 acres | Human made?: no | Is wetland part of a wildlife corridor?: no | or a "habitat island"?: no

Adjacent land use: mowed field/transportation | Distance to nearest roadway or other development: 10 feet

Dominant wetland systems present: PEM1 | Contiguous undeveloped buffer zone present: no

Is the wetland a separate hydraulic system?: no | If not, where does the wetland lie in the drainage basin?: low

How many tributaries contribute to the wetland?: 1 | Wildlife & vegetation diversity/abundance: low

Wetland I.D.: Wetlands 8, 9, and 17
Latitude: | Longitude:
Prepared by: AM, AS
Wetland Impact: | Date:
Type: | Area:
Evaluation based on:
Office: | Field: X
Corps manual wetland delineation completed? Y X N

Function/Value	Occurrence Yes	Occurrence No	Rationale (Reference #)*	Principal Functions(s)/ Values	Comments
Groundwater Recharge/Discharge	☒		4, 5, 7, 13, 15, 17	☒	obvious signs of discharge
Floodflow Alteration	☒		3, 5, 6, 7, 8, 9, 10, 13, 15, 16, 18	☒	
Fish and Shellfish Habitat		☒	4, 14, 16, 17		
Sediment/Toxicant Retention	☒		2, 3, 4, 7, 9, 10, 16		
Nutrient Removal	☒		3, 7, 8, 9, 10, 11, 13		
Production Export	☒		1, 7, 10		much of wetland frequently mowed
Sediment/Shoreline Stabilization	☒		2, 3, 9, 12, 13, 15		
Wildlife Habitat		☒	3, 6, 7, 8, 13		animal access minimized due to location on airport
Recreation		☒			
Educational Scientific Value		☒	11, 14		
Uniqueness/Heritage		☒	17, 22		
Visual Quality/Aesthetics		☒	11		
Endangered Species		☒			
Other		☒			

Notes: *Refer to back up list of numbered rational factors. Any rational factors that were answered with a “Yes” were recorded in the Rationale (Reference #) column of this data form.

Wetland Function-Value Evaluation Form

Total Area of Wetland: about 1.5 acres | Human made?: no | Is wetland part of a wildlife corridor?: no | or a "habitat island"?: no

Adjacent land use: transportation | Distance to nearest roadway or other development: 60'

Dominant wetland systems present: PEM1 | Contiguous undeveloped buffer zone present: no

Is the wetland a separate hydraulic system?: no | If not, where does the wetland lie in the drainage basin?: low

How many tributaries contribute to the wetland?: 1 | Wildlife & vegetation diversity/abundance: low

Wetland I.D.: Wetland 14
Latitude: | Longitude:
Prepared by: AM, AS
Wetland Impact: | Date:
Type: | Area:
Evaluation based on:
Office: | Field: X
Corps manual wetland delineation completed? Y X N

Function/Value	Occurrence Yes	Occurrence No	Rationale (Reference #)*	Principal Functions(s)/ Values	Comments
Groundwater Recharge/Discharge	☒		5, 7, 15		
Floodflow Alteration	☒		4, 5, 6, 7, 8, 9, 10, 13	☒	
Fish and Shellfish Habitat	☒		14, 16		
Sediment/Toxicant Retention	☒		2, 4, 5, 7, 10, 12		
Nutrient Removal	☒		3, 5, 7		area recently mowed, no veg. in majority of wetland at time of investigation
Production Export	☒		10		area recently mowed, no veg. in majority of wetland at time of investigation
Sediment/Shoreline Stabilization	☒		1, 2, 3, 4, 7, 9		area recently mowed, no veg. in majority of wetland at time of investigation
Wildlife Habitat	☒		6		area recently mowed, no veg. in majority of wetland at time of investigation, formerly *Phragmites* dominated
Recreation		☒			
Educational Scientific Value		☒	11		
Uniqueness/Heritage		☒	1, 11, 22		
Visual Quality/Aesthetics		☒	11, 12		
Endangered Species		☒			
Other		☒			

Notes: *Refer to back up list of numbered rational factors. Any rational factors that were answered with a “Yes” were recorded in the Rationale (Reference #) column of this data form.

Appendix I Contains the Following Documents:

1. Public Workshop Announcement, November 8, 2010
2. Public Workshop Announcement, November 14, 2010
3. BWI Transmittal announcing public workshop, October 27, 2010
4. Public Comment received during Scoping Workshop, November 18, 2010
5. Draft EA and Public Workshop Announcement, December 18, 2011
6. Draft EA and Public Workshop Announcement, December 21, 2011
7. Public Workshop Announcement, January 18, 2011
8. Public Workshop Announcement, January 22, 2011

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SPRINT CUP AAA TEXAS 500

Hamlin overtakes Johnson with 2 races left

Texas win gives him 33-point lead over 4-time defending Chase champion

ASSOCIATED PRESS

FORT WORTH, TEXAS — More Texas trouble for Jimmie Johnson, and a new leader in the closest three-way Chase for the Sprint Cup with only two races left.

Denny Hamlin completed a Texas two-step Sunday, winning at the track for the second time this year and taking over the points lead from Johnson, who has won the past four season championships.

Fourteen points ahead at the start of the race, Johnson finished ninth to fall 33 points behind Hamlin.

"We're on the cusp of trying to get our first championship, and as long as we keep doing what we've been doing, we should be OK," Hamlin said. "I'm going to race like we need to win from here on out. I've been saying with three [races] to go I was going to be a little bit more aggressive."

Hamlin took the lead with 29 laps to go and then overcame a push from Matt Kenseth on the final restart with three laps left, holding on for his series-best eighth victory this season.

Denny Hamlin

Kevin Harvick finished sixth and remained third in points, 59 behind Hamlin.

Johnson had troublesome pit stops that led to an unusual midrace crew change when Hendrick teammate Jeff Gordon's crew was conveniently available. Gordon got wrecked out of the race and then shoved Jeff Burton on the track when they got out of their mangled cars.

"It was just a long day," Johnson said. "I had speed in the car. We worked our way forward and had issues on pit road. … We gave away so much track position from the beginning. It's tough to get back where we needed to."

Greg Biffle led 11 times for 224 of the 334 laps but finished fifth. The 20th Cup race at the 1½-mile, high-banked Texas track included a record 33 lead changes.

Hamlin won at Texas in April less than three weeks after surgery to repair a torn anterior cruciate ligament in his left knee. His first race after the surgery was a 30th-place finish at Phoenix, where the Chase goes next weekend.

AT TEXAS MOTOR SPEEDWAY
FORT WORTH, TEXAS
Lap length: 1.5 miles
(Start position in parentheses)
1. (30) Denny Hamlin, Toyota, 334 laps,
2. (19) Matt Kenseth, Ford, 334,
3. (9) Mark Martin, Chevrolet, 334,
4. (20) Joey Logano, Toyota, 334,
5. (2) Greg Biffle, Ford, 334,
6. (26) Kevin Harvick, Chevrolet, 334,
7. (7) Clint Bowyer, Chevrolet, 334,
8. (5) David Ragan, Ford, 334,
9. (17) Jimmie Johnson, Chevrolet, 334,
10. (12) Paul Menard, Ford, 334,
11. (11) Tony Stewart, Chevrolet, 334,
12. (32) Marcos Ambrose, Toyota, 334,
13. (24) Kasey Kahne, Toyota, 334,
14. (10) A J Allmendinger, Ford, 334,
15. (18) David Reutimann, Toyota, 334,
16. (25) Jamie McMurray, Chevrolet, 334,
17. (28) Trevor Bayne, Ford, 334,
18. (27) Sam Hornish Jr., Dodge, 334,
19. (3) Carl Edwards, Ford, 334,
20. (14) Ryan Newman, Chevrolet, 334,
21. (13) Aric Almirola, Ford, 334,
22. (8) Regan Smith, Chevrolet, 334,
23. (1) Elliott Sadler, Ford, 333,
24. (6) Kurt Busch, Dodge, 333,
25. (22) Dale Earnhardt Jr., Chevrolet, 333,
26. (35) Casey Mears, Toyota, 333,
27. (23) Scott Speed, Toyota, 333,
28. (4) Juan Pablo Montoya, Chevrolet, 333,
29. (33) David Gilliland, Ford, 333,
30. (31) Bobby Labonte, Chevrolet, 333,
31. (37) Patrick Carpentier, Ford, 333,
32. (29) Kyle Busch, Toyota, 332,
33. (36) Brad Keselowski, Dodge, 332,
34. (40) Andy Lally, Chevrolet, 331,
35. (39) Robby Gordon, Toyota, eng, 63.
36. (16) Jeff Burton, Chevrolet, acc, 55.
37. (15) Jeff Gordon, Chevrolet, acc, 52.
38. (21) Martin Truex Jr., Toyota, acc, 49.
39. (38) Mike Bliss, Toyota, rear gear, 51.
40. (43) Landon Cassill, Chevy, vibration, 43.
41. (41) Travis Kvapil, Ford, ovh, 40.
42. (42) Dave Blaney, Ford, ovh, 37.
43. (34) Joe Nemechek, Toyota, eng, 34.

Average speed of race winner: 140.456 mph.
Time of race: 3 hours, 34 minutes, 1 second.
Margin of victory: 0.488 of a second.
Caution flags: 9 for 40 laps.
Lead changes: 33 among 13 drivers.
Leaders summary (driver, times led, laps led): G.Biffle, 11 times for 224 laps; M.Martin, 4 times for 36 laps; D.Hamlin, 2 times for 31 laps; J.Logano, 6 times for 30 laps; A.Lally, 2 times for 4 laps; M.Kenseth, 1 time for 2 laps; K.Harvick, 1 time for 1 lap; J.Johnson, 1 time for 1 lap; C.Mears, 1 time for 1 lap; D.Gilliland, 1 time for 1 lap; P.Carpentier, 1 time for 1 lap; R.Gordon, 1 time for 1 lap; M.Bliss, 1 time for 1 lap.
Top 12 in points: 1. D.Hamlin, 6,325; 2. J.Johnson, 6,292; 3. K.Harvick, 6,266; 4. C.Edwards, 6,008; 5. M.Kenseth, 6,000; 6. J.Gordon, 5,994; 7. Ky.Busch, 5,986; 8. T.Stewart, 5,962; 9. G.Biffle, 5,953; 10. C.Bowyer, 5,928; 11. Ku.Busch, 5,890; 12. J.Burton, 5,852.

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LEGAL NOTICES

PUBLIC WORKSHOP FOR THE PREPARATION OF AN ENVIRONMENTAL ASSESSMENT at BALTIMORE/WASHINGTON INTERNATIONAL THURGOOD MARSHALL AIRPORT

The Maryland Aviation Administration (MAA) in conjunction with the Federal Aviation Administration (FAA) and the U.S. Army Corps of Engineers - Baltimore District (as a Cooperating Agency) announces their intent to conduct a Public Scoping Workshop associated with the preparation of an Environmental Assessment (EA) for the proposed Runway Safety Area and other improvements at BWI Marshall. The Public Scoping Workshop, which will be held as an "open house" forum, is scheduled for **Thursday , November 18, 2010 from 4:00 p.m. to 8:00 p.m. in Assembly Rooms A & B at the MAA Offices, 991 Corporate Boulevard, Linthicum, Maryland.** This forum is designed to inform the public of the proposed action, any alternatives, and the proposed study approach.

Written scoping comments should be submitted by mail, post-marked by December 3, 2010, and sent to:

Ms. Robin Bowie
Manager, Division of Environmental Planning Maryland Aviation Administration Baltimore/Washington International Thurgood Marshall Airport P.O. Box 8766
BWI Airport, MD 21240

Comments will be accepted by fax at 410-859-7082 or by email at rbowie@bwiairport-.com no later than December 3, 2010. Any comments that are mailed, faxed, or emailed after this date will be considered to the extent practicable.

NOVEMBER 22, 2010 10:30 a.m. HOWARD COUNTY, MARY LAND ELKRIDGE ROOM 3430 COURTHOUSE DRIVE, ELLICOTT CITY, MARYLAND

NOTICE OF PUBLIC HEARING CONCERNING PROPOSED ISSUANCE OF BONDS

Notice is hereby given that at the time and place indicated above, the Director of Finance of Howard County, Maryland (the "County") will hold a public hearing regarding the issuance of the County's revenue bonds or other obligations pursuant to Resolution No. 124-2010 (the "Bonds"). The County will lend the proceeds of the Bonds to Merritt Properties, LLC or a related entity (the "Borrower") for the purposes of financing or refinancing a portion of the costs of the construction of a two-story office building located at 6514 Meadowridge Road, Elkridge, Maryland 21075 (the "Project").

The Bonds will be issued as limited obligations and not upon its full faith or credit or taxing power of the County.

Merritt-MR, LLC, a wholly owned subsidiary of Merritt Properties, LLC, will be the initial owner and operator of the Project. The maximum principal amount of the Bonds issued with respect to the Project will be $9,000,000.00.

Interested persons are invited to attend the public hearing and will have a reasonable opportunity to express their views both orally and in writing on the proposed issue of Bonds and the location and nature of the Project proposed to be financed.

The public hearing will be held to meet the requirements imposed by Section 147(f) of the Internal Revenue Code to the extent applicable to the Bonds.

Sharon F. Greisz,
Director of Finance,
Howard County, Maryland

NOVEMBER 22, 2010 10:00 a.m. HOWARD COUNTY, MARYLAND ELKRIDGE ROOM 3430 COURTHOUSE DRIVE, ELLICOTT CITY, MARYLAND

NOTICE OF PUBLIC HEARING CONCERNING PROPOSED ISSUANCE OF BONDS

Notice is hereby given that at the time and place indicated above, the Director of Finance of Howard County, Maryland (the "County") will hold a public hearing regarding the issuance of the County's revenue bonds or other obligations pursuant to Resolution No. 125-2010 (the "Bonds"). The County will lend the proceeds of the Bonds to M10 Elkridge, LLC (the "Borrower") for the purposes of financing or refinancing a portion of the costs of the construction of a 64-bed skilled nursing facility on approximately 11.7 acres of property owned by Music Fair Road Limited Partnership and located at 7615 Washington Blvd, Elkridge, Maryland (the "Project").

The Bonds will be issued as limited obligations and not upon its full faith and credit or taxing power of the County.

The Borrower will be the initial owner of the Project, and Lorien Life Center Howard II, Inc. will be the initial operator of the Project. The maximum principal amount of the Bonds issued with respect to the Project will be $8,406,000.00.

