


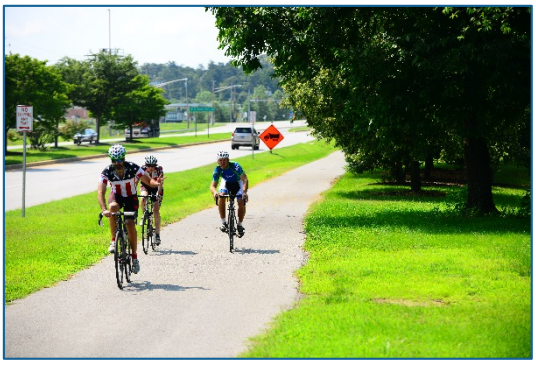

AIRPORT LAYOUT PLAN PHASE I IMPROVEMENTS AT BALTIMORE/WASHINGTON INTERNATIONAL THURGOOD MARSHALL AIRPORT

Linthicum, Maryland

Final Environmental Assessment and Section 4(f) Determination

Prepared for:
Maryland Department of Transportation
Maryland Aviation Administration
Office of Environmental Services

November 2020

This environmental assessment becomes a Federal document when evaluated, signed, and dated by the Responsible FAA Official.

Genevieve Walker
Responsible FAA Official

November 6, 2020
Date

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
FINDING OF NO SIGNIFICANT IMPACT
RECORD OF DECISION

Location

Baltimore Washington International Thurgood Marshall Airport
Linthicum, Maryland

Introduction

This Finding of No Significant Impact /Record of Decision (FONSI/ROD) sets out the Federal Aviation Administration's (FAA) consideration of the environmental and other factors for Airport Layout Plan (ALP) approval and federal financial assistance for Phase 1 Airport Improvement projects at Baltimore/Washington International Thurgood Marshall (BWI) Airport. This FONSI/ROD is based on the *Final Environmental Assessment and Section 4(f) Determination for the Airport Layout Plan Phase 1 Improvements at Baltimore Washington International Thurgood Marshall Airport* (Final EA and Section 4(f) Determination) prepared by the Maryland Department of Transportation, Maryland Airport Authority (MDOT MAA), dated September 2, 2020, which is hereby incorporated by reference.

Background

A Draft EA and Draft Section 4(f) Determination for Proposed Improvements 2016-2020 (January 2018 Draft EA) at BWI was published on January 5, 2018. A public workshop was held on January 25, 2018 and comments were accepted from the public through February 5, 2018 (See Chapter 6, Public and Agency Involvement for details). Following public review and comment on the January 2018 Draft EA, additional areas of analysis were identified that required revision to the EA and subsequent issuance of a revised Draft EA to the general public for review and comment. More specifically, additional analysis was added to address the following issues:

- To ensure the public is provided an additional review of the updated Draft EA as a result of the changes made to address public comments received on the January 2018 Draft EA;

- To include an updated analysis on the accuracy of the radar data used in the noise analysis, as provided in Appendix K-4, in response to public comments on the January 2018 Draft EA;

- To include additional coordination conducted with Anne Arundel County related to impacts to Section 4(f) resources, including new impacts to the BWI Trail determined as a result of refined preliminary design;

- To update the aviation activity forecast with modified fleet plans that have occurred since the January 2018 Draft EA forecast, which was completed in 2016 (Refer to **Appendix C, Aviation Activity Forecast,** Attachment 2 for the Updated BWI ALP Phase I Improvements EA Aviation Activity Forecast);

- To update the existing conditions to 2018 (previously 2016), incorporating an updated aviation activity forecast which includes the Midfield Cargo Facility project (approved by the FAA October 23, 2018) as part of the baseline;

- To address cumulative impacts related to additional projects that have been approved by the FAA since the January 2018 Draft EA publication (Refer to **Appendix E, BWI Marshall Airport Planning Documentation**, Attachments 5 and 6 for the 2017 and 2018 approved NEPA documents); and

- To include updated project plans and preliminary design, including updates to limits of disturbance related to planning that has continued since the January 2018 Draft EA publication.

The revised Draft EA and Section 4(f) Determination was re-issued for public comment on February 6, 2020 in order to present updated information related to project planning. The revised Draft EA and Section 4(f) Determination included responses to public comments on the January 2018 issuance of the Draft EA and Section 4(f) Determination. Notice of Availability of the updated Draft EA and Section 4(f) Determination and links to the updated Draft EA and Section 4(f) Determination document were available on the MDOT MAA website from February 6, 2020 until May 21st, 2020.

Just prior to the scheduled workshop date, responses to the risks of the COVID-19 public health emergency were elevated. As a result of public health guidance and at the direction of the State of Maryland, the MDOT MAA postponed the public workshop. In April 2020, the FAA authorized the MDOT MAA to move forward with holding a virtual public workshop for the project, scheduled for May 21, 2020. Two public workshops, advertised in The Baltimore Sun, The Capital Gazette, and The Howard County times, were held on May 21st, 2020, at 11:30 AM – 1:30 PM and 6:00 PM – 8:30 PM.

Additionally, the construction of the projects evaluated in the January 2018 Draft EA was delayed and completion of these projects is now expected in 2022. Consequently, a shift in the years of analysis from 2020 and 2025 to 2022 and 2027 was also warranted.

Project Description

The following is a list of project components contained within section 1.2 of the EA and projects defined as "Connected Actions" listed in Table 1.2.1 of the EA. For more discussion regarding each of the project components, reference Chapter 3 of the EA, incorporated by reference herein.