Interested persons are invited to attend the public hearing and will have a reasonable opportunity to express their views both orally and in writing on the proposed issue of Bonds and the location and nature of the Project proposed to be financed.

The public hearing will be held to meet the requirements imposed by Section 147(f) of the Internal Revenue Code to the extent applicable to the Bonds.

Sharon F. Greisz,
Director of Finance,
Howard County, Maryland

November 8, 2010

NOTICE TO LAST KNOWN REGISTERED OWNERS AND SECURED PARTIES OF ABANDONED VEHICLES TAKEN INTO CUSTODY BY THE POLICE

PURSUANT TO SECTION 25-205 OF THE TRANSPORTATION ARTICLE OF THE MARYLAND ANNOTATED CODE, THIS IS TO GIVE NOTICE THAT VARIOUS VEHICLES HAVE BEEN TAKEN INTO CUSTODY AND ARE NOW STORED AT THE TOWING SECTION LOCATED AT 6700 PULASKI HIGHWAY, BALTIMORE, MARYLAND 21237. ALL REGISTERED OWNERS AND SECURED PARTIES OF THESE VEHICLES HAVE THE RIGHT TO RECLAIM THEIR VEHICLES WITHIN ELEVEN (11) WORKING DAYS AFTER THE DATE OF THIS NOTICE SO LONG AS ALL TOWING, PRESERVATION AND STORAGE CHARGES ARE PAID. FAILURE OF AN OWNER OR SECURED PARTY TO EXERCISE THIS RIGHT WITHIN THE TIME PRESCRIBED ABOVE CONSTITUTES A WAIVER BY THEM OF ALL RIGHTS, TITLE AND INTEREST IN THEIR VEHICLE AND WILL BE CONSIDERED THEIR CONSENT TO THE SALE OF THE VEHICLE AT PUBLIC AUCTION OR RETENTION OF THE VEHICLE FOR PUBLIC PURPOSES. VISIT OUR WEBSITES: WWW.BALTIMORECITY.GOV/GOVERNMENT/TRANSPORTATION AND WWW.BALTIMORECITYTOWING.NET TO VIEW THE FULL LISTING OF THESE "UNCLAIMED" VEHICLES.

Babatunde Yussuf
ACTING TOWING MANAGER

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NOTICE OF SEIZURE AND INTENT TO FORFEIT: FP&F Number 2010130300007001, $106,020.00 in U. S. Currency, seized December 16, 2009, for violation of 18 USC § 981, § 1956 and § 1961. Any person having an interest in and desiring to claim this merchandise is required to file a claim with the FP&F Officer, U. S. Customs and Border Protection, 40 South Gay Street, Baltimore, Maryland 21202. Claim must be received prior to December 1, 2010, in default of which the merchandise will be considered forfeited and disposed of in accordance with the law.

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LEGALS

THE FISHER LAW GROUP, PLLC
9440 PENNSYLVANIA AVENUE
SUITE 350
UPPER MARLBORO, MARYLAND 20772
In the Circuit Court for
Anne Arundel County
No. C10-152452
NOTICE

Jeffrey B. Fisher,
Substitute Trustees
vs.
Linnise D. Jackson,
Rhonda D. Jackson,
Defendant

Notice is hereby issued this **25th day of October, 2010** That the sale of the property in the proceedings mentioned, made and reported by **William K. Smart, Substitute Trustee.**

BE RATIFIED AND CONFIRMED, unless cause to the contrary thereof be shown on or before the **24th day of November, 2010** next; Provided, a copy of this Notice be inserted in some newspaper published in Anne Arundel County, once in each of three successive weeks before the **24th day of November 2010** next. The report states that the amount of sale of the property at **8022 BRASS HORN LANE, GLEN BURNIE, MD 21061** to be **$403,700.00.**

True Copy:
ROBERT P. DUCKWORTH
Clerk
152452 (11/1, 11/8, 11/15)

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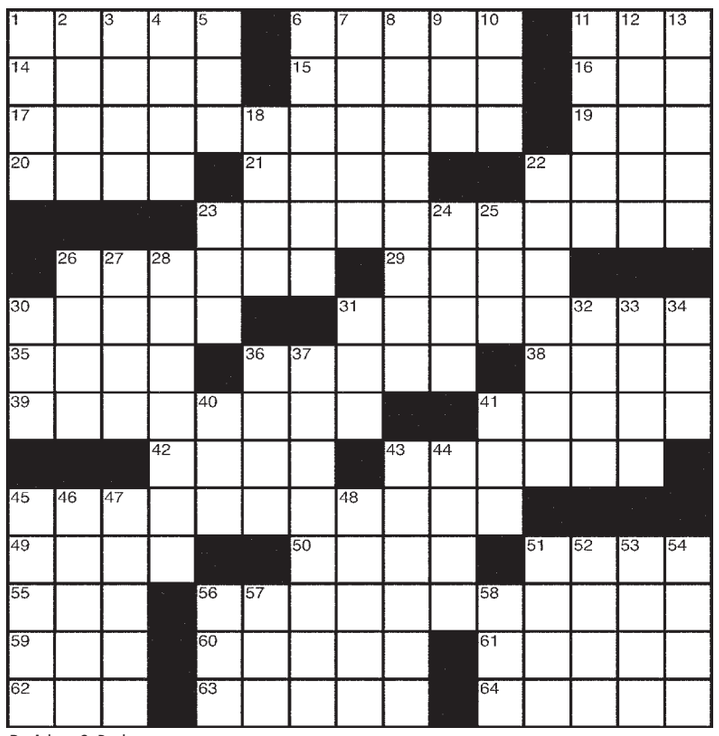
The Maryland Aviation Commission will meet Wednesday, **November 10, 2010**, 1 p.m. in the Linowes Conference Room, Third Floor, Terminal Building, Baltimore/ Washington International Thurgood Marshall Airport. A portion of the meeting may be held in closed session in accordance with §10-508 (d)(2) of the State Government Article, Annotated Code of Maryland. The open session topics include Executive Director's Report, Business Update and Operations Update. Please call Jeanette Brewer at 410-859-7734 for more information.

the new york times crossword

no. 1004



By Adam G. Perl

ACROSS
1 Frame job
6 Taste
11 Somme summer
14 Love to pieces
15 Clara Barton, e.g.
16 Rank above maj.
17 Michelle Obama and Laura Bush
19 Singer Yoko
20 Sicilian spewer
21 On a grand scale
22 Somersault
23 Highway troopers
26 Of greatest age
29 Poi source
30 The Beach Boys' "___ John B"
31 Drinker's next-day woe
35 Submarine sandwich
36 Early synthesizers
38 Great review
39 Eave
41 Tendon
42 Cubes in a casino
43 E-mail predecessor
45 Oppressive regime
49 ___ Canal, waterway through Schenectady
50 "___ la Douce"
51 Lane of the Daily Planet
55 Beachgoer's shade
56 Tenet of chivalry
59 Had something
60 Assists at a heist
61 Cosmetician Lauder
62 Plural of "la" and "le"
63 West Pointer
64 Unexpected win

DOWN
1 Opposite of "out" in baseball
2 Tighten the writin'?
3 Ripped
4 ___ Major
5 Hamster, for one
6 Speak sharply to
7 Bad news for a taxpayer
8 Sticker
9 Sugar suffix
10 Hi-___ monitor
11 Food-poisoning bacteria
12 Gin's partner
13 Run off to a judge in Vegas, say
18 Allows
22 Put the pedal to the metal
23 Mo. when fall starts
24 Lousy reviews
25 U.R.L. ending that's not "com" or "gov"
26 Mt. McKinley's is 20,320 ft.
27 Oral history
28 Like a dire situation
30 HBO rival
31 Animal in a sty
32 It shows which way the wind blows
33 At any time
34 FF's opposite
36 Spray used on rioters
37 Completely biased
40 Drunk's outburst
41 Jeanne d'Arc, e.g.: Abbr.
43 Least plausible, as an excuse
44 Hellenic H's
45 Daisy part
46 Pontificate
47 Actors speak them
48 Hackneyed
51 Daffy Duck has one
52 Table scraps
53 "Now you're making sense"
54 Proofreader's "reinstate" mark
56 Fond du ___, Wis.
57 Atty.'s org.
58 Fire: Fr.

ANSWER TO SATURDAY'S PUZZLE

Answers to any three clues in this puzzle are available by touch-tone phone: 1-900-285-5656 ($1.49 per minute).

Annual subscriptions are available for the best of Sunday crosswords from the last 50 years: 1-888-7-ACROSS

11/8/10

Bridge Play Frank Stewart

Thousands of players came to New Orleans for the ACBL Summer Championships. In the opening Grand National Teams, a Midwest squad — Dennis and Jerry Clerkin, Walter Johnson-Doug Simson — won out over a Los Angeles team.

In the final, South opened one heart at both tables. North-South for L.A. rested at two notrump, down one on a diamond lead, when North never supported the hearts.

In the replay, Dennis Clerkin responded one spade as North. When South bid two clubs next, North liked his fitting honors in South's suits plus the prime kings outside; he tried four hearts.

East dealer
Both sides vulnerable

NORTH
♠ K J 9 2
♡ Q 7 5
♢ K 4 2
♣ Q J 5

WEST
♠ 10 6 4 3
♡ K 2
♢ A 10 9
♣ 9 8 7 2

EAST
♠ Q 8 5
♡ 6 4 3
♢ Q J 8 6 5
♣ A 10

SOUTH
♠ A 7
♡ A J 10 9 8
♢ 7 3
♣ K 6 4 3

East	South	West	North
Pass	1 ♡	Pass	1 ♠
Pass	2 ♣	Pass	4 ♡
All Pass			

Opening lead — Choose it

West led a spade: nine, queen, ace. South next took the K-J to pitch a diamond and lost a trump finesse. The defense got the minor-suit aces, but South made his game.

A columnist who wrote up this deal noted that a club opening lead, setting up a ruff for East, would beat four hearts but implied that no West would lead a club. That lead doesn't look so far-fetched to me.

This week: Big Easy bridge.

DAILY QUESTION You hold: ♠ Q 8 5 ♥ 6 4 3 ♦ Q J 8 6 5 ♣ A 10. Your partner opens one heart. The next player passes. You say?

ANSWER Even in "Standard" methods, this hand is not worth a bid of two diamonds. The three low hearts are a negative feature as is the unsupported queen of spades. A one notrump response would deny heart support. A raise to two hearts might be a slight underbid but would be my choice. I don't mind having a little extra strength occasionally.

— *Tribune Media Services*

marketplaceindex
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THE BALTIMORE SUN
Publication Date: 11/14/2010
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Insertion Number: 40575917
Size: 1 x 4.83
Color Type: B&W
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Advertiser:
Section/Page/Zone: Autos/13/Maryland
Description:

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'08 LEXUS RX350 slv/gry lthr, Fact Warr, $30,455 jimcolemantoyota.com 888-364-4059

'07 LEXUS GX470 blk/tan, lthr, 35k, $35,955 jimcolemantoyota.com 888-364-4059

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2004 HARLEY DAVIDSON Screaming Eagle Deuce Showbike. 5,000 miles, flawless, $17,000. Call 240-994-1464.

02 Harley Davidson Superglide lowered, garage kept, exc cond, many extras, $7500 neg, 301-639-3073 cell

LEGAL NOTICES

PUBLIC AUCTION OF FEE SIMPLE PROPERTY BY THE MARYLAND DEPARTMENT OF TRANSPORTATION OFFICE OF REAL ESTATE IN COOPERATION WITH THE STATE HIGHWAY ADMINISTRATION

Under the provisions of Transportation Article of the Annotated Code of Maryland.

AUCTION TO BE CONDUCTED: Wednesday, December 1, 2010 at 12:00 p.m. on the premises. The Auction will commence with registration beginning at **11:30 a.m.** Please follow directional signage.

SUBJECT: The former Wilks, et al property. Auction to be held for a 8.079 +/- acre parcel located on the southeast side of MD RT 100 and MD RT 10 in Anne Arundel County. The apparent zoning is mixed – Residential/Open Space. For further information on any zoning issue, please contact the County zoning office at 410-222-7450. In responding to this ad or for the purposes of any questions, please refer to **MMC #08-1026.**

TERMS OF SALE: A deposit in the form of a certified or cashier's check in the amount of **$20,000.00** shall be required from the successful bidder at the time of the Auction, and shall be payable to the State Highway Administration (SHA). The balance of the purchase price must be paid at time of settlement. **Settlement must occur within ninety days of acceptance of bid by the Administrator of the Maryland State Highway Administration and/or the Maryland Board of Public Works. Any extensions must be granted, in writing, by the Maryland Department of Transportation (MDOT); otherwise, any and all deposit(s) received may be forfeited** to the MDOT and said deposit(s) may then be disposed of, in whatever manner the MDOT may determine, without any further obligation or liability to the Bidder. *The MDOT reserves the right to reject any and all bids.*

IMPORTANT NOTICE: All property information contained herein is subject to independent verification by any and all interested parties; whereas it is believed to be accurate, it is in no way warranted. A requested bid is only a starting point for the Auction, and may not be accepted by the MDOT if it is not commensurate with the appraised value of the property, or there could be other reasons for the rejection of all bids.

This sale is governed by the standard conditions, reservations, restrictions and covenants of the MDOT. Any questions regarding the Auction may be directed to:

Mr. Henry H. Whaley
Manager, Real Estate Services Group
Office of Real Estate — Phone: 410-865-1273
Maryland Department of Transportation — Toll-free: 1-866-242-9405
P.O. Box 548 — Fax: 410-865-1385
7201 Corporate Center Drive — Email: *lwhaley@mdot.state.md.us*
Hanover, Maryland 21076 — Web: *www.mdotrealestate.com*

NOTICE OF EVENING HEARINGS FOR PUBLIC COMMENT Before the Maryland Public Service Commission

In the Matter of the Merger of FirstEnergy Corp. and Allegheny Energy Inc.

Case No. 9233

Evening hearings for the purpose of receiving public comment in connection with the application of FirstEnergy Corp. ("FirstEnergy") and Allegheny Energy, Inc. ("Allegheny") (collectively, the "Applicants"), which requests authorization from the Maryland Public Service Commission for FirstEnergy to acquire the power to exercise substantial influence over the policies and actions of The Potomac Edison Company d/b/a Allegheny Power ("Allegheny Power") in Maryland, have been scheduled as follows:

Tuesday, November 30, 2010 at 7:00 p.m.
Winchester Hall
12 East Church Street
Frederick, Maryland 21701

Thursday December 2, 2010 at 7:00 p.m.
Hagar Hall Conference & Event Center
(Adjacent to the Clarion Hotel)
901 Dual Highway
Hagerstown, Maryland 21740

Monday, December 6, 2010 at 7:00 p.m.
Garrett College - Fine Arts Building Auditorium
687 Mosser Road
McHenry, Maryland 21520

Tuesday, December 7, 2010 at 6:00 p.m.
Allegany College of Maryland - College Theater in College Center
12401 Willowbrook Road SE
Cumberland, Maryland 21502

Written public comments also may be filed by Friday, December 10, 2010. The comments shall be addressed to Terry J. Romine, Executive Secretary, Maryland Public Service Commission, William Donald Schaefer Tower, 6 St. Paul Street, 16th Floor, Baltimore, Maryland 21202, and reference "Case No. 9233."

Reasonable accommodations will be made at Maryland Public Service Commission proceedings for qualified persons with disabilities, if requested 5 days in advance of the proceeding. Dial 410-767-8000 or 1-800-492-0474, or access these numbers via the Maryland Relay Service at 1-800-735-2558.

PUBLIC NOTICE

The **U.S. General Services Administration (GSA)** is preparing an Environmental Assessment (EA), in accordance with the National Environmental Policy Act, to assess the potential environmental impacts of the proposed site acquisition and construction of a new Social Security Administration (SSA) National Support Center (NSC). As part of the American Recovery and Reinvestment Act of 2009, the SSA received an appropriation to construct a new NSC. This center will replace the existing National Computer Center at the SSA Campus in Woodlawn, MD, which houses computer operations essential to prompt and accurate payment of benefits to Americans. The current data center was constructed in 1979 and the infrastructure systems are approaching the end of their useful lives. This project will provide the SSA with a new data center which will meet the agency's current and future needs. The NSC would be approximately 400,000 square feet with 200 parking spaces.

Two action alternatives and the no action alternative for the proposed construction of the SSA NSC are analyzed in the EA. The two action alternatives being considered are located at:
• 7630, 7726, 7818 North Johnnycake Road, Woodlawn, Maryland; and
•Terminus of Bennett Creek Blvd at the southernmost end of the Urbana Corporate Center, Urbana, Maryland.

The GSA invites your participation and is soliciting comments on the Draft EA, as well as comments under Section 106 of the National Historic Preservation Act regarding historic resources. Copies of the Draft EA can be viewed at the locations below beginning November 15, 2010. The Draft EA can also be viewed online at www.SSA-NSCea.com.

Urbana Regional Library	Woodlawn Library
9020 Amelung Street	1811 Woodlawn Drive
Frederick, MD 21704	Woodlawn, MD21207

Submit your comments to the project mailbox at SSA-NSC@gsa.gov or to Ms. Courtenay Hoernemann, U.S. General Services Administration, 20 North Eighth Street, Philadelphia, PA 19107. Please provide your comments by **December 15, 2010**, to ensure consideration in the Final EA.

PUBLIC WORKSHOP FOR THE PREPARATION OF AN ENVIRONMENTAL ASSESSMENT at BALTIMORE/WASHINGTON INTERNATIONAL THURGOOD MARSHALL AIRPORT

The Maryland Aviation Administration (MAA) in conjunction with the Federal Aviation Administration (FAA) and the U.S. Army Corps of Engineers - Baltimore District (as a Cooperating Agency) announces their intent to conduct a Public Scoping Workshop associated with the preparation of an Environmental Assessment (EA) for the proposed Runway Safety Area and other improvements at BWI Marshall. The Public Scoping Workshop, which will be held as an "open house" forum, is scheduled for **Thursday , November 18, 2010 from 4:00 p.m. to 8:00 p.m. in Assembly Rooms A & B at the MAA Offices, 991 Corporate Boulevard, Linthicum, Maryland.** This forum is designed to inform the public of the proposed action, any alternatives, and the proposed study approach.

Written scoping comments should be submitted by mail, post-marked by December 3, 2010, and sent to:

Ms. Robin Bowie
Manager, Division of Environmental Planning Maryland Aviation Administration Baltimore/Washington International Thurgood Marshall Airport P.O. Box 8766
BWI Airport, MD 21240

Comments will be accepted by fax at 410-859-7082 or by email at rbowie@bwiairport-.com no later than December 3, 2010. Any comments that are mailed, faxed, or emailed after this date will be considered to the extent practicable.

MOTORCYCLES

2009 HARLEY DAVIDSON SPORSTER 883 Custom model. Forward foot pedals & deer shifter, Root beer Brown, Loud Pipes & garage kept. 1000 Orig miles. $7000 410-984-2303

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PARKWOOD CEMETERY Last Supper, Grave 1, Lot 31 Call Betty:972-954-7627

LEGAL NOTICES

THE MARYLAND STATE BOARD OF CHIROPRACTIC AND MASSAGE THERAPY EXAMINERS WILL HOLD A PUBLIC MEETING ON **THURSDAY, NOVEMBER 18, 2010** AT DHMH, 4201 PATTERSON AVENUE, ROOM 528, BALTIMORE, MD, COMMENCING 10:00 A.M. DURING THE MEETING, THE BOARD WILL DISCUSS GENERAL TOPICS RELATING TO CHIROPRACTIC AND MASSAGE THERAPY.

SERVICES

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FATHERS-MEN'S RIGHTS Atty-Custody, visitation, child support, alimony. ET Clarke Esq. 410-583-9001

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Teak Desk and File Cabinet Excellent Condition. Contemporary. Orig 1900. Call 410-346-7947. $300

Toshiba TV 32" With VHS/DVD. Good condition. Call 410-346-7947. $40

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ESTATE SALE
SATURDAY November 13, 2010. 9:00 a.m. to 5:00 p.m.
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PLEASE CALL 410 585-4297

MISCELLANEOUS

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XMAS OLD BALLS/LIGHTS Aluminum tree, religious statues, Natty Boh, Nick-nacks, 410-235-4244

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▼ ANNE ARUNDEL CO.

SPARK YARD SALE- Sun. Nov. 14 @ 168 Ritchie Hwy, Severna Park, MD from 8am-2pm- - designer items, furn., sports equip. & other great items.

▼ BALTIMORE CITY

BOLTON HILL SUN. 8-11 1700 Blk Park Ave. Multi-family. Antiques, collectibles, furniture, old Baltimore prints, fabric, etc.

▼ HOWARD COUNTY

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MAA Office of Noise, Real Estate
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COPY

TRANSMITTAL

Date: **October 27, 2010**

TO: Airport Community

Fax phone:

CC:

From: Ellen Sample

Maryland Aviation Administration
Office of Noise, Real Estate and Land Use Compatibility Planning
P.O. Box 8766
BWI Airport, Maryland 21240-0766
Phone: **410-859-7375**
Fax phone: 410-859-7288

Attached is a notice for an upcoming Public Scoping Workshop for the preparation of an Environmental Assessment at Baltimore/Washington International Thurgood Marshall Airport. Additional information can be found on our website at www.marylandaviation.com under Environmental Planning.

PUBLIC WORKSHOP FOR THE PREPARATION OF AN ENVIRONMENTAL ASSESSMENT at BALTIMORE/WASHINGTON INTERNATIONAL THURGOOD MARSHALL AIRPORT

The Maryland Aviation Administration (MAA) in conjunction with the Federal Aviation Administration (FAA) and the U.S. Army Corps of Engineers – Baltimore District (as a Cooperating Agency) announces their intent to conduct a Public Scoping Workshop associated with the preparation of an Environmental Assessment (EA) for the proposed Runway Safety Area and other improvements at BWI Marshall. The Public Scoping Workshop, which will be held as an "open house" forum, is scheduled for **Thursday , November 18, 2010 from 4:00 p.m. to 8:00 p.m. in Assembly Rooms A & B at the MAA Offices, 991 Corporate Boulevard, Linthicum, Maryland**. This forum is designed to inform the public of the proposed action, any alternatives, and the proposed study approach.

Written scoping comments should be submitted by mail, post-marked by December 3, 2010, and sent to:

Ms. Robin Bowie
Manager, Division of Environmental Planning
Maryland Aviation Administration
Baltimore/Washington International
Thurgood Marshall Airport
P.O. Box 8766
BWI Airport, MD 21240

Comments will be accepted by fax at 410-859-7082 or by email at rbowie@bwiairport.com no later than December 3, 2010. Any comments that are mailed, faxed, or emailed after this date will be considered to the extent practicable.

Ms. Nancy Brown
Glen Burnie Improvement Assoc.
19 Georgia Ave, NW
Glen Burnie MD 21061

Mr. Eric Jordan
Elmhurst Improvement Association
7848 Coldbrooke Dr.
Severn MD 21144

Mr. Ernie Michaelson
Timber Ridge Improvement Association
7425 Hawkins Drive
Hanover MD 21076

Mr. William Raymond Faith
Greater Elkridge Community Assoc.
6039 Hunt Club Road
Elkridge MD 21075

Mr. Rodney Jones
Severn Improvement Association
613 Jones Road
Severn, MD 21144

Mr. Ken Glendenning
Linthicum-Shipley Improvement Assoc.
602 Fairmount Rd.
Linthicum MD 21090

Mr. Ed Huber
Elkridge Community Association
6615 Pheasant Dr.
Elkridge MD 21075

Mr. Rusty Bristow
Harmans Civic Association
7215 Ridge Road
Hanover Maryland 21076

Mr. Wayne Dixon
Harmans Civic Association
7677 Ridge Chapel Road
Hanover MD 21076

Mr. Richard Hanna
Timber Ridge Improvement Association
7403 Hawkins Drive
Hanover MD 21076

Ms. Liz Wagner
Greater Ferndale Communty Civic Association
239 Wicklow Ave.
Glen Burnie MD 21061

Mr. Melvin Kelly
Seven Imporvement Association
768 Queenstown Road
Severn MD 21144

Mr. Fred Davis
Greater Pasadena Council
653 Colston Lane
Pasadena MD 21122

Mr. Corey Jones
Severn Improvement Association
441 Queenstown Road
Severn, MD 21144

Neighbors
Committee
with Alternates

Community Organizations

Andorick Acres
1405 Pride Tree Circle
Severn, MD 21144

Cohansey Court Condo
7611 McNamara Drive
Glen Burnie, MD 21061

Crestwood Community Association
P.O. Box 114
Linthicum, MD 21090

Danza Village Community Association
821 Meadow Road
Severn, MD 21144

Deep Run Civic Association
7107 Forest Avenue
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Delmont Improvement Association
P.O. Box 956
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Delmont Station Homeowners
P.O. Box 867
Severn, MD 21144

Dundee & Associates
P.O. Box 1297
Glen Burnie, MD 21060

Elmhurst Improvement Association
7809 Walnut Tree Road
Severn, MD 21144

Ferndale/Linthicum Community Association
504 Packard Avenue
Ferndalel, MD 21061

Fox Mill Community Association
311 Valiant Circle
Glen Burnie, MD 21061

Foxchase Community Association
136 Pointer Circle
Glen Burnie, MD 21061

Glen Burnie Improvement Association
19 Crain Highway South
Glen Burnie, MD 21060

Woodlawn Heights Community Association
40 Glendale Avenue
Glen Burnie, MD 21061

Timber Ridge Community Association
7425 Hickory Lane
Hanover, MD 21076

Greater Ferndale Community Association
4 Greenwood Avenue
Ferndale, MD 21061

Greenbriar Homeowners
3 Green Knoll Blvd.
Hanover MD 21076

Harmons Civic Association
P.O. Box 711
Hanover, MD 21076

Harundale Oakwood Park Civic Association, Inc.
P.O Box 522
Glen Burnie, MD 21060

Wicklow Woods Homeowners Association
11 Lennon Court
Glen Burnie MD 21061

Woodside Square Condo
578 Glen Court
Glen Burnie, MD 21061

Woodcrest Homeowners Association
6319 Harris Heights Avenue
Glen Burnie, MD 21061

Linthicum-Shipley Community Association
721 S. Hammonds Ferry Road
Linthicum, MD 21090

Maple Glen Estates
127 Sunlight Circle
Glen Burnie, MD 21061

Merriweather Homeowners Association
7314 Musical Way
Severn, MD 21144

Myers Estates Homeowners Association
7808 Stafford Hill Court
Glen Burnie, MD 21061

N. Ferndale Community Association
108 Chalmers Avenue
Glen Burnie, MD 21061

inthicum Improvement Association
414 Laura Avenue
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Peach Orchard Homeowners
P.O. Box 841
Severn, MD 21144

Provinces Civic Association
P.O. Box 313
Jessup, MD 20794

Quail Run Association
P.O. Box 431
Severn, MD 21144

Trailside Improvement
Association
435 Arbor Drive
Glen Burnie, MD 21061

Severn Hills Homeowners
Association
7914 Severn Hills Way
Severn, MD 21144

Severn Improvement Association
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Interested Parties Page 1

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Mr. Michael Staiano
Staiano Engineering Inc.
1923 Stanley Ave.
Rockville MD 200851

Mr. William Kerler
7716 Pecan Leaf
Severn MD 21144

Alice Cook
107 Mountain Rd.
Linthicum MD 21090

Ms. Dina M. Bashman
793 Warren Ave.
Linthicum MD 21090

Mr. Reggie Dixon
7677 Ridge Chapel Rd.
Hanover MD 21076

Mr. Walter Dirndorfer
6219 Woodland Rd.
Linthicum MD 21090

Mr. Joseph Bouler
8363 Sycamore Rd.
Millersville MD 21108

Yasi... Boodhoosingh
6025 Hanover Rd.
Hanover MD 21076

Ms. Cecilia Januszkiewicz
6412 Steel Flower Path
Columbia MD 21045

Mr. Art Lisowsky
1529 Severn Chapel Rd.
Crownsville MD 21032

Ms. Robin Cook
662 Rhone Court
Glen Burnie MD 21061

Mr. Gary Hanneken
620 Old Stage Rd.
Glen Burnie MD 21061

Mr. Booker Madden
721 Snowden Lane
Glen Burnie MD 21061

Mr. Daniel McLaughlin
1226 Severnview Dr.
Crownsville MD 21032

Mr. Paul Harrell
7904 Poplar Grove Road
Severn MD 21144

Mr. Bruce Fink
323 School Lane
Linthicum MD 21090

Mr. Fred Marc
St. Augustine's School
6112 Old Washington Rd.
Elkridge MD 21227

Ms. Kandace Harries
14 Lennon Court
Ferndale MD 21061

Mr. Mark Anderson
212 Cypress Ridge Rd.
Severna Park MD 21146

Juliet Page
253 Mill Church Rd.
Arnold MD 21012

Mr. Tony Frank
5 Tomcat Lane
Glen Burnie MD 21060

Ms. Susan Mocko
6948 Ridge Rd.
Hanover MD 21076

Ms. Patricia Hudson
Jessup Improvement Assoc.
7107 Forest Ave.
Hanover MD 21076

Ms. Margaret Daniels
8449 Woodland Rd.
Millersville MD 21108

Cpt. Walter Stocknick
1920 Chapparral Court
Crownsville MD 21032

Mr. Joe LaCasio, Principal
Quarterfield Elementary School
7967 Quarterfield Rd.
Severn MD 21144