- Improve taxiway fillets/shoulders in the International Terminal Area;
- Construct new infill pavement near Taxiways T, P and 'Future P,' including
    - Rebuild Taxiway E 300 feet to the east;
    - Reposition VSR
    - Demolish and relocate existing Airfield Lighting Vault (ALV);
    - Demolish and relocate Glycol Pump Control Building; and
    - Provide new infrastructure from the Airport Traffic Control Tower (ATCT) for software upgrades;
- Relocate Taxiway K and Re-establish Taxiway L;
- Relocate Taxiways R and F, including
    - Rebuild portions of Taxiways G and R1 to connect Runway 10-28 to the relocated Taxiway R;
    - Build Taxiway R2 to provide additional connection between Runway 10-28 and proposed Taxiway R;
    - Build Taxiway F1 to provide additional connection between new Taxiway R and relocated Taxiway F; and
    - Relocate FAA Equipment Shelters for the High Intensity Approach Lighting System with Sequenced Flashing Lights (ALSF-2), its associated infrastructure, and co-located FAA facilities outside of the Runway and Taxiway Object Free Areas (ROFA and TOFA)

- Relocate Taxiway V;
- Expand Runway 28 Deicing Pad, including
    - Relocate blending station and glycol storage tank;
- Remove Part 77 Obstructions:
    - for on-airport property clear the primary, approach (50:1) and transition surfaces;
    - for off-airport properties clear to the threshold siting surface (34:1);
- Clear trees in the VORTAC critical area to a 1,200-foot radius;
- Construct Taxiway U3;
- Relocate Taxiway H, including
    - Demolish existing Taxiway H exit pavement; and
    - Re-designate Taxiway H segment adjacent to Runway 15R deicing pad pavement;
- Construct Isolation/ Remain Overnight (RON) Apron, including
    - Reconfigure ARFF access road around the apron area; and
    - Install blast fence;
- Construct vehicle service roadway (VSR) connector south of the former Runway 4 end;
- Expand existing ARFF indoor parking;
- Relocate fire training facility, including
    - Provide VSR from Runway 33L to the relocated training facility;
    - Provide VSR from the relocated training facility to Runway 28;
    - Provide VSR from relocated training facility to Aviation Boulevard; and
    - Construct new MDOT MAA training facilities, including a fire training area and classroom building;
- Rehabilitate/improve pavement in accordance with the latest Pavement Management Plan;
- Relocate the remote receiver (RR);
- Expand Runway 15R Deicing Pad, including
    - Relocate Glycol Storage/Truck Staging, including demolition of the existing building;
    - Provide new area for snow dumping;
    - Provide Taxicab Support Building at Former Hotel Site, including taxi / bus staging area;
    - Demolish Hudson General Bus Storage and demolish existing taxi/bus staging area;
    - Relocate Airport Surface Detection System, Model X (ASDE-X);
    - Relocate Gate A1;
    - Remove FAA Remote Receiver (RR) facility and demolish existing buildings; and
    - Demolish deicing control building
- Construct Second Fixed Based Operator;
- Construct new airline maintenance facility;
- Increase runway deicing chemical storage and construct access road;
- Building 113 Demolition;
- Relocate and consolidate airport maintenance complex, including
    - Provide perimeter roadway in the northwest quadrant of the Airport;
- Construct new Sky Bridge C;
- Widen terminal roadway; and
- Widen upper level roadway at Concourse E.

Proposed Agency Actions

The FAA actions involved in the implementation of the Proposed Action include the following:

a. Unconditional Approval of the BWI ALP to reflect all components of Phase 1 of the Airport Improvement Projects identified above (Project Description), pursuant to 49 U.S.C. §40103(b) and §47107(a)(16). Subsequent individual project approvals may still be subject

to a determination of the effects of this project upon the safe and efficient utilization of navigable airspace pursuant to 14 C.F.R. Parts 77 and 157 and 49 U.S.C. §44718;

b. Determination under 49 U.S.C. §40101(d)(1) and 47105(b)(3) as to whether the Proposed Action maintains and enhances safety and security, and meets the applicable design and engineering standards set forth in FAA Advisory Circulars;
c. Determination concerning funding through the Federal grant-in-aid program authorized by the Airport and Airway Improvement Act of 1982, as amended (recodified at 49 U.S.C. §§47107) and/or approval of an application to use Passenger Facility Charges (PFCs) under 49 U.S.C. §40117 (this FONSI/ROD does not determine project eligibility or availability of potential funds).
d. Determination under 49 U.S.C §44502(b) that the subject airport development is reasonably necessary for the use in air commerce or in the interests of national defense;
e. Continued close coordination with the MDOT MAA and the appropriate FAA program offices, as required, for safety during construction (14 C.F.R. Part 77); and
f. Approval of appropriate amendments to the BWI Airport Certification Manual (ACM), as required, pursuant to 49 U.S.C. §44706.

Purpose and Need

The Purpose and Need of implementing the Proposed Action is to meet various FAA design standards, enhance airfield safety and efficiency, accommodate existing and anticipated passenger demand at a higher quality level of service, and improve customer service at BWI Marshall Airport.

Alternatives

Various potential alternatives were identified to meet the needs at BWI Marshall Airport. These alternatives were screened and either eliminated from further consideration or carried forward for environmental evaluation. Retained component alternatives were combined to form three overall airport alternatives reviewed in the EA; the 2015 ALP Alternative, the Other Action Alternative (Sponsor's Preferred Alternative), and the No Action Alternative.

The 2015 ALP Alternative includes the actions identified as the Phase I Improvements on the BWI Marshall ALP as conditionally approved by FAA in April 2015. The 2015 ALP Phase I Improvements are those actions required to meet BWI Marshall's needs through 2022.

The Other Action Alternative (Sponsor's Preferred Alternative) is the 2015 ALP Alternative modified to reduce potential impact on environmental resources and/or modify the action shown on the 2015 ALP as a result of additional planning efforts and considerations during the development of the Final EA and Section 4(f) Determination. This alternative was modified from the 2015 ALP Alternative following the release of the January 2018 Draft EA to account for additional design refinements to project components.

The No Action Alternative represents BWI Airport in its current state without any proposed improvements. The Airport would remain in its current configuration and none of the proposed improvements would be implemented.

These alternatives are comprised of alternatives to various individual project components contained within the Project Description above. The full descriptions of these alternatives and the respective reasons for elimination are described in the Alternatives Analysis contained in Chapter 3 of the Final EA and incorporated by reference herein.

Potential Impacts

The Final EA and Section 4(f) Determination addresses all environmental impact categories, as required by FAA Orders 1050.1F, 5050.4B and the Desk Reference for Airports Actions. The attached Final EA

and Section 4(f) Determination, together with all of its appendices, addresses the potential effects of the Proposed Action on the human and natural environment, and is made part of these Finding. Significance determinations were based on consideration of the significance thresholds set forth in Exhibit 4-1 of FAA Order 1050.1F. The following impact analysis provides highlights of the more thorough analysis presented in the Final EA and Section 4(f) Determination. . One resource area, Wild and Scenic Rivers, was eliminated from analysis as there are no river segments listed in the Wild and Scenic River System located within the vicinity of BWI Marshall Airport or the Physical Development Study Area.

Air Quality

The only difference in aviation operations between the Proposed Action and No Action is an increase in run-up operations associated with the proposed Airline Maintenance Facility. This increase in run-up operations was modeled; however, their contribution to each of the criteria pollutants reviewed is two tons per year or less. None of the pollutants/precursors for which there are *de minimis* levels (NOx, VOC, and SO_2) would exceed the threshold levels in any year for either Proposed Action Alternative. This holds true even when the project-related Airport operations emissions from the additional run-up operations and construction emissions are combined. As a result, the General Conformity regulations do not require a conformity determination. Further, it can be presumed that the emissions would not cause or contribute to a violation of or exceed the National Ambient Air Quality Standards for ozone precursors NO_X and VOCs or SO_2. Therefore, the Proposed Action would not result in a significant impact to air quality.

Biological Resources

The Proposed Action Alternatives would not cause long-term or permanent loss of state or federally-listed plant or wildlife species. The removal of several large tracts of trees on-airport would reduce wildlife attractants on the Airport.

Preliminary consultation with USFWS Chesapeake Bay Field Office (CBFO), via the Information for Planning and Consultation (IPaC) Official Species List, indicated that there were no critical habitats or national wildlife refuges or fish hatcheries within the Study Area; however federally threatened swamp pink (*Helonias bullata*) should be considered, as known populations exist in the project area. Accordingly, a Biological Assessment was completed in January 2020. A "Not Likely to Adversely Affect" determination for swamp pink was received from USFWS on February 19, 2020 (see *Appendix H, Attachment 9,* of the Final EA and Section 4 (f) Determination)

The IPAC also identified the northern long-eared bat/ NLEB (*Myotis septentrionalis)* as potentially occurring in the study area. Correspondence with MDNR WHS, dated April 9, 2019, indicated that there are no known hibernacula or maternity roost trees for the NLEB within the vicinity of BWI Marshall Airport (See *Appendix H, Attachment 7*). FAA consulted with USFWS through the NLEB 4(d) Rule Streamlined Consultation process and received the following determination on July 16, 2020: “may effect however, any take that may occur as a result of the Action is not prohibited under the ESA Section 4(d) rule adopted for this species at 50 CFR §17.40(o).” (See *Appendix H, Attachment 10*).

The primary difference between the two Action Alternatives is that the Sponsor’s Preferred Alternative reduces total forest clearing by selective harvesting of individual tree obstructions (see table below).

For the tree removal off-airport, the property will be allowed to regenerate and/or be replanted with low-growing tree species thereby replacing the lost habitat with different, yet comparable, vegetation for unlisted plants and wildlife. As requested through consultation with the Maryland Department of Natural Resources (MDNR), appropriate mitigation would be applied to tree removal in the area designated as Wetlands of Special State Concern (WSSC), as has been done in the past, yielding a determination of no adverse effect on this system.

Comparison of 2015 ALP Alternative and Sponsor's Preferred Alternative
Impacts to Biological Resources

	2015 ALP Alternative	Sponsor's Preferred Alternative
Biological Resources		
Forest Clearing	219.38 ac	83.00 ac
Individual Trees Removed Off-Airport	1,147 trees	1,102 trees
Individual Trees Removed On-Airport	355 trees	1,228 trees
Mitigation: Placement of MDNR Forest Conservation Easements on MDOT MAA-owned land.		

Source: Final Environmental Assessment and Section 4(f) Determination for the Airport Layout Plan Phase 1 Improvements at Baltimore Washington International Thurgood Marshall Airport

In response to consultation with MDNR Environmental Review Program (MDNR ERP), MDOT MAA will adhere to time of year restrictions (March 1 through June 15) for work within Stony Run, Cabin Branch and Sawmill Creek. MDOT MAA will also apply sediment and erosion control measures to upland areas during construction to protect anadromous finfish and other fish species.

As neither Action Alternatives would result in long-term or permanent loss of state or federally-listed plant or wildlife species, and with the application of Forest Conservation Easements on MDOT MAA-owned land, there would be no significant impact to biological species as a result of the Sponsor's Preferred Alternative.

Climate

Potential impacts to climate related to airport operations and construction emissions of Green House Gases (GHGs) were identified and evaluated for the Proposed Action Alternatives. A relatively small increase in GHG emissions (two tons per year or less between 2022 and 2027) in the Proposed Action Alternatives is due to the additional run-up operations modeled at the new Airline Maintenance Facility. Emissions of carbon dioxide equivalents (CO_2e) would increase due to construction activities during the years 2019-2022. However, this would only be for the short term and the projects would have no long-term impacts to CO_2e emissions.