Ms. Tina Shanks
301 Johnson Farm Lane
Glen Burnie MD 21060

Interested Parties Page 2

Mr. James Wilkinson
9255 Brush Run
Col· ia MD 21045

Ms. Ara Crowe
571 Nolview Court
Glen Burnie MD 21061

Mr. Robert Haney
505 Clubside Drive
Taneytown MD 21787

Mr. Richard Forgo
Linthicum-Shipley Improv. Assoc.
114 South Camp Meade Rd.
Linthicum Heights MD 21090

Ms. Denise Harris
806 Andover Rd.
Glen Burnie MD 21061

Mr. Lou Bova
5 D Street, N.W.
Glen Burnie MD 21061

Mr. Harry Matthews
7652 Harmans Rd.
Hanover MD 21076

Reverend Abraham Shanklin
7605 Harmans Rd.
Hanover MD 21076

Ms. Mary Harding
5741 A Mineral Ave.
Halethorpe MD 21227

Ms. da Greene, Executive Dir.
BWI Business Partnership
1302 Concourse Dr., Suite 105
Linthicum MD 21090

Ms. Kelly Pierson
929 Evergreen Road
Severn MD 21144

Ms. Patricia Beattey-Patterson
421 Ben Oaks Drive, East
Severna Park MD 21146

Ms. Laura C. English
455 Darton Court
Glen Burnie MD 21061

Ms. Toni Leazer
7802 Metacomet Rd.
Hanover MD 21076

Ms. Sharon Stafford
1734 Maple Ave.
Hanover MD 21076

Mr. William Felger
20 Hanford Drive
Harmans MD 21077

Mr. Robert Krause
219 Wittshire Lane
Severna Park MD 21146

Ms. Barbara Turner
514 Stewart Avenue
Glen Burnie, MD 21061

Mr. Donald Bonn
7807 Stafford Hill Court
Glen Burnie MD 21061

Mr. David Servinsky
7872 Sandy Pine Drive
Severn MD 21144

Ms. Ruth Carter
7515 Old Stage Rd.
Glen Burnie MD 21061

Mr. Joseph Pfeiffer
1703 Maple Ave.
Hanover MD 21076

Mr. Paul Harrell
Elmhurst Improvement Association
P.O. Box 941
Severn MD 21144

Ms. Elizabeth Greene
Harmans Woods News
7720 Aragorn
Harmans MD 21076

Mr. Carlos Berrios
714 Jones Road
Glen Burnie MD 21061

Mr. Michael Davie
1020 Summer Hill Dr.
Odenton MD 21113

Ms. Gail Nickells
4516 Kesting Court
Ellicott City MD 21043

Ms. Janice MacIntosh, Principal
Arthur Slade Regional School
120 Dorsey Rd.
Glen Burnie MD 21061

Mr. Charles Levay, President
Peach Orchard Civic Assoc.
7804 Elberta Dr.
Severn MD 21144

Richard Chapman
Provinces Civic Assoc.
7847 Statesman St.
Severn MD 21144

Interested Parties Page 3

Mr. John Robertson
c/o Nationwide Insurance
3350K Dorsey Rd.
Han. : MD 21076

Mr. Tom Galligan
3393 Greenstone Court
Millersville MD 21108

Mr. Rich Creech
1002 Thomas Rd.
Glen Burnie MD 21061

Mr. Louis Toth
751 White Oaks Ave.
Catonsville MD 21228

Mr. David Barry
506 Devonshire Lane
Severna Park MD 21146

Mr. Sean Hughes
14510 Dorsey Mill Rd.
Glenwood MD 21738-9320

Mr. Edward Guzinski
203 Maple Ave.
Glen Burnie MD 21061

Mr. Edmund Klebe
116 Dunrovin Ave.
Westminster MD 21158

Ms. Marsha Willis
916 Timber Ridge Dr.
Hanover MD 21076

Mr. mond Ringgold
Delmont Improvement Assn. Inc.
1267 Delmont Rd.
Severn MD 21144

Ms. Roberta Boyle
7836 Clark Station Road
Severn MD 21144

Mr. Bob Colvin
150 Mullar Lane
Stevensville MD 21666

Mr. Birney Smith
c/o Parke West Homeowners Assoc.
P.O. Box 678
Severn MD 21144

Mr. Cliff Kooser
8 Lennon Court
Ferndale MD 21061

Mr. Allen G. Eckert
5 Raylene Court
Glen Burnie MD 21061

Mr. Bill Szyperski
7921 Darien Dr.
Glen Burnie MD 21061

Mr. Kevin Stearman
7650 Airpark Rd.
Gaithersburg MD 20879

Mr. David E. Barry
506 Devonshire Lane
Severna Park MD 21146

Mr. Ron Ulrich
100 St. Ives Dr.
Severna Park MD 21146

Ms. Martha Wilbur
307 Johnson Farm Lane
Glen Burnie MD 21061

Ms. Donna Sakenes
55 St. Andrews Rd.
Severna Park MD 21146

Ms. Cookie Wineholt
692 Ritchie Highway, Suite 100
Severna Park 21146

Mr. Dennis Dabrowka
661 Rhone Court
Glen Burnie MD 21061

Mr. Andrew Bassler
Arthur Slade School Board
461 Edgewater Rd.
Pasadena MD 21122

Mr. Michael Wassil
Tipton Airport
P.O. Box 155
Odenton MD 21113

Ms. Debbie Cruder
514 Heavitree Garth
Severna Park MD 21146

Mr. Manuel Perez
508 McPherson
Glen Burnie MD 21061

Mr. Richard Decker
7044 Cresthaven Dr.
Glen Burnie MD 21061

Mr. Don Newhouse
14 Apple Tree Court
Catonsville MD 21228

Mr. Dave Freeman
6108 Adcock Lane
Hanover MD 21076

Maryland Aviation Administration

BWI BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

FEDERAL AVIATION ADMINISTRATION

ENVIRONMENTAL ASSESSMENT FOR PROPOSED AIRPORT IMPROVEMENTS AT BWI MARSHALL

PUBLIC SCOPING WORKSHOP COMMENT FORM

November 18, 2010 **4:00 PM – 8:00 PM**
Maryland Aviation Administration Offices
Assembly Rooms A & B
991 Corporate Boulevard
Linthicum, Maryland

WE WELCOME YOUR COMMENTS! Thank you for participating in tonight's Public Scoping Workshop. Please provide your comments and place this form in the "Comment Box" before you leave. You may also mail it to the address listed on the back, fax it to 410-859-7082 or email it to rbowie@bwiairport.com. Comments pertaining to the workshop will be accepted until **December 3, 2010.**

PLEASE PRINT CLEARLY:

FIRST NAME: Keith [redacted] LAST NAME: Jamison

ADDRESS: 1628 Bear Paw Lane

CITY: Hanover STATE: MD ZIP: 21076

E-MAIL: KRJ9999@AOL.COM

Do you live close to the BWI Marshall Airport?

YES ✓ **NO** _____

If yes, what is the name of your community?

Hawks Ridge

Please provide your comments about the Environmental Assessment for Proposed Airport Improvements at BWI Marshall.

Only concerns I have are:

- Erosion in areas where trees are to be removed; this needs to be evaluated/addressed
- Number of trees being removed; BWI should be required to plant replacements (on or off property)

LEGAL NOTICES

PUBLIC NOTICE OF AVAILABILITY AND PUBLIC WORKSHOP ANNOUNCEMENT

FEDERAL AVIATION ADMINISTRATION
MARYLAND AVIATION ADMINISTRATION

DRAFT ENVIRONMENTAL ASSESSMENT
PROPOSED AIRPORT IMPROVEMENTS
BALTIMORE/WASHINGTON INTERNATIONAL THURGOOD MARSHALL AIRPORT
LINTHICUM, MARYLAND

The Maryland Aviation Administration (MAA) in conjunction with the Federal Aviation Administration (FAA) and the U.S. Army Corps of Engineers - Baltimore District (as a Cooperating Agency) and in compliance with the National Environmental Policy Act of 1969; FAA Orders 1050.1E and 5050.4B, has completed a Draft Environmental Assessment (EA) for the Proposed Airport Improvements at Baltimore / Washington International Thurgood Marshall Airport in Linthicum, Maryland. Copies of the document are available at the following locations for review and comment:

Federal Aviation Administration
Washington Airports District Office
23723 Air Freight Lane, Suite 210
Dulles, VA 20166

Maryland Aviation Administration
Office of Planning and Environmental Services
991 Corporate Boulevard
Linthicum, MD 21090

Anne Arundel County Library
Linthicum Branch
400 Shipley Road
Linthicum, MD 21090

Anne Arundel County Library
North County Branch
1010 Eastway
Glen Burnie, MD 21060

In addition, a Public Workshop will be conducted to demonstrate the information presented in the EA. The Public Workshop, which will be held as an "open house" forum, is scheduled for **January 25, 2012 from 4:00 p.m. to 8:00 p.m. in Assembly Rooms A & B at the MAA Offices, 991 Corporate Boulevard, Linthicum, Maryland.** This forum is designed to inform the public of the proposed action and associated alternatives as well as anticipated impacts.

Written comments on the Draft EA are requested from interested parties and will be accepted if postmarked or received by **February 9, 2012.** Comments should be submitted in writing to:

Ms. Robin Bowie
Manager, Division of Environmental Planning
Maryland Aviation Administration
Baltimore/Washington International
Thurgood Marshall Airport
P.O. Box 8766
BWI Airport, MD 21240

Comments will be accepted by fax at 410-859-7082 or by email at rbowie@bwiairport.com no later than February 9, 2012. Any comments that are mailed, faxed, or emailed after this date will be considered to the extent practicable.

All substantive comments will be carefully reviewed and addressed in the Final EA. In accordance with Federal regulations, the FAA will not decide whether to implement the proposed projects or take an alternative action until the review process is completed and an environmental finding is issued.

...Classified for more jobs, cars, homes, apartments and stuff • Place an ad: 410.539.7700

RECOMMENDED

PUBLIC NOTICE OF AVAILABILITY AND PUBLIC WORKSHOP ANNOUNCEMENT

FEDERAL AVIATION ADMINISTRATION
MARYLAND AVIATION ADMINISTRATION

DRAFT ENVIRONMENTAL ASSESSMENT
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APARTMENTS BALTIMORE CITY

ASHBURTON WOODS APARTMENTS
1 & 2 Bedrooms

CEMETERY LOTS | LEGAL NOTICES

PUBLIC WORKSHOP FOR THE PREPARATION OF AN ENVIRONMENTAL ASSESSMENT

FEDERAL AVIATION ADMINISTRATION
MARYLAND AVIATION ADMINISTRATION

DRAFT ENVIRONMENTAL ASSESSMENT
PROPOSED AIRPORT IMPROVEMENTS
BALTIMORE/WASHINGTON INTERNATIONAL THURGOOD MARSHALL AIRPORT
LINTHICUM, MARYLAND

The Maryland Aviation Administration (MAA) in conjunction with the Federal Aviation Administration (FAA) and the U.S. Army Corps of Engineers - Baltimore District (as a Cooperating Agency) and in compliance with the National Environmental Policy Act of 1969, FAA Orders 1050.1E and 5050.4B, has completed a Draft Environmental Assessment (EA) for the Proposed Airport Improvements at Baltimore / Washington International Thurgood Marshall Airport in Linthicum, Maryland.

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MARYLAND ENVIRONMENTAL ASSESSMENT FORM

			YES	NO	COMMENTS
A.	**Land Use Considerations**				
	1.	Will the action be within the 100-year floodplain?	X		
	2.	Will the action require a permit for construction or alteration within the 50-year floodplain	X		
	3.	Will the action require a permit for dredging, filling, draining, or alteration of a wetland	X		
	4.	Will the action require a permit for the construction or operation of facilities for solid waste disposal including dredge and excavation spoil?		X	
	5.	Will the action occur on slopes exceeding 15%?	X		
	6.	Will the action require a grading plan or a sediment control permit?	X		
	7.	Will the action require a mining permit for deep or surface mining?		X	
	8.	Will the action require a permit for drilling a gas or oil well?		X	
	9.	Will the action require a permit for airport construction?		X	
	10.	Will the action require a permit for the crossing of the Potomac River by conduits, cables, or other like devices		X	
	11.	Will the action affect the use of a public recreation area, park, forest, wildlife management area, scenic river or wildland?		X	
	12.	Will the action affect the use of any natural or man-made features that are unique to the county, state, or nation?		X	
	13.	Will the action affect the use of an archaeological or historical site or structure?		X	
B.	**Water Use Considerations**				
	14.	Will the action require a permit for the change of the course, current, or cross-section of a stream or other body of water?	X		
	15.	Will the action require the construction, alteration, or removal of a dam, reservoir, or waterway obstruction?		X	
	16.	Will the action change the overland flow of stormwater or reduce the absorption capacity of the ground?	X		

	17.	Will the action require a permit for the drilling of a water well?		X	
	18.	Will the action require a permit for water appropriation?		X	
	19.	Will the action require a permit for the construction and operation of facilities for treatment or distribution of water?		X	
	20.	Will the project require a permit for the construction and operation of facilities for sewage treatment and/or land disposal of liquid waste derivatives?		X	
	21.	Will the action result in any discharge into surface or sub-surface water?	X		
	22.	If so, will the discharge affect ambient water quality parameters and/or require a discharge permit?		X	
C.	**Air Use Considerations**				
	23.	Will the action result in any discharge into the air?	X		Construction impacts will be temporary.
	24.	If so, will the discharge affect ambient air quality parameters or produce a disagreeable odor?		X	
	25.	Will the action generate additional noise, which differs in character or level from present conditions?	X		Construction impacts will be temporary.
	26.	Will the action preclude future use of related air space?		X	
	27.	Will the action generate any radiological, electrical, magnetic, or light influences?		X	
D.	**Plants and Animals**				
	28.	Will the action cause the disturbance, reduction, or loss of any rare, unique, or valuable plant or animal?		X	
	29.	Will the action result in the significant reduction or loss of any fish or wildlife habitats?		X	
	30.	Will the action require a permit for use of pesticides, herbicides, or other biological, chemical, or radiological control agents?		X	
F.	**Socio-Economic**				
	31.	Will the action result in a pre-emption or division of properties or impair their economic use?		X	
	32.	Will the action cause relocation of activities, structures, or result in a change in the population density or distribution?		X	
	33.	Will the action alter land values?		X	
	34.	Will the action affect traffic flow and volume?	X		Construction impacts will be temporary.