Because the Proposed Action Alternatives represent such a small amount of U.S. GHG emissions, and given the related uncertainties involving the assessment of such emissions regionally and globally, the incremental contribution of the Proposed Action Alternatives to U.S. and global GHG emissions cannot be adequately assessed given the current state of the science and assessment methodology.

As the only increase in CO_2e is associated with construction activities, and therefore temporary, there would be no significant impacts to Climate Change associated with the Sponsor's Preferred Alternative.

Coastal Resources

The proposed improvements are within the Maryland Coastal Zone. The Proposed Action Alternatives would result in impacts to wetlands, waterways, surface waters, and forests each of which are discussed in the associated resource categories throughout this section of the FONSI/ROD.

MDOT MAA obtained a Coastal Zone Consistency Determination from the Maryland Department of Natural Resources dated May 7, 2020, which stated "the above project is consistent with the enforceable coastal policies of the Maryland Coastal Zone Management Program" and therefore would not cause significant impacts to coastal resources.

Department of Transportation Act: Section 4(f)
The 2015 ALP Alternative includes a *de minimis* impact to Andover Park, as well as to the BWI Trail where a proposed VSR will need to cross. Two temporary occupancies to the trail are also possible during construction. A request for a *de minimis* concurrence was sent to Anne Arundel County Department of Recreation and Parks (DRP) for impacts to Andover Park and concurrence was received March 24, 2017. *De minimis* concurrence requests were also sent to DRP for concurrence that the proposed improvements would not adversely affect the BWI Trail. DRP responded on August 20, 2018 (VSR construction) and January 23, 2019 (Airline Maintenance Facility) with concurrence that the temporary impacts to the BWI Trail related to construction activity of proposed facilities would not adversely affect the BWI Trail.

The Sponsor's Preferred Alternative would result in the same potential impacts to Section 4(f) resources as with the 2015 ALP Alternative, in addition to temporary impacts from proposed utility connections under the BWI Trail associated with the Relocated Fire Training Facility and New Airline Maintenance Facility. As a result of the additional project planning for the Relocated Fire Training Facility and Airline Maintenance Facility, an updated *de minimis* concurrence letter was sent to Anne Arundel County DRP on December 20, 2018 and again on October 15, 2019 to indicate the Sponsor's Preferred Alternative impacts to the BWI Trail. Concurrence that the proposed improvements would not adversely affect the BWI Trail was received from the DRP on January 23, 2019 and November 22, 2019 (see *Appendix I, Section 4 (f) Determination,* of the Final EA and Section 4(f) Determination)

As DRP concurred that neither Andover Park nor the BWI Trail would not be adversely impacted by the Proposed Action, the FAA determined that the Section 4 (f) resources would not be significantly impacted by the Sponsor's Preferred Alternative.

Farmlands
There would be no conversion of existing farmland or other agricultural uses to non-agricultural uses; therefore, neither Proposed Action alternative would have a significant impact on farmland. No mitigation would be required.

Hazardous Materials
Several sites on, or near the Airport were identified that are known, or have the potential, to involve hazardous materials, hazardous waste, environmental contamination and/or other regulated substances.

These sites could have an effect on the proposed improvements at BWI Marshall Airport. However, the design and use of the proposed improvement projects will adhere to federal and state regulations as well as best practices pertaining to the use of hazardous materials, petroleum storage and waste disposal. This includes precautionary measures aimed at preventing and minimizing impacts to surface and ground waters, soil and air. As a result, no mitigation is required.

The construction and use of the proposed improvement projects include some hazardous materials, petroleum storage and waste disposal. Additionally, research on historic sites in the vicinity of the Proposed Action, indicated some previous hazardous material usage, releases, and cleanups. With the application of BMPs and adherence to federal and state regulations (including precautionary measures aimed at preventing and minimizing impacts to surface and ground waters, soil and air), the Sponsor's Preferred Alternative would not result in significant impacts to the environment.

Historical, Archaeological, Architectural, and Cultural Resources
There is only one historical resource identified within the Area of Potential Effect (APE)- Direct and APE-Indirect: the National Register of Historic Places (NRHP) listed Benson-Hammond House. It was determined that the Proposed Action would have no effect on the historic property. The Maryland

Historical Trust (MHT) concurred with this determination of no effect on December 13, 2019 (See *Appendix J, Attachment 3* of the Final EA and Section 4(f) Determination).

Additionally, there are archaeological resources that have not been evaluated for NRHP eligibility or have been determined not eligible. These include ten sites which have been determined not eligible for the NRHP. Thus, while work would affect these sites, impacts to these sites would not be deemed significant given the amount of prior disturbance which has already affected the integrity of these sites and the fact that the these resources are not eligible for the NRHP. Potential impacts were considered for four archaeological resources within the APE-Direct that have not received an MHT determination: Sites 18AN23, 18AN1011, 18AN1428, and 18AN1488. No formal determination of eligibility was provided by MHT for these sites, however, recommendations of "not eligible" were made to MHT on Sites 18AN1011 and 18AN1428. No recommendation was made on Site 18AN23 as the proposed improvements were revised to avoid the site, or on 18AN1488 because the site was determined to be outside the APE-Direct.

In summary, no archaeological or architectural resources would be adversely impacted by either Proposed Action Alternative, and therefore there would be no significant impact. Mitigation measures (outlined below in Required Mitigation) will apply if unexpected discoveries of archaeological resources or human remains are discovered during construction.

Land Use

No significant impacts related to land use are expected with the Proposed Action Alternatives and no mitigation would be required. The majority of the 2015 ALP Alternative projects are located within existing Airport property, with the exception of vegetation obstruction removal located off-airport property, and connections to existing utilities off-airport. The 2015 ALP Alternative is consistent with the Airport's 2015 ALP, as well as local land use plans.

The differences between the Sponsor's Preferred Alternative and 2015 ALP Alternative as it relates to land use, is the use of selective tree clearing in environmentally sensitive areas. The selective tree clearing would minimize impacts to wetlands and prevent the creation of newly open waters associated with clear cutting in wetland areas. This would also limit the creation of new wildlife attractants to open waters.

No significant impacts related to land use are expected with either Proposed Action Alternative and no mitigation would be required.

Natural Resources and Energy Supply

The anticipated increase in additional resources and energy consumption required by the Proposed Action Alternatives would not amount to a significant percentage of the total Airport use. The proposed improvements would not create a substantial increase in demand for local resources and utilities or strain the capacity/supply of these resources/ utilities to the meet the additional demand. The proposed projects would not involve the use of any unusual or scarce resources nor cause a demand for the use of any unusual or scarce resources that are in short supply

The Sponsor's Preferred Alternative also includes two new connections to Anne Arundel County utility lines: a water line from the proposed Airline Maintenance Facility, under Aviation Blvd, to connect into an existing County water line; and a potential sanitary sewer connection from the Relocated Fire Training Facility, under Aviation Blvd, to connect into the County's sanitary system. The County has sufficient capacity/supply to provide utility connection for these proposed projects.

No significant impacts related to natural resources or energy supply are expected with either Proposed Action Alternative and no mitigation would be required.

Noise and Noise- Compatible Land Use
Compared with the No Action Alternative, the noise contours in the Proposed Action Alternatives expand towards north of Runway 10 associated with the run-up operations at the proposed Airline Maintenance Facility. There is little difference between the 65 DNL contours for the Proposed Action Alternatives when compared to the No Action Alternative and any increase in exposure of 1.5 dB or greater is over compatible land uses.

There are two small areas of land west of the Airport identified as residential land use newly included within the 65 DNL contour as a result of the proposed Airline Maintenance Facility. Additional analysis was undertaken to determine the differences between the Action Alternatives and the No Action Alternatives relative to these two single family residential parcels. The additional analysis determined that no additional structures or residents are located within the small area newly included within the 65 DNL contour. Therefore, the threshold for significant noise impact was not exceeded for any of the alternatives considered and no mitigation would be required.

Notably, the Proposed Action Alternatives are not anticipated to cause a change in aircraft operations when compared to the No Action Alternative. Therefore, with the exception of change due to the Airline Maintenance Facility described above, the Proposed Action would not change the 65 DNL contours at the airport and therefore would have no significant impacts

Socioeconomics, Environmental Justice and Children's Environmental Health and Safety
An evaluation of population statistics for 11 Census tracts (CTs), nine within Anne Arundel County and and two within Howard County. The Airport property makes up much of one the tracts; therefore, it is not included in the demographic analysis.

Eight of the ten CTs have minority populations greater than their respective Counties, and three CTs have over 50 percent minority populations. The percent of families below the poverty line ranges from 1.9 percent to 12.9 percent, and the percent of individuals below the poverty line ranges from 2.9 percent to 17.0 percent. All CTs except one have lower percentages of poverty than the State.

The Proposed Action Alternatives include Terminal Roadway Widening and Access Improvements, and the Upper Level Roadway Widening at Concourse E. These improvements would help improve on-airport traffic congestion and serve the increased traffic and growth anticipated into the future with a quality level of service.

The traffic analysis indicates that the increase of traffic volumes (due to previously approved projects both on and around the airport) in the Proposed Action Alternatives would result in virtually no changes compared to the No Action Alternative for either 2022 or 2027 conditions. Four intersections would operate at Level of Service (LOS) E or F during the AM and PM peak hours in the 2027 No Action Alternative. These intersections are along Aviation Blvd/MD 170 at Dorsey Rd/MD 176 – West, Amtrak Way/MD 995 and Air Cargo Drive and Stoney Run Rd at New Ridge Rd. Intersection 1 (Aviation Blvd/MD 170 at Dorsey Rd/MD 176 – West) also operates at LOS E or F in the 2022 No Action Alternative.

The Proposed Action Alternatives would not result in disproportionately high and adverse effects to environmental justice communities, nor would it otherwise cause a significant impact to socioeconomics (including and children's health and safety risks).

Visual Effects
No significant impacts related to light emissions or visual resources / visual character are expected with the Proposed Action Alternatives. The only difference between the Sponsor's Preferred Alternative and

2015 ALP Alternative as it relates to visual resources and character, is the minimization of obstruction removal through selective tree clearing on-airport property under the Sponsor's Preferred Alternative. As a result, changes to visual resources may differ slightly from the 2015 ALP Alternative. No significant impacts to visual character and visual resources are expected with either Proposed Action Alternative.

Water Resources

Six of the proposed improvement projects could potentially impact wetlands, wetland buffers, streams or 100-year floodplains. The table below identifies the potential impacts of each of the Action Alternatives. Cumulatively, implementation of all the 2015 ALP Alternatives would result in temporary or permanent impacts to 5.44 acres of nontidal wetlands, 6.28 acres of wetland buffers, 838 linear feet of streams, and 7.07 acres of 100- year floodplains. The 2015 ALP Alternative projects would result in an increase in stormwater runoff from the additional impervious surfaces proposed. Based on preliminary engineering design, the 2015 ALP Alternative projects would result in a net increase of approximately 86.0 acres of impervious surface.

Comparison of 2015 ALP and Sponsor's Preferred Alternative Impacts to Water Resources

	2015 ALP Alternative	Sponsor's Preferred Alternative
Water Resources		
Wetlands	5.44 ac. (237,077 sf)	0.57 ac. (24,994 sf)
Wetland Buffers	6.28 ac. (273,672 sf)	1.99 ac. (86,657 sf)
Stream Channel	838 lf	1,003 lf
100-Year Floodplain	7.07 ac.	13 Trees (0.33 ac)
Net Increase in Impervious Area	86.01 ac.	95.63 ac.