	35.	Will the action affect the production, extraction, harvest, or potential use of a scarce or economically important resource?		X	
	36.	Will the action require a license to construct a sawmill or other plant for the manufacture of forest products?		X	
	37.	Is the action in accord with federal, state, regional, and local comprehensive or functional plans - including zoning?	X		
	38.	Will the action affect the employment opportunities for persons in the area?	X		Increased employment activity is expected for the duration of the construction period.
	39.	Will the action affect the ability of the area to attract new sources of tax revenue?		X	
	40.	Will the action discourage present sources of tax revenue from remaining in the area, or affirmatively encourage them to relocate elsewhere?		X	
F.	**Other Considerations**				
	41.	Will the action affect the ability of the area to attract tourism?		X	
	42.	Could the action endanger the public health, safety, or welfare?		X	
	43.	Could the action be eliminated without deleterious affects to the public health, safety, welfare, or the natural environment?		X	
	44.	Will the action be of statewide significance?		X	
	45.	Are there any other plans or actions (federal, state, county, or private) that, in conjunction with the subject action, could result in a cumulative or synergistic impact on the public health, safety, welfare, or environment?		X	
	46.	Will the action require additional power generation or transmission capacity?		X	
	47.	This agency will develop a complete environmental effect report on the proposed action.	X		

Appendix K Contains the Following Documents:

1. Draft EA Distribution List
2. Comments Received on the Draft EA
    a. Maryland Historical Trust, January 5, 2012
    b. Maryland Department of Planning, January 3, 2012
    c. US Army Corps of Engineers, January 26, 2012 (email)
    d. Maryland Department of Planning, January 30, 2012
    e. Maryland Department of Natural Resources, January 24, 2012
    f. Federal Aviation Administration, February 7, 2012
    g. Maryland Department of the Environment, February 10, 2012
    h. Anne Arundel County, February 14, 2012
    i. US Army Corps of Engineers, February 24, 2012
3. Comment Response Matrix

DRAFT EA DISTRIBUTION LIST

Mr. George G. Cardwell, Administrator
Anne Arundel County
Transportation Planning Division
Heritage Office Complex
2664 Riva Road
Annapolis, Maryland 21401

Ms. Meg Andrews
Maryland Department of Transportation
Office of Planning and Capital Programming
7201 Corporate Center Drive
Hanover, Maryland 21076

Mr. Devin Ray
US Fish and Wildlife Service
Chesapeake Bay Field Office
177 Admiral Cochran Drive
Annapolis, Maryland 21401

Ms. Lori Byrne
Maryland Department of Natural Resources
Wildlife and Heritage Division
580 Taylor Avenue, E1
Annapolis, Maryland 21401

Ms. Elizabeth J. Cole
Maryland Historical Trust
Division of Historical and Cultural Programs
100 Community Place
Crownsville, Maryland 21032-2023

Mr. Elder A. Ghigiarelli, Jr.
Deputy Program Manager
Federal Consistency Coordinator
Maryland Department of Environment
Wetlands and Waterways Program
1800 Washington Boulevard
Baltimore, Maryland 21230

Ms. Judy Broersma
Natural Resources Planner
Maryland Department of Environment
Nontidal Wetlands & Waterways Division
1800 Washington Boulevard
Baltimore, Maryland 21230

Mr. Richard Kibby
U.S. Army Corps of Engineers
CENAB-OP-RX, Room 8600
10 South Howard Street
Baltimore, Maryland 21203-1715

Mr. Joseph P. DaVia, Chief
U.S. Army Corps of Engineers,
Maryland Section Northern, Baltimore District
CENAB-OP-RMN
10 South Howard Street
Baltimore, Maryland 21203-1715

Mr. Larry Tom, Officer
Anne Arundel County Planning and Zoning
Heritage Office Complex
2664 Riva Road
Annapolis, Maryland 21401

Mr. Dave Walbeck
Natural Resources Planner
Maryland Department of the Environment
Nontidal Wetlands and Waterways Division
Mitigation and Technical Assistance
1800 Washington Boulevard
Baltimore, Maryland 21230

Ms. Kelly Flint, Engineer
Maryland Department of Environment
Nontidal Wetlands and Waterways Division
Regulatory Service Coordination Office, Suite 430
1800 Washington Boulevard
Baltimore, Maryland 21230

Ms. Marian Honeczy
State Forest Conservation Program Coordinator
MD DNR Forest Service
580 Taylor Avenue, E-1
Annapolis, Maryland 21401

Ms. Kathy McCarthy
Southern Regional Ecologist
Maryland Department of Natural Resources
Wildlife and Heritage Division
580 Taylor Avenue, E1
Annapolis, Maryland 21401

Ms. Dianne Franks
Program Manager
Maryland Department of the Environment
Air Quality Planning and Monitoring Program
1800 Washington Boulevard
Baltimore, Maryland 21230

Mr. Reid Nelson
Director, Advisory Council on Historic Preservation
Old Post Office Building
1100 Pennsylvania Avenue, NW, Suite 803
Washington, DC 20004

Mr. Thomas A. Priscilla, Jr. P.E.
Baltimore Metro Engineer
Federal Aviation Administration
Washington Airports District Office
23723 Air Freight Lane, Suite 210
Dulles, Virginia 20166

Anne Arundel County Library
Linthicum Branch
400 Shipley Road
Linthicum, MD 21090

Anne Arundel County Library
North County Branch
1010 Eastway
Glen Burnie, MD 21060

Mr. Bob Rosenbush
Maryland Department of Planning
Clearing House and Plan Review Section, Room 1104
301 W. Preston Street
Baltimore, MD 21201

Maryland Aviation Administration

Martin O'Malley
Governor
Anthony G. Brown
Lt. Governor
Beverley K. Swaim-Staley
Secretary

Paul J. Wiedefeld, A.A.E.
Executive Director

20110 5099

F
MAA
EJC/ARA

RECEIVED
JAN 9 2012
FAA AVIATION
ADMIN & EMPIRE

RECEIVED
DEC 16 2011
BY:

December 15, 2011

Ms. Elizabeth J. Cole
Maryland Historical Trust
Division of Historical and Cultural Programs
100 Community Place
Crownsville MD 21032-2023

The Maryland Historical Trust has determined that there are no historic properties affected by this undertaking.
Beth Cole Date 1/5/2012

Dear Ms. Cole:

SUBJECT: Draft Environmental Assessment (EA) for Proposed Airport Improvements at Baltimore/Washington International Thurgood Marshall Airport (BWI Marshall), Anne Arundel County, Maryland

The Maryland Aviation Administration (MAA) is pleased to submit for your review and comment a copy of the above-referenced EA. The MAA must obtain an environmental finding from the Federal Aviation Administration (FAA) for each of the proposed actions discussed in this EA prior to development of each project. The proposed projects included are shown on an FAA-approved Airport Layout Plan (ALP) and the EA identifies their purpose and need, evaluates potential alternatives (as appropriate), discusses existing conditions and determines potential environmental impacts of the proposed projects.

The proposed projects discussed in the EA include several projects relating to safety enhancements as well as projects for additional airport facilities and pavement improvements. Projects include improvements to the Runway Safety Areas and obstruction removal for the runways at BWI Marshall. As a result of the proposed improvements to the Runway Safety Areas, navigation aids are also being relocated to meet FAA design standards. Other proposed projects include improvements to the terminal exit roadway, central utility plant, airfield paving projects, and various landside pavement rehabilitations.

A Public Workshop will be conducted to demonstrate the information presented in the EA. The Public Workshop, which will be held as an "open house" forum, is scheduled for **January 25, 2012 from 4:00 p.m. to 8:00 p.m. in Assembly Rooms A & B at the MAA Offices, 991 Corporate Boulevard, Linthicum, Maryland**. This forum is designed to inform the public of the proposed action and associated alternatives as well as anticipated impacts. You are welcome to attend this Public Workshop.

20111222

prior reviews, Survey + Coordination 20090441

Written comments on the Draft EA will be accepted by mail, by fax at 410-859-7082, or by email at rbowie@bwiairport.com. If you need any additional information, please call me at 410-859-7103.

Sincerely,

Robin M. Bowie

Robin M. Bowie, Manager
Division of Environmental Planning

Enclosure

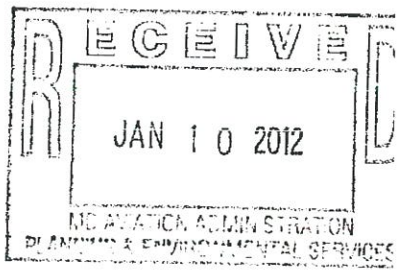
cc: Thomas A. Priscilla, Jr. P.E., Baltimore Metro Engineer, Federal Aviation Administration
Ms. Stacy Quesinberry, Airports Environmental Planner, URS

Maryland Department of Planning

Martin O'Malley
Governor
Anthony G. Brown
Lt. Governor

Richard Eberhart Hal
Secretary
Matthew J. Power
Deputy Secretary

January 3, 2012



Ms. Robin Bowie
Manager, Division of Environmental Planning
Maryland Aviation Administration
P.O. Box 8766
BWI Airport, MD 21240-0766

STATE CLEARINGHOUSE REVIEW PROCESS

State Application Identifier: MD20111220-0904
Reply Due Date: 02/02/2012
Project Description: Draft EA and EAF: Proposed Airport Improvements at Baltimore/Washington International Thurgood Marshall Airport: address runway safety; FAA design standards; airport roadways; covert non-precision instrument runway to a taxiway
Project Location: County of Anne Arundel
Clearinghouse Contact: Bob Rosenbush

Dear Ms. Bowie:

Thank you for submitting your project for intergovernmental review. Your participation in the Maryland Intergovernmental Review and Coordination (MIRC) process helps to ensure that your project will be consistent with the plans, programs, and objectives of State agencies and local governments.

We have forwarded your project to the following agencies and/or jurisdictions for their review and comments: the Maryland Departments of Housing and Community Development, the Environment, Transportation, Natural Resources, State Police, Business and Economic Development; the County of Anne Arundel; the Baltimore Metropolitan Council; and the Maryland Department of Planning; including the Maryland Historical Trust. A composite review and recommendation letter will be sent to you by the reply due date. Your project has been assigned a unique State Application Identifier that you should use on all documents and correspondence.

Please be assured that we will expeditiously process your project. The issues resolved through the MIRC process enhance the opportunities for project funding and minimize delays during project implementation.

If you need assistance or have questions, contact the State Clearinghouse staff noted above at 410-767-4490 or through e-mail at brosenbush@mdp.state.md.us. Thank you for your cooperation with the MIRC process.

Sincerely,

Linda C. Janey

Linda C. Janey, J.D., Assistant Secretary

LCJ:BR

11-0904_NRR.NEW.doc

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ion 2.1.2.4 Disadvantages: Include the impacts to "jurisdictional stream)".

Identify in the legend what the yellow hatch area is on the plan. Also, check all plans (Exhibits) to ensure all symbols are identified in the relative features are labeled, i.e., streams.

unway 15R-33L Safety Area Improvements: Reference to Exhibit 4.5-2 extending an outfall pipe, this is not shown on the Exhibit.

4-15 **Runway 10-28 Safety Area Improvements:**
references 60 feet of headwaters of Kitten Branch being placed in a pipe, de to Exhibit 4.5-3 to show this, however, the Exhibit does not show what ed in the text. Also, it is not clear why this section discusses Kitten parallel to Runway 15R, etc., when the pipe extension discussion pertains headwaters under Runway 10-28.

.3 Mitigation Measures: Last sentence delete …"and no change in the of the forested wetlands would occur."

f page the sentence may want to include …..MAA anticipates obtaining der one permit *each from the COE and MDE* to construct these proposed

3 Mitigation Measures: Clarify the last two sentences, specifically "these activities".
idance and minimization "for floodplain impacts" must be...
r "activities associated with floodplain impacts" by the COE is not ection 404 of the CWA, as amended.

Manager
dministration
ental Planning

nd 21240-0766

January 26, 2012 (via email)

onse to your request for comments on the Draft Environmental Assessment 2011, for proposed projects regarding the Runway Safety Area (RSA) more/Washington International Thurgood Marshall Airport (BWI ndel County, Maryland.

Ms. Robin M
Maryland A
Division of
P.O. Box 87
BWI Airpor

Dear Ms. Bo

This
(EA) dated D
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Comments:
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Page 4-31 **4.12 Light Emissions and Visual Impacts:** Is there documentation that could be referenced to the qualitative assessment that was completed for the light emission and visual impact?

Page 4-36 This paragraph refers to Table 4.15-1. The second sentence should include "floodplains" as one of the proposed impact areas. Also, "Build Alternatives" should be changed to "Sponsor's Preferred Alternatives" as stated in the title of the Table 4.15-1. If "Preferred Alternatives" is going to be used as a title in this table, then all the preferred alternatives should be clearly stated as such for each proposed project.

Sincerely,
Richard Kibby
Corps of Engineers
Operations Division
410-962-0694

Maryland Department of Planning

Martin O'Malley
Governor
Anthony G. Brown
Lt. Governor

Richard Eberhart Ha
Secretary
Matthew J. Power
Deputy Secretary

January 30, 2012

Ms. Robin Bowie
Manager, Division of Environmental Planning
Maryland Aviation Administration
P.O. Box 8766
BWI Airport, MD 21240-0766

STATE CLEARINGHOUSE RECOMMENDATION

State Application Identifier: MD20111220-0904
Applicant: Maryland Aviation Administration
Project Description: Draft EA and EAF: Proposed Airport Improvements at Baltimore/Washington International Thurgood Marshall Airport: address runway safety; FAA design standards; airport roadways; covert non-precision instrument runway to a taxiway
Project Location: Anne Arundel County
Approving Authority: U.S. Department of Transportation
Recommendation: **Consistent Contingent Upon Certain Actions**

Dear Ms. Bowie:

In accordance with Presidential Executive Order 12372 and Code of Maryland Regulation 34.02.01.04-.06, the State Clearinghouse has coordinated the intergovernmental review of the referenced project. This letter constitutes the State process review and recommendation based upon comments received to date. This recommendation is valid for a period of three years from the date of this letter.