Source: *Final Environmental Assessment and Section 4(f) Determination for the Airport Layout Plan Phase 1 Improvements at Baltimore Washington International Thurgood Marshall Airport*

Cumulatively, implementation of the Sponsor's Preferred Alternative projects would result in temporary or permanent impacts to 0.57 acres of non-tidal wetlands, 1.99 acres of non-tidal wetland buffers, 1,003 linear feet of streams, and 0.33 acres of mapped 100-year floodplain. The Sponsor's Preferred Alternative would not result in a significant impact to wetlands, streams, or floodplains. Mitigation would be provided for all permanent impacts to wetlands and streams.

The Sponsor's Preferred Alternative projects would result in an increase in stormwater runoff from the additional impervious surfaces proposed. Based on preliminary engineering design, the Sponsor's Preferred Alternative projects would result in a net increase of approximately 95.6 acres of impervious surface.

As the Proposed Action would comply with BWI Marshall Airport's National Pollutant Discharge Elimination System (NPDES) permit and other applicable stormwater requirements, the Sponsor's Preferred Alternative would not significantly impact stormwater discharges.

Summary of All Impact Categories

The Final EA and Section 4(f) Determination addresses all environmental impact categories, as required by FAA Orders 1050.1F, 5050.4B and the Desk Reference for Airports Actions. Impact categories, as described above, such as Air Quality; Biological Resources; Climate; Coastal Resources; DOT Section 4

(f) Resources; Farmlands; Hazardous Materials, Solid waste, and Pollution Prevention; Historical, Architectural, Archaeological, and Cultural Resources; Land Use; Natural Resources and Energy Supply; Noise and Noise-compatible Land use; Socioeconomics, Environmental Justice, Children's Environmental and Safety Risks; Visual Resources; Water Resources; and Cumulative Impacts were considered during the preparation of, and analysis for the Final EA and Section 4(f) Determination.

It is the FAA's finding that the Proposed Action will not have a significant effect on any of the above noted categories with strict adherence to the avoidance, minimization and mitigation measures, outlined in the Final EA and Section 4(f) Determination.

Coordination with General Public and Agencies

Numerous opportunities for public and Agency comments were afforded at various points in the development of both the January 2018 EA and the Final EA and Section 4(f) Determination. The scoping process began with the preparation of a Scoping Information Package that included discussion of the project background, proposed action, preliminary purpose and need, preliminary alternatives, environmental analysis, and preliminary schedule. The package was sent to regulatory agencies and relevant parties prior to the agency and public scoping meeting date. Included in the relevant party's mailing list were property owners of parcels off of the Runway 15L end where obstruction removal is proposed on their property.

Outreach on January 2018 Draft EA

Public Scoping Meeting

A public notice detailing the date, location, and purpose of the public scoping meeting was published in the Legal Notices section of *The Baltimore Sun* and the *Daily* on August 5 and 19, 2016. A second Public Scoping Meeting was also held on August 25, 2016 at MDOT MAA's offices. The public scoping meeting was held in an "open house" format with representatives from the MDOT MAA and the Project Team available to answer questions throughout the meeting.

Comments were received expressing some of the following concerns: Obstruction Removal/ Tree removal, Noise, Visual (tree removal), Traffic, and potential impacts to the BWI Trail.

Agency Scoping Meeting

The agency scoping meeting was held on Thursday, August 25, 2016 at 10:00 a.m. at MDOT MAA's offices in Linthicum, Maryland. Meeting invites and scoping information packages were sent to 20 regulatory agencies that would be considered to have an interest in or regulatory oversight of the preparation of the EA.

Notice of Availability of the Draft EA

The public and agencies had an opportunity to review and comment on the Draft EA and Draft Section 4(f) Determination for 30 days, from January 5, 2018 through February 5, 2018. A NOA was published in *The Baltimore Sun* on January 5, 2018 and again on January 14, 2018. Limited comments were received during the comment period and they were focused on past changes to the flight paths at BWI Marshall Airport associated with implementation of FAA's Washington, D.C. Optimization of Airspace and Procedures in the Metroplex (OAPM) project. Following the closure of the 30-day comment period, comments were received from Howard County Office of Law and the BWI Community Roundtable. Both sets of comments were focused on the flight path changes associated with the FAA's DC OAPM project.

Public Workshop

Advertisement of a public workshop for the January 5, 2018 Draft EA and Section 4(f) Determination was included in the NOA. The public workshop was held on January 25, 2018. Three members of the public attended. Attendees of the public workshop were concerned with the past changes to flight paths at

BWI Marshall Airport associated with the implementation of FAA's Washington, D.C. OAPM project, and how proposed improvements in the Draft EA and Draft Section 4(f) Determination could further impact noise.

Outreach on Updated Draft EA and Section 4(f) Determination

An updated Draft EA and Section 4(f) Determination was re-issued for public comment on February 6, 2020 in order to present updated information related to project planning and to respond to public comments on the January 2018 issuance of the Draft EA and Section 4(f) Determination (see Background, above). An NOA was published in *The Baltimore Sun, The Capital Gazette*, and the *Howard County Times* on February 6, 2020 and again in *The Baltimore Sun* on February 9, 2020. Notice of availability of the updated Draft EA and Section 4(f) Determination and links to the updated Draft EA and Section 4(f) Determination document are available on the MDOT MAA website.

Public Workshop

A virtual public workshop was held via Webex on Thursday, May 21st, 2020 at 11:30 AM – 1:30 PM and 6:00 PM – 8:30 PM to share information and invite comments on the project. There were 52 attendees at the midday 11:30 AM session and 30 attendees at the evening 6:00 PM session. The primary comments and questions from elected officials and from the public received during and following the virtual public workshops were concerns related to the tree removal associated with the Proposed Action and comments and questions related to the Proposed Action's impact on noise and aircraft operations. Two comments were received following the June 4th end date and have been included in the comment-responses; one of the comments had previously been received via email. Comments and their associated responses for all versions of the EA can be seen in Appendix N in the Final EA and Section 4(f) Determination.

Mitigation Requirements

Biological Resources

MDOT MAA will adhere to time of year restrictions (March 1 through June 15) for work within Stony Run, Cabin Branch and Sawmill Creek. MDOT MAA will also apply sediment and erosion control measures to upland areas during construction to protect anadromous finfish and other fish species.

MDOT MAA calculated forest mitigation requirements by completing MDNR Forest Conservation Worksheets for individual projects. Mitigation requirements were calculated for all projects and are presented in Tables 5.2.4 and 5.2.5 of the Final EA and Section 4(f) Determination, for the 2015 ALP Alternative and Sponsor's Preferred Alternative, respectively. See *Appendix H, Attachment 6* of the Final EA and Section 4(f) Determination for the Forest Conservation mitigation worksheets for each project. MDOT MAA proposes to meet forest mitigation requirements for individual projects through placement of MDNR Forest Conservation Easements on MDOT MAA-owned forests within and surrounding the Stony Run WSSC. Due to the high quality of these resources, MDNR Forest Service has granted three acres of credit for every one acre placed under easement. MDOT MAA also has additional forested parcels that could be placed under Forest Conservation Easements as necessary; however, only one acre of credit will be granted for every one acre placed under easement. Note: No mitigation under Maryland's FCA is required for removal of forested areas or individual tree obstructions that occur within FAR Part 77 primary, approach, departure, and transitional surfaces (COMAR 5-1602(b)(11)).

Historical, Archaeological, Architectural, and Cultural Resources

If unmarked burial sites are encountered, then staff would stop work and follow the procedures established in the BWI Marshall Airport Historic Preservation Plan (HPP) and required by MHT regulations. Reference Section 5.8 of the Updated DEA/Section 4(f) Determination for additional detail.

Off-Airport Traffic

To address the four intersections operating at LOS E or F during the 2027 No Action Alternative AM or PM peak hours, mitigations measures such as signal split optimization and restriping of an approach could be implemented. Authority to implement improvements to off-airport intersections falls to the roadway owner – either Anne Arundel County or the State Highway Administration (SHA). During design, MDOT MAA would consult with the County and SHA for proposed facilities that would add a new entrance or increase peak hour traffic at an existing entrance within County or SHA right of way. MDOT MAA must obtain a permit to add or modify an entrance within County or SHA right of way. If required, signal timing improvements would be implemented by the County or SHA.

Water Resources

Wetlands and Streams:

Mitigation requirements are determined by MDE and USACE on a case-by-case basis and therefore cannot be firmly determined at this time; however, based on these typical mitigation ratios and the impacts detailed in this EA, potential mitigation for the 2015 ALP Alternative would be to purchase credits to offset the needed 10.7 acres of wetland and 838 linear feet of stream mitigation, and the Sponsor's Preferred Alternative would be to purchase credits to offset the needed 0.9 acres of wetland and 1,003 linear feet of stream mitigation.

Surface Waters

Impacts to water quality resulting from an increase in impervious surface would be avoided and mitigated using stormwater management techniques. Stormwater treatment requirements for the proposed projects were determined in accordance with MDE's Stormwater Management Guidelines for State and Federal Projects. Determination for details on stormwater treatment requirements by project. Stormwater design for each project will adhere to MDE guidelines and regulations. A Stormwater Management Concept Report will be provided during project design.

Floodplain

Mitigation measures to minimize potential impacts to surface waters and floodplains include designing facilities above the base flood elevation; minimizing fill placed in floodplains and wetlands; construction controls to minimize erosion and sedimentation; restoring vegetation on disturbed areas to prevent soil erosion following project completion; designing facilities to allow adequate flow circulation and preserve free, natural drainage; comply with special flood-related design criteria; controlling run off, while ensuring the run-off control measures does not attract wildlife hazardous to aviation; controlling waste and spoils disposal to prevent contamination of ground and surface water; and Section 404 and 401 permit terms and conditions for minimizing and compensating for impacts to surface waters. An Erosion and Sediment Control Plan would be developed in accordance with MDE guidelines and implemented during construction activities to minimize erosion and sedimentation and its impacts on surface waters.

The FAA understands that the MAA will undertake the necessary actions to ensure that the above conditions and/or mitigation measures are undertaken and that it will monitor the implementation and effectiveness of such measures. In some instances, the above conditions are required as a result of coordination and agreement. They do not necessarily reflect impacts that require mitigation to meet FAA standards pursuant to FAA Order or guidance. As with all projects subject to NEPA, should any conditions change or impacts be discovered that require further NEPA analysis, the FAA will require that a separate analysis, review and decision be conducted.

Federal Agency Findings

In accordance with all applicable laws, the FAA makes the following findings for the Proposed Action based on all appropriate information and analyses contained in the Final EA and Section 4(f) Determination:

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)(l)). 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 coordination efforts with public agencies as indicated in Appendix M, *Public and Agency Involvement,* of the Final EA and Section 4(f) Determination; Federal Consistency Certification Concurrence (May 7, 2020); and Maryland Department of Planning determination that the proposed project is "consistent with their plans program and objectives" (June 1, 2020).

B. The interest of the communities in or near where the Proposed Action 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 will be located were given fair consideration as demonstrated by the Final EA and Section 4(f) Determination, including Appendix N, *Comments and Responses,* which includes the following information: Public and Agency Response Matrix, and Public Workshops.