Review comments were requested from the Maryland Department(s) of Housing and Community Development, the Environment, Transportation, Natural Resources, State Police, Business and Economic Development, Anne Arundel County, the Baltimore Metropolitan Council, and the Maryland Department of Planning, including the Maryland Historical Trust. As of this date, the Maryland Departments of Business and Economic Development, Transportation, the Environment, Anne Arundel County, and the Baltimore Metropolitan Council have not submitted comments. **This recommendation is contingent upon the applicant considering and addressing any problems or conditions that may be identified by their review. Any comments received will be forwarded.** The Maryland Departments of Housing and Community Development, and State Police had no comments.

The Maryland Department of Natural Resource found the referenced project to be generally consistent with its plans, programs, and objectives, but included qualifying comments concerning forest conservation and a forest management plan. See the attached letter.

The Maryland Department of Planning, including the Maryland Historical Trust found this project to be consistent with their plans, programs, and objectives.

The Maryland Historical Trust has determined that the project will have "no effect" on historic properties.

Any statement of consideration given to the comments should be submitted to the approving authority, with a copy to the State Clearinghouse. The State Application Identifier Number must be placed on any correspondence pertaining to this project. The State Clearinghouse must be kept informed if the approving authority cannot accommodate the recommendation.

Please remember, you must comply with all applicable state and local laws and regulations. If you need assistance or have questions, contact the State Clearinghouse staff person noted above at 410-767-4490 or through e-mail at brosenbush@mdp.state.md.us. **Also please complete the attached form and return it to the State Clearinghouse as soon as the status of the project is known.** ***Any substitutions of this form must include the State Application Identifier Number.*** **This will ensure that our files are complete.**

Thank you for your cooperation with the MIRC process.

Sincerely,

Linda C. Janey

Linda C. Janey, J.D., Assistant Secretary

LCJ:BR

cc: Beth Cole - MHT
Hara Wright-Smith - DHCD
Joane Mueller - MDE
Melinda Gretsinger - MDOT
Greg Golden - DNR
William Ebare - MDSP
Tammy Edwards - DBED
John Dodds - ANARP
Todd Lang - BMC

11-0904_CRR.CLS.doc

MD20111220-0904

MARYLAND DEPARTMENT OF NATURAL RESOURCES

Martin O'Malley, Governor
Anthony G. Brown, Lt. Governor
John R. Griffin, Secretary
Joseph P. Gill, Deputy Secretary

January 24, 2012

Robin Bowie
Maryland Aviation Administration
P.O. Box 8766
BWI Airport, MD 21240-0766

RE: Draft Environmental Assessment Proposed Airport Improvements at Baltimore/Washington International Thurgood Marshall Airport December 2011

Dear Ms. Bowie:

Upon review of the Environmental Assessment December 2011 for Baltimore/Washington International Thurgood Marshall Airport submitted December 15, 2011, I have the following comments:

1) The MD Forest Service is willing to meet with you to discuss the implementation of the components of this plan as needed; specifically compliance with the MD Forest Conservation Act.

2) The MD Forest Conservation Act does contain an exemption for airports:
(11) The cutting or clearing of trees to comply with the requirements of 14 C.F.R. §77.25 relating to objects affecting navigable airspace, provided that the Federal Aviation Administration has determined that the trees are a hazard to aviation. [NRA 5-1602(b)(11)]

To explain, this exemption would cover the "controlled activity area" as shown on pg 1-12 Figure 2 but not cover the "central portion". In other words, the runway or the structure would not be exempt but the airspace that meets the 14 C.F.R. would be exempt.

At the time that projects are ready for permits, include in the submittal package a letter from FAA that confirms that the trees are a hazard to aviation.

3) On pg 4-23 section 4.8.1.3 Mitigation Measures, there is mention of the linear project exemption. Please be advised that the linear project exemption only applies if less then 20,000 square feet of forest clearing is occurring. Also the exemption may only apply to the airport for runway work. As this has not come up in the past, I have asked for clarification from the OAG- DNR on the linear project definition and its use at airports. In the past, the airport's forest clearing has met the timber harvest exemption (the trees have been cut but not cleared) and this exemption has been used instead of the linear project.

4) Exhibit 1.1-8 indicates that trees that are obstructions need to be removed from two forest stands onsite. MAA should consider having a forest management plan with a fire prevention objective completed for the area. Let me know if you are interested.

If you have any questions with my comments I can be reached at (410) 260-8511 or via email at mhoneczy@dnr.state.md.us

Sincerely,

Marian R. Honeczy, AICP, CA
Supervisor, Urban & Community Forestry

cc: Horace Henry, MD Forest Service UCF – Southern Region

JAN 30 2011

Martin O'Malley
Governor
Anthony G. Brown
Lt. Governor

MDP
Maryland Department of Planning

Richard Eberhart Ha
Secretary
Matthew J. Power
Deputy Secretary

PROJECT STATUS FORM

Please complete this form and return it to the State Clearinghouse upon receipt of notification that the projec has been approved or not approved by the approving authority.

TO: **Maryland State Clearinghouse**
Maryland Department of Planning
301 West Preston Street
Room 1104
Baltimore, MD 21201-2305

DATE: _____
(Please fill in the date form completed)

FROM: _____
(Name of person completing this form.)

PHONE: ____-____-_____
(Area Code & Phone number)

RE: **State Application Identifier:** **MD20111220-0904**
Project Description: Draft EA and EAF: Proposed Airport Improvements at Baltimore/Washingtoı International Thurgood Marshall Airport: address runway safety; FAA design standards airport roadways; covert non-precision instrument runway to a taxiway

PROJECT APPROVAL

This project/plan was: ☐ **Approved** ☐ **Approved with Modification** ☐ **Disapproved**

Name of Approving Authority: **Date Approved:**

FUNDING APPROVAL

The funding (if applicable) has been approved for the period of:

_____, 201____ **to** _____, 201____ **as follows:**

Federal $:	**Local $:**	**State $:**	**Other $:**
_____	_____	_____	_____

OTHER

☐ **Further comment or explanation is attached**

MARYLAND
DEPARTMENT OF
NATURAL RESOURCES

Martin O'Malley, Governo
Anthony G. Brown, Lt. Governo
John R. Griffin, Secretar
Joseph P. Gill, Deputy Secretar

January 24, 2012

Robin Bowie
Maryland Aviation Administration
P.O. Box 8766
BWI Airport, MD 21240-0766

RE: Draft Environmental Assessment Proposed Airport Improvements at Baltimore/Washington International Thurgood Marshall Airport December 2011

Dear Ms. Bowie:

Upon review of the Environmental Assessment December 2011 for Baltimore/Washington International Thurgood Marshall Airport submitted December 15, 2011, I have the following comments:

1) The MD Forest Service is willing to meet with you to discuss the implementation of the components of this plan as needed; specifically compliance with the MD Forest Conservation Act.

2) The MD Forest Conservation Act does contain an exemption for airports:
(11) The cutting or clearing of trees to comply with the requirements of 14 C.F.R. §77.25 relating to objects affecting navigable airspace, provided that the Federal Aviation Administration has determined that the trees are a hazard to aviation. [NRA 5-1602(b)(11)]

To explain, this exemption would cover the "controlled activity area" as shown on pg 1-12 Figure 2 but not cover the "central portion". In other words, the runway or the structure would not be exempt but the airspace that meets the 14 C.F.R. would be exempt.

At the time that projects are ready for permits, include in the submittal package a letter from FAA that confirms that the trees are a hazard to aviation.

3) On pg 4-23 section 4.8.1.3 Mitigation Measures, there is mention of the linear project exemption. Please be advised that the linear project exemption only applies if less then 20,000 square feet of forest clearing is occurring. Also the exemption may only apply to the airport for runway work. As this has not come up in the past, I have asked for clarification from the OAG- DNR on the linear project definition and its use at airports. In the past, the airport's forest clearing has met the timber harvest exemption (the trees have been cut but not cleared) and this exemption has been used instead of the linear project.

4) Exhibit 1.1-8 indicates that trees that are obstructions need to be removed from two forest stands onsite. MAA should consider having a forest management plan with a fire prevention objective completed for the area. Let me know if you are interested.

If you have any questions with my comments I can be reached at (410) 260-8511 or via email at mhoneczy@dnr.state.md.us

Sincerely

Marian R. Honeczy, AICP, CA
Supervisor, Urban & Community Forestry

cc: Horace Henry, MD Forest Service UCF – Southern Region

JAN 3 0 2011
AVIATION ADMINISTRATION
PLANNING & ENVIRONMENTAL SERVICE

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U.S. Department
of Transportation
**Federal Aviation
Administration**

February 7, 2012

Mr. Paul J. Wiedfield
Executive Director
Maryland Aviation Administration
Baltimore / Washington International Thurgood Marshall Airport
P.O. Box 8766
BWI Airport, Maryland 21240-0766

**RE: Review of the Draft Environmental Assessment
Baltimore / Washington International Thurgood Marshall Airport
Baltimore, Maryland**

Dear Mr. Wiedfield :

Our office reviewed the Draft Environmental Assessment (EA) for various improvements at Baltimore/Washington Airport (BWI). We offer the following comments:

1. Page 1.3: It said here that the FAA design standard improvements for runway 15L are being studied separately. However, this EA discusses improving that runway's RSAs. Therefore, this line is confusing and needs to be clarified.

2. Purpose and Need: There should be a more in depth explanation of why instituting the declared distances will not impact the type or number of aircraft that will operate at the airport. However it is not clear if use of the declared distances will result in weight penalties to air carriers. If this is not the case, this should be stated. Citing the July 16, 2008 RSA determination revalidation would be useful.

3. Alternatives-There should be a discussion about why it was decided not to build standard RSAs or EMAS (too expensive, too many environmental impacts etc.)

4. Alternatives-For each instance in which there is more than one build alternative the sponsor's preferred alternative should be identified. Identification of the preferred alternative comes at the end of the section. We think this portion at the end should stay identification of the preferred alternative should be given throughout the Alternatives section.

5. Alternatives-There should be an explanation of why the sponsor picked its preferred alternatives.

6. Environmental Consequences- Based on Exhibit 4.1-1 it looks like there will be an increase in the noise contour with the build alternative, however, the text of the EA suggests otherwise. Perhaps Exhibit 4.1-1 and 4.1-2 were mistitled.

7. Environmental Consequences-Throughout this section it is at times unclear if the environmental impacts of each of the build alternatives were looked at, or just the preferred alternatives impact, or if the suggestion is that if either the preferred or non-preferred build alternatives were selected the environmental impacts would be the same. Please provide clarification.

8. Environmental Consequences-There needs to be more explanation as to why there is no significant impact to socioeconomic impacts (land acquisition) wetlands and floodplains. The significance criteria should be analyze in describing why significant impacts will not occur and for floodplains why a significant encroachment won't occur. The biggest impact of the project seems to be to floodplains so the floodplains section of the Desk Reference should be reviewed carefully.

9. Environmental Consequences- The document should explain why is Build Alternative 2 being picked if it will have more floodplain impacts than alternative 1?

10. Environmental Consequences-There should be an air quality section in the Environmental Consequences section that explains why an air quality analysis was only performed for air quality impacts due to construction. It should also say why a NAAQS analysis was not performed. We assume that part of the reason is that it is not anticipated that this proposed action will lead to an increase in airport operations or airport related vehicular traffic but this should be stated. Finally, it should be said in the air quality section that the emissions are not regionally significant.

11. Environmental Consequences: In the 4F Section it needs to be stated whether there will be a physical use or constructive use of the BWI trail or the observatory. It should be analyzed if cutting down trees or otherwise changing the scenery outside the observatory or near the trail create a constructive use. If not, please explain why.

12. Environmental Consequences: Will any property within these two 4f properties be taken or modified by the project? If so there would be a physical use.

13. The Cumulative Impacts Section is confusing, particularly the table on Page 4-42. The section should be redrafted using the guidance in the Desk Reference.

Thank you for the opportunity to review the draft EA. If you would like to discuss any of the above comments, please call me at 718 553-3335.

Sincerely,

Tom Felix

Manager Planning & Programming

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MARYLAND DEPARTMENT OF THE ENVIRONMENT
1800 Washington Boulevard • Baltimore MD 21230
410-537-3000 • 1-800-633-6101

Martin O'Malley
Governor

Anthony G. Brown
Lieutenant Governor

Robert M. Summers, Ph.D.
Secretary

February 10, 2012

Ms. Robin M. Bowie, Manager
Division of Environmental Planning
Maryland Aviation Administration
P. O. Box 8766
BWI Airport, MD 21240-0766

RE: Draft Environmental Assessment (EA) for Proposed Airport Improvements at Baltimore/Washington International Thurgood Airport (BWI Marshall)

Dear Ms. Bowie:

The Maryland Department of the Environment (MDE) has reviewed the proposed airport improvements at BWI Marshall evaluated in the referenced Draft EA for consistency with the State's Coastal Zone Management Program (CZMP), as required by Section 307 of the Federal Coastal Zone Management Act of 1972, as amended (CZMA). Section 307 of the CZMA requires that proposed federal activities affecting the State's coastal zone be consistent, to the maximum extent practicable, with the State's federally-approved CZMP. Because the Federal Aviation Administration (FAA) must approve the use of federal funds for airport development, the proposed activities are subject to the provisions of Section 307 of the CZMA.

Since December, 2010, the Maryland Aviation Administration (MAA) has held monthly meetings with representatives of the wetlands and waterways permitting agencies, MDE and the U.S. Army Corps of Engineers, to discuss the proposed BWI Marshall airport improvements evaluated in the EA. MDE commends MAA for its diligent efforts in arranging these meetings and preparing minutes summarizing the discussions. The meetings have helped ensure that proposed impacts to regulated resources are minimized to the extent practicable during the pre-application phase and that the alternatives information/analysis contained in the EA is sufficient to meet regulatory requirements. The results of these discussions should also serve to expedite the decision-making process when MAA applies for wetlands and waterways authorizations. MDE looks forward to continued coordination with MAA in this regard as the proposed improvement project(s) moves forward.

The purpose of the proposed improvements is to allow BWI Marshall to continue to operate in a safe and efficient manner while meeting FAA design criteria, and accommodating the Airport's current and future needs. Each of the proposed improvements is necessary for one of the following reasons:

- Meet FAA design standards for Runway Safety Area (RSA) improvements for Runways 15R-33L, 10-28, and 15L-33R;
- Meet FAA design standards for Navigational Aid (NAVAID) installation, runway to taxiway separations, perimeter roadways, taxiway configurations; line-of-sight clearance; and Runway Protection Zones (RPZs);
- Improve Airport egress through Terminal Exit Roadway improvements;
- Improve heating, ventilation, and air conditioning (HVAC) capacity;
- Improve existing pavement conditions through pavement rehabilitations and construction of new pavement; or
- Meet Part 77 of the Code of Federal Regulations (CFR) requirements for obstruction removal.

The Draft EA notes that the United States Congress has established a deadline of December 31, 2015, for all commercial airports to have compliant RSAs. In order to accomplish this requirement and keep BWI Marshall operating during this time, the MAA has proposed a phased approach to the design and construction of the three RSAs. Therefore, the impacts of each project will be further addressed and refined during later phases of design. Accordingly, MDE is implementing a "phased" Federal Consistency review be for the proposed improvements addressed in the Draft EA. The Phase I determination is based on the information provided in the Draft EA. The Phase II determination will consist of separate consistency determinations for those activities which must undergo further design and refinement. The completion of the Federal Consistency review and determination will be based upon permits and approvals required from MDE and compliance with the State's Forest Conservation (FCA) as noted in the following discussion of environmental issues.

Based on review of the Draft EA, the major environmental issues associated with the proposed actions consist of impacts to wetlands, waterways, and the 100-year nontidal floodplain; erosion and sediment control, and stormwater management; and forest impacts.

- Wetland and Waterway Impacts. Nontidal wetlands and intermittent and perennial headwater streams were identified in the project study area. According to the Draft EA, permanent wetland impacts total approximately 0.3 acre, and stream impacts, permanent and temporary, total approximately 3,560 linear feet. Additionally, approximately 232,000 square feet (5.33 acres) of the 100-year floodplain associated with Kitten Branch will be

permanently impacted. As noted in the Draft EA, proposed impacts to these resources will require wetlands and waterways authorization from MDE, including issuance of a Clean Water Act, Section 401 Water Quality Certification. According to the Draft EA, stream restoration is proposed as mitigation.

- Erosion and Sediment Control, and Stormwater Management. These issues are of particular concern due to the proximity of the proposed projects to headwater streams. The Draft EA notes that potential impacts to water quality will be minimized through design modifications and implementation of stormwater management measures (quality and quantity controls) approved by MDE prior to construction. MAA is coordinating with MDE's Sediment, Stormwater and Dam Safety Program regarding best management practices and the most appropriate means of managing stormwater runoff so as to minimize water quality impacts while not increasing the attractiveness of the area to potentially hazardous wildlife.

- Forest Impacts. Regarding compliance with the FCA, the Draft EA notes that 507 individual trees will be removed as obstructions to navigable airspace. In addition, 5.66 acres of existing forest and 0.28 acres of afforestation areas will be removed as a result of the proposed projects. The Draft EA notes that, with the exception of obstructions to navigable airspace, all forest impacts will be mitigated through measures approved by the Maryland Department of Natural Resources in compliance with the FCA.

- Air Quality. MDE is reviewing the air quality analyses provided in the Draft EA. The document concludes that there will be no adverse air quality impacts resulting from the Build Alternative, and therefore, the proposed action(s) complies with the General Conformity Rule, and is in conformity with the State Implementation Plan. MDE will be in contact with MAA concerning the results of its review of the air quality analyses.

In summary, based on our review of the Draft EA, the proposed airport improvements are consistent with the State's CZMP, as required by Section 307 of the CZMA. This letter constitutes the Phase I Federal Consistency determination for the proposed activities. As previously discussed, the Phase II completion of the State's CZMA, Section 307 Federal Consistency review will be based upon the development of detailed plans and the outcome of the State's review of application(s) for necessary permits and approvals. MDE looks forward to continuing its coordination with MAA on the BWI Marshall airport improvements.

If you have any questions, please contact me at 410-537-3763 or by email at eghigiarelli@mde.state.md.us.

Sincerely,

Elder A. Ghigiarelli, Jr.
Deputy Program Administrator
Federal Consistency Coordinator
Wetlands and Waterways Program

cc: Joe DaVia, Corps of Engineers
Richard Kibby, Corps of Engineers
Marian Honeczy, DNR
Jim Tracy, MDE
Judy Broersma, MDE
Kelly Flint, MDE
Dave Walbeck, MDE

ANNE ARUNDEL COUNTY
M A R Y L A N D
County Executive John R. Leopold

2664 RIVA ROAD, P.O. BOX 6675
ANNAPOLIS, MARYLAND 21401

February 14, 2012

Ms. Robin M. Bowie, Manager
Division of Environmental Planning
Maryland Aviation Administration
PO Box 8766
BWI Airport, Maryland 21240

RE: Draft Environmental Assessment (EA) for Proposed Airport Improvements at Baltimore/Washington International Thurgood Marshall (BWI Marshall), Anne Arundel County, Maryland

Dear Ms. Bowie:

Per your request, the Office of Planning and Zoning's (OPZ) Transportation Division (TD) has reviewed the above referenced Draft Environmental Assessment (DRAFT EA) for BWI-Thurgood Marshall Airport (BWI). The purpose of the Draft EA is to obtain Federal Aviation Administration (FAA) approval of proposed actions required to meet modification of standards (MOS) for safety improvements to runways, taxiways and their approaches. Proposed action involves acquisition of properties, relocation of landing lights and other aids, converting a non-precision instrument approach runway to a taxiway and relocation of other structures.

OPZ recognizes the need to meet changes in Federal standards and to protect the safety and welfare of the traveling public as well as residents and workers in the vicinity of BWI. Based on our review of the aforementioned document, we offer the following comments:

1. The County presently owns property (approximately 8.1 acres) at the intersection of Stoney Run Road and Aviation Boulevard (MD 170). Based on changes in MOS, a portion of that property is now located within the runway protection zone (RPZ) of Runway 10-28. We understand that the FAA requires that MAA control property located within that zone wherever possible. That will require MAA to obtain the parcel from the County. We are willing to work with the MAA so that they can meet the Federal standard and ensure that the County's rights are recognized.

2. Additionally, Maryland SHA owns right-of-way for the I-195/MD 170 interchange which will now be located within the RPZ for Runway 15R-33L. Satisfaction of FAA requirements will lead to a need to relocate this interchange. While this action is a later initiative, we recommend that any relocation alternative be evaluated for impact both in terms of land use intrusion and redistributed travel, so that the overall impacts to localized land use and the transportation network are understood by all stakeholders. If such a study has been done previously, there is no reference within the Draft EA. There is a reference in the document on page 4-9, Item 4.3.1 indicating that "None of the

proposed Build Alternatives would cause...disruption of local traffic patterns that would substantially reduce the Level of Service of the roads serving the Airport and its surrounding communities..." Beyond this comment, there does not appear to be any back up material to support the comment. We believe that any land use/transportation study should include the active participation of MAA, the Maryland State Highway Administration and Anne Arundel County, along with the affected property owners.

3. Finally, the MAA proposes to relocate a portion of the BWI Trail alignment to remove the alignment from the RPZ of 10-28. The alignment would be shifted to the opposite side of MD 170 crossing that roadway at a signalized location at Mathison Way. We support this proposed action as the safest means to meeting the requirement to relocate activity outside the RPZ.

The OPZ thanks MAA for the opportunity to provide comment on the Draft EA. If there are any questions or concerns regarding these comments, please contact George Cardwell, Transportation Planning Administrator, via email at pzcard44@aacounty.org or via phone at (410) 222-7440.

Sincerely,

Larry R. Tom
Planning & Zoning Officer

cc: Carole Sanner, Assistant Planning & Zoning Officer, OPZ
Mettie Smith, Assistant County Attorney, Office of Law
George Cardwell, Planning Administrator, OPZ

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, U.S. ARMY CORPS OF ENGINEERS
P.O. BOX 1715
BALTIMORE, MD 21203-1715

REPLY TO
ATTENTION OF

FEB 24 2012

Operations Division

Subject: Draft Environmental Assessment / BWI Marshall Airport / Runway Safety Area (RSA) Improvements (2011-03044-M18)

Ms. Robin M. Bowie, Manager
Maryland Aviation Administration
Division of Environmental Planning
P.O. Box 8766
BWI Airport, Maryland 21240-0766

Dear Ms. Bowie:

This is in response to your letter dated December 15, 2011, requesting comments on the Draft Environmental Assessment (EA) dated December 2011, for proposed projects regarding the Runway Safety Area (RSA) improvements at Baltimore/Washington International Thurgood Marshall Airport (BWI Marshall) in Anne Arundel County, Maryland. The Corps appreciates the opportunity to provide comments on the draft EA.

Alternatives Analysis: The project as currently proposed will require a standard permit review and public notice. The Corps looks forward to working with MAA to further identify practicable alternatives to avoid and minimize impacts to waters of the U.S. during the application review process. Under Section 404 of the Clean Water Act, the Corps can only authorize the least environmentally damaging practicable alternative.

Compensatory Mitigation Plan: The project must comply with the 2008 EPA/Corps Mitigation Rule. Please see 33 CFR Part 332 regarding mitigation requirements and the required components of a mitigation plan. For standard permit decisions, the mitigation rule requires the submission of final mitigation plans (e.g., 30% design), which must be approved by the Corps prior to issuance of a permit decision. Should the project be authorized by the Corps, the approved final mitigation plans will be incorporated into the individual permit by reference? No permit will be issued prior to approval of the final mitigation plans.

The Corps offers the following specific comments regarding the draft EA:

Comments:

Page 2-5: **Section 2.1.2.4 Disadvantages:** Include the impacts to "jurisdictional stream (Kitten Branch)".

Exhibit 2.2-7 Identify in the legend what the yellow hatch area is on the plan. Also, overall, please check all plans (Exhibits) to ensure all symbols are identified in the legend and all relative features are labeled, i.e., streams.

Page 4-14: **Runway 15R-33L Safety Area Improvements:** Reference to Exhibit 4.5-2 with regards to extending an outfall pipe, this is not shown on the Exhibit.

Page 4-14 and 4-15 **Runway 10-28 Safety Area Improvements:**
This paragraph references 60 feet of headwaters of Kitten Branch being placed in a pipe, reference is made to Exhibit 4.5-3 to show this, however, the Exhibit does not show what is being referenced in the text. Also, it is not clear why this section discusses Kitten Branch, located parallel to Runway 15R, etc., when the pipe extension discussion pertains to the 60-feet of headwaters under Runway 10-28.

Page 4-23 **4.8.1.3 Mitigation Measures**: Last sentence delete …"and no change in the overall character of the forested wetlands would occur."

Page 4-29 top of page the sentence may want to include … MAA anticipates obtaining authorization under one permit *each from the COE and MDE* to construct these proposed projects.

Page 4-30 **4.10.3 Mitigation Measures:** Clarify the last two sentences, specifically what is meant by "these activities".
Suggestion: Avoidance and minimization "for floodplain impacts" must be...
Authorization for "activities associated with floodplain impacts" by the COE is not required under Section 404 of the CWA, as amended.

Page 4-31 **4.12 Light Emissions and Visual Impacts:** Is there documentation that could be referenced to the qualitative assessment that was completed for the light emission and visual impact?

Page 4-36 This paragraph refers to Table 4.15-1. The second sentence should include "floodplains" as one of the proposed impact areas. Also, "Build Alternatives" should be changed to "Sponsor's Preferred Alternatives" as stated in the title of the Table 4.15-1. All preferred alternatives should be clearly stated as such for each proposed project.

If you have any questions concerning this letter, please call me at (410) 962-0694.

Sincerely,

Richard Kibby

Richard Kibby
Project Manager, Maryland Section Northern

COMMENTS AND RESPONSES

DECEMBER 2011 DRAFT ENVIRONMENTAL ASSESSMENT

PROPOSED AIRPORT IMPROVEMENTS AT

BALTIMORE / WASHINGTON INTERNATIONAL THURGOOD MARSHALL AIRPORT

COMMENT NUMBER	COMMENT ORIGIN	COMMENT	RESPONSE
1	COE	Page 2-5: **Section 2.1.2.4 Disadvantages:** Include the impacts to "jurisdictional stream (Kitten Branch)".	An additional bullet will be added to the disadvantages to state: "Approximately 60 linear feet of the headwaters of Kitten Branch (jurisdictional stream) will be impacted by this alternative."
2	COE	**Exhibit 2.2-7** Identify in the legend what the yellow hatch area is on the plan. Also, overall, please check all plans (Exhibits) to ensure all symbols are identified in the legend and all relative features are labeled, i.e., streams.	The yellow hatch will be removed from the exhibit. All other exhibits will be checked to ensure items on the exhibits are either labeled or included in the legend.
3	COE	Page 4-14: **Runway 15R-33L Safety Area Improvements:** Reference to Exhibit 4.5-2 with regards to extending an outfall pipe, this is not shown on the Exhibit.	The exhibit will be revised to reflect what is stated in the text.
4	COE	Page 4-14 and 4-15 **Runway 10-28 Safety Area Improvements:** This paragraph references 60 feet of headwaters of Kitten Branch being placed in a pipe, reference is made to Exhibit 4.5-3 to show this, however, the Exhibit does not show what is being referenced in the text. Also, it is not clear why this section discusses Kitten Branch, located parallel to Runway 15R, etc., when the pipe extension discussion pertains to the 60-feet of headwaters under Runway 10-28.	The exhibit will be revised to reflect what is stated in the text. The impacts to Kitten Branch in this circumstance are due to Runway 10-28 improvements as Kitten Branch is perpendicular to the this runway and flows under the runway.
5	COE	Page 4-23 **4.8.1.3 Mitigation Measures**: Last sentence delete …"and no change in the overall character of the forested wetlands would occur."	The text will be deleted, as requested in the comment.
6	COE	Page 4-29 top of page the sentence may want to include …..MAA anticipates obtaining authorization under one permit *each from*	Text will be revised, as requested in the comment.

		the COE and MDE to construct these proposed projects.	
7	COE	Page 4-30 **4.10.3 Mitigation Measures:** Clarify the last two sentences, specifically what is meant by "these activities". *Suggestion:* Avoidance and minimization "for floodplain impacts" must be... Authorization for "activities associated with floodplain impacts" by the COE is not required under Section 404 of the CWA, as amended.	The text will be revised to read "Avoidance and minimization for floodplain impacts must be fully demonstrated prior to authorization being granted. Authorization for activities associated with floodplain impacts by the COE is not required under Section 404 of the CWA as amended."
8	COE	Page 4-31 **4.12 Light Emissions and Visual Impacts:** Is there documentation that could be referenced to the qualitative assessment that was completed for the light emission and visual impact?	The text will further state that there are no proposed new lights or light structures proposed under any projects included in the EA. And changes to lighting and/or their associated structures are for relocations of existing equipment, not new installations.
9	COE	Page 4-36 This paragraph refers to Table 4.15-1. The second sentence should include "floodplains" as one of the proposed impact areas. Also, "Build Alternatives" should be changed to "Sponsor's Preferred Alternatives" as stated in the title of the Table 4.15-1. If "Preferred Alternatives" is going to be used as a title in this table, then all the preferred alternatives should be clearly stated as such for each proposed project.	The word "floodplains" will be added to the text and Build Alternatives will be referred to as Sponsor's Preferred Alternatives".
10	DNR	On pg 4-23 section 4.8.1.3 Mitigation Measures, there is no mention of the linear project exemption. Please be advised that the linear project exemption only applies if less than 20,000 square feet of forest clearing is occurring. Also the exemption may only apply to the airport for runway work. As this has not come up in the past, I have asked clarification from the OAG-DNR on the linear project definition and its use at airports. In the past, the airport's forest clearing has met the timber harvest exemption (the trees have been cut but not cleared) and this exemption has been used instead of the linear project.	Comment noted. MAA is aware that this exemption would only apply to runway work in which less than 20,000 square feet of forest clearing would occur and would work with MDNR Forest Service on a case-by-case basis to determine applicability.

11	DNR	Exhibit 1.1-8 indicates that trees that are obstructions need to be removed from two forest stands onsite. MAA should consider having a forest management plan with a fire prevention objective completed for the area.	A statement will be added in the mitigation section that MAA will consider updating its existing Forest Maintenance Plan when the obstruction removal occurs.
12	FAA	Page 1.3: It said here that the FAA design standard improvements for runway 15L are being studied separately. However, this EA discusses improving that runway's RSAs. Therefore, this line is confusing and needs to be clarified.	The Runway 15L-33R safety areas are being addressed, but not the ROFAs, glide slope relocations, and obstructions. The note will be expanded to state that, "While the RSA improvements for Runway 15L-33R are included in this EA, other FAA Design… will be studied under…"
13	FAA	Purpose and Need: There should be a more in depth explanation of why instituting the declared distances will not impact the type or number of aircraft that will operate at the airport. However it is not clear if use of the declared distances will result in weight penalties to air carriers. If this is not the case, this should be stated. Citing the July 16, 2008 RSA determination revalidation would be useful.	In July of 2008 the Federal Aviation Administration (FAA) issued a Runway Safety Area (RSA) Determination Revalidation. This Revalidation evaluated RSA alternatives considered for implementation by the FAA and Maryland Aviation Administration (MAA) at Baltimore/Washington International Thurgood Marshall Airport (BWI Marshall), and in accordance with FAA Order 5200.8, calculated the maximum feasible RSA improvement cost for each runway at BWI Marshall and recommended an improvement alternative for each runway. The Runway 15R-33L RSA improvement alternative preferred by FAA requires the application of declared distances to comply with RSA standards, which will result in a loss of 1,200 feet to Runway 15R-33L. In the Revalidation FAA stated that the implementation of declared distances on Runway 15R-33L at BWI Marshall would *"have negligible operational impact on the aircraft currently operating at BWI"*. Prior to FAA's calculation of the maximum feasible cost of $24M for Runway 15R-33L, the MAA had evaluated a $118M alternative that would provide standard RSAs at the 15R and 33L ends and maintain the current 9,500 feet runway length. This alternative would have required relocation of the I-195/MD 170 interchange and on-ramps (located north of Runway 15R), as well as placing Dorsey Road (located south of Runway 33L) in a tunnel. It was determined that it would not be feasible to achieve these necessary improvements prior to the 2015 deadline for RSA compliance; thus, the MAA proposed to defer these improvements until a later time. In an effort to recapture the

			runway length lost with the preferred alternative of applying declared distances, the MAA has programmed the recapture of the displaced thresholds on both ends of Runway 15R and 33L on the FAA-approved Airport Layout Plan (ALP) within Phase II (2021 to 2025). Prior to the future planned recapture of runway length for Runway 15R-33L, the primary departure runway at BWI Marshall, Runway 10-28 (10,500 feet), will remain available for use by any aircraft that would demand additional length. This will alleviate any potential for weight penalties that might be incurred by the air carriers, and minimize the impact of the loss of runway length on Runway 15R-33L until the future planned recapture of the full existing length.
14	FAA	Alternatives – there should be a discussion about why it was decided not to build standard RSAs or EMAS (too expensive, too many environmental impacts etc.)	The preferred RSA improvement alternative for Runway 15R-33L requires the application of declared distances which will diminish the landing length of the 9,500-foot runway by 1,200 feet. An RSA improvement option considered and dismissed for Runway 15R-33L was the installation of an Engineered Materials Arrestor System (EMAS). The EMAS solution if implemented at both ends of Runway 15R-33L would not provide standard RSAs and would exceed FAA's maximum feasible cost per FAA Order 5200.8.
15	FAA	Alternatives – For each instance in which there is more than one build alternative the sponsor's preferred alternative should be identified. Identification of the preferred alternative comes at the end of the section. We think this portion at the end should stay identification of the preferred alternative should be given throughout the Alternatives section.	Text will be added to each alternative discussion (as appropriate), identifying the sponsor's preferred alternative.
16	FAA	Alternatives – There should be an explanation of why the sponsor picked its preferred alternatives.	Text will be added to explain each preferred alternative (resembling the text below): • Runway 10-28 Safety Area – Alternative 1 has a lower retaining wall and less ground disturbance and impacts. • Runway to Taxiway Separation – Alternative 1 includes a culvert to allow Fork Branch to go under the proposed Taxiway D hold pad with a majority of the culvert not being located under the proposed hold pad pavement. • Runway 15R Glide Slope Relocation and perimeter roadway – Alternative 2 includes a straight culvert and would allow for

			the proposed perimeter roadway to remain on MAA property. • Runway 33L Glide Slope Relocation and perimeter roadway – Alternative 1 would involve less ground disturbance.
17	FAA	Environmental Consequences – Based on Exhibit 4.1-1 it looks like there will be an increase in the noise contour with the build alternative, however, the text of the EA suggests otherwise. Perhaps Exhibit 4.1-1 and 4.1-2 were mistitled.	Exhibits 4.1-1 and 4.1-2 were inverted and therefore will be corrected for the Final EA document. As titled in the Draft EA, Exhibit 4.1-1 is the No-Build and Exhibit 4.1-2 is the Build.
18	FAA	Environmental Consequences – Throughout this section it is at times unclear if the environmental impacts of each of the build alternatives were looked at, or just the preferred alternatives impact, or if the suggestion is that if either the preferred or non-preferred build alternatives were selected the environmental impacts would be the same. Please provide clarification.	The environmental impacts for each of the Build Alternatives were evaluated. Additional language added to the beginning and each section.
19	FAA	Environmental Consequences – There needs to be more explanation as to why there is no significant impact to socioeconomic impacts (land acquisition) wetlands and floodplains. The significance criteria should be analyze in describing why significant impacts will not occur and for floodplains why a significant encroachment won't occur. The biggest impact of the project seems to be floodplains so the floodplains section of the Desk Reference should be reviewed carefully.	Verbiage from the Desk Reference has been added to the socioeconomic, floodplains, and wetlands sections.
20	FAA	Environmental Consequences – The document should explain why is Build Alternative 2 being picked if it will have more floodplain impacts than alternative 1?	The text was changed to reflect the comment.
21	FAA	Environmental Consequences – There should be an air quality section in the Environmental Consequences section that explains why an air quality analysis was only performed for air quality impacts due to construction. It should also say why a NAAQS analysis was not performed. We assume that part of the reason is that it is not anticipated that this proposed action will lead to an increase in airport operations or airport related vehicular traffic but this should be stated. Finally, it should be said in the air quality section that the emissions are not regionally	**Comment 21a**: "There should be an air quality section in the Environmental Consequences section that explains why an air quality analysis was only performed for air quality impacts due to construction." **Response 21a**: The text will be appended to rationalize this decision as follows: Under the General Conformity Regulations of the federal Clean Air Act, both direct and indirect emissions associated

		significant.	with a proposed project or action need to be quantified and subjected to an applicability test, whereby the emissions are compared to applicable de minimis thresholds. *Direct* emissions are defined at 75 FR 17273 as "those emissions of a criteria pollutant or its precursors that are caused or initiated by the Federal action and originate in a nonattainment or maintenance area and occur at the *same time and place as the action* and are reasonably foreseeable" (e.g. an increase in operational emissions compared to the No-action Alternative). *Indirect* emissions include "those emissions of a criteria pollutant or its precursors: (1) That are caused or initiated by the Federal action and originate in the same nonattainment or maintenance area but occur at a *different time or place as the action* [e.g. construction equipment performing the airfield improvements]; (2) That are reasonably foreseeable; (3) That the agency can practically control; and (4) For which the agency has continuing program responsibility. For the purposes of this definition, even if a Federal licensing, rulemaking or other approving action is a required initial step for a subsequent activity that causes emissions, such initial steps do not mean that a Federal agency can practically control any resulting emissions. ". Based on the descriptions of the proposed project alternatives, including the preferred alternative, the proposed improvements at BWI would not induce any operational emissions over the no-action condition that would occur at *the same time and place as the action* (i.e. direct), yet would induce emissions that *occur at a different time or place as the action* (i.e. indirect). Accordingly, only indirect emissions (from construction) were evaluated. **Comment 21b**: "[The air quality analysis] should also say why a [National Ambient Air Quality Standard (NAAQS)] analysis was not performed."

			Response 21b: Figures 1 and 2 of the Federal Aviation Administration's (FAA) *Air Quality Procedures for Civilian Airports and Air Force Bases* (also known as the *Air Quality Handbook*) delineate the air quality assessment process as it pertains to federally-supported airport projects. Following these figures, and based on the project descriptions of the BWI improvements, a NAAQS assessment is not required, as summarized below: ✓ Scope of action and alternatives under consideration were specified (including No-build Alternative); ✓ Activity levels occurring due to the project and its alternatives were specified; ✓ Location of project in a nonattainment or maintenance area was positively verified; ✓ Action was determined to be neither exempt nor presumed to conform according to the General Conformity Rule; ✓ Action does not result in reasonably foreseeable direct emissions (as defined in Response 10b above) According to Figures 1 and 2 of the *Air Quality Handbook*, these parameters indicate that a NAAQS assessment is not required. For reference Figures 1 and 2 of the *Handbook* are reproduced as an attachment to these responses. **Comment 21c:** "Finally, it should be said in the air quality section that the emissions are not regionally significant" **Response 21c:** Historically, the General Conformity Rule required a Regional Significance Test whereby project-related emissions were compared to applicable regional emissions budgets and demonstrated to be less than ten percent of the budget(s). On April 5, 2010 a final rule was published in the Federal Register at 75 FR 17254 which called for revisions to the General Conformity Rule. These revisions included the revocation of the Regional Significance Test requirements previously in place (75 FR 17257). Accordingly, construction related emissions expected to occur

			due to the BWI improvements were not compared to the applicable non-attainment area emissions budget(s) for a determination of regional significance.
22	FAA	Environmental Consequences: In the 4F Section it needs to be stated whether there will be a physical use or constructive use of the BWI trail or the observatory. It should be analyzed if cutting down trees or otherwise changing the scenery outside the observatory or near the trail create a constructive use. If not, please explain why.	Text will be revised to indicate there are no impacts to Section 4(f) properties.
23	FAA	Environmental Consequences: Will any property within these two 4f properties be taken or modified by the project? If so there would be a physical use.	Text will be revised to indicate that there are no impacts to Section 4(f) properties.
24	FAA	The Cumulative Impacts Section is confusing particularly the table on 4-42. The section should be redrafted using the guidance in the Desk Reference.	The cumulative impacts section was revised to better model the Desk Reference. Extraneous information has been deleted.
25	AA County	The County presently owns property (approximately 8.1 acres) at the intersection of Stoney Run Road and Aviation Boulevard (MD 170). Based on changes in MOS, a portion of that property is now located within the Runway Protection Zone (RPZ) of Runway 10-28. We understand that the FAA requires MAA control property located within that zone where possible. That will require MAA to obtain the parcel from the County. We are willing to work with the MAA so that they can meet the Federal standard and ensure that the County's rights are reserved.	MAA and Anne Arundel County have agreed in principal that the parcel in question is to be deeded back to MAA without any restrictions. A draft agreement is in for execution with the legal department at Anne Arundel County and that subsequent to that agreement and action by the county council the property will be deeded to MAA.
26	AA County	Additionally, Maryland SHA owns right-of-way for the I-195/MD 170 interchange which will now be located within the RPZ for Runway 15R-33L. Satisfaction of FAA requirements will lead to a need to relocate this interchange. While this action is a later initiative, we recommend that any relocation alternative be evaluated for impact both in terms of land use intrusion and redistributed travel, so that the overall impacts to localized land use and the transportation network are understood by all stakeholders. If such a study has been done previously, there is no reference within the Draft EA. There is a referenced in the	Relocation of the interchange is not proposed at this time. No response required.

		document on page 4-9, Item 4.3.1 indicating that "None of the proposed Build Alternatives would cause…disruption of local traffic patterns that would substantially reduce Level of Service of the roads serving the Airport and its surrounding communities…" Beyond this comment, there does not appear to be any back up material to support the comment. We believe that any land use / transportation study should include the active participation of MAA, the Maryland State Highway Administration and Anne Arundel County, along with the affected property owners.	
27	AA County	Finally, the MAA proposes to relocate a portion of the BWI Trail alignment to remove the alignment from the RPZ of 10-28. The alignment would be shifted to the opposite side of MD 170 crossing that roadway at a signalized location at Mathison Way. We support this proposed actions as the safest means to meeting the requirement to relocate activity outside the RPZ.	The trail is not proposed for relocation at this time. No response required.

Comment Origin

AA County: Anne Arundel County, letter dated February 14, 2012
COE: US Army Corps of Engineers, email dated January 26, 2012 and letter dated February 24, 2012
DNR: Maryland Department of Natural Resources, letter dated January 24, 2012
FAA: Federal Aviation Administration, letter dated February 7, 2012