C. The FAA has given this Proposed Action the independent and objective evaluation required by the Council on Environmental Quality {40 C.F.R. Section 1506.5). The FAA's review and ultimate decision process included the FAA's rigorous exploration and objective evaluation of reasonable alternatives and probable environmental consequences, regulatory agency and Native American consultations, as required, and public involvement. FAA furnished guidance and participated in the preparation of the Final EA and Section 4(f) Determination by providing input, advice and expertise throughout the planning and technical analyses, along with administrative direction and legal review. FAA has independently evaluated the Final EA and Section 4(f) Determination and takes responsibility for its scope and content.

D. There are no disproportionately high and adverse environmental effects on minority and/or low-income populations that would result from the Proposed Action. (Executive Order 12898) (U.S. DOT Order 5610.2(a)). The FAA is satisfied that the analysis correctly identified low-income and minority populations that potentially could be affected by the Proposed Action. None of the resources evaluated (noise, off-airport traffic, and visual impacts) indicated disproportional impacts to Environmental Justice Communities.

E. The Proposed Action is consistent with the Virginia Coastal Zone Management Program in accordance with the CZMA, as amended (16 U.S.C. §1451-1464). As indicated in Appendix N of the Final EA and Section 4(f) Determination, on May 7th, 2020 the Maryland Department of Natural Resources concurred that the Proposed Action meets its consistency concurrence criteria and is consistent with the approved Coastal Zone Management Plan. There would be no significant adverse impacts to the Maryland Coastal Zone Management Area as result of the Proposed Action.

Decision and Order

The FAA recognizes its responsibilities under the National Environmental Policy Act of 1969 (NEPA), the Council on Environmental Quality's (CEQ) implementing regulations[1], and the FAA's own directives.

[1] The CEQ recently promulgated revisions to its regulations implementing NEPA, effective September 14, 2020. However, pursuant to 40 CFR 1506.13, because the NEPA process for the Proposed Action commenced years ago, the FAA has not applied the revised regulations to this Finding of No Significant Impact/Record of Decision.

Recognizing these responsibilities, I have carefully considered the FAA's goals and objectives in relation to the various aeronautical aspects of the *Airport Layout Plan Phase 1 Improvements at Baltimore Washington Thurgood Marshall Airport* as discussed in the Final EA and Section 4(f) Determination and I have used the environmental process to make a more informed decision. This review included the purposes and needs to be served by this Proposed Action and alternative means to achieve them. This review has also included consideration of the environmental impacts of these alternatives, and the mitigation and conditions necessary to preserve and enhance the human environment. This decision is based on a comparative examination of environmental impacts, operational factors, and economic factors for each of the alternatives. The Final EA and Section 4(f) Determination provides a fair and full discussion of the impacts of the Proposed Action. The NEPA process included appropriate planning and design for avoidance and minimization of impacts, as required by NEPA, the CEQ regulations, other special purpose environmental laws, and appropriate FAA environmental directives and guidance.

The FAA has determined that environmental and other relevant concerns presented by interested agencies and the general public have been addressed in the Final EA and Section 4(f) Determination. The FAA believes that with respect to the Proposed Action, there are no outstanding environmental issues within FAA jurisdiction to be studied or NEPA requirements that have not been met. In making this determination, the FAA must decide whether to approve the federal actions necessary for Project implementation. FAA approval signifies that applicable federal requirements relating to airport development planning have been met and permits the Sponsor to proceed with development and possibly receive funds for eligible items. Not approving these actions would prevent the Sponsor from proceeding with this airport development.

After careful and thorough consideration of the facts contained herein and subsequent to my review of the Final EA and Section 4(f) Determination and all of its related materials, the undersigned finds that the proposed Federal action is consistent with existing national environmental policies and objectives as set forth in Section 101 of NEPA and other applicable environmental requirements and 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.

This decision does not constitute a commitment of funds under the Airport Improvement Program (AIP); however, it does fulfill the environmental prerequisites for future AIP funding determinations associated with AIP-eligible project components (49 U.S.C. §47107).

Accordingly, pursuant to the authority delegated to me by the Administrator of the FAA, I find that the actions summarized in this FONSI/ROD are reasonably supported and approved. I hereby direct that action be taken together with the necessary related and collateral actions, to carry out the agency actions noted above. Specifically:

1. Unconditional Approval of BWI ALP pursuant to 49 U.S.C. §40103(b) and §47107(a)(16), and determination of the effects of each of the components comprising the Proposed Action as described above, in the Final EA and Section 4(f) Determination. Subsequent individual project approvals may still be subject to a determination of the effects of this project upon the safe and efficient utilization of navigable airspace pursuant to 14 C.F.R. Parts 77 and 157 and 49 U.S.C. §44718;

2. Determination under 49 U.S.C. §§4010l(d)(l) and 47105(b)(3) that the proposed project meets applicable design and engineering standards set forth in FAA Advisory Circulars;

3. Determinations concerning funding through the Federal grant-in-aid program authorized by the Airport and Airway Improvement Act of 1982, as amended (recodified at 49 U.S.C. §47107)

and/or approval of an application to use Passenger Facility Charges (PFCs) under 49 U.S.C. §40117 (this does not determine eligibility or availability of potential funds);

4. Determination under 49 U.S.C. §44502(b) that the airport development is reasonably necessary for use in air commerce or in the interests of national defense;

5. Continued close coordination with the Sponsor, and appropriate FAA program offices, as required, to ensure safety during construction (14 C.F.R. Part 77); and

6. Approval of appropriate amendments to the BWI Airport Certification Manual (ACM), as required, pursuant to 49 U.S.C. §44706.

Approved:

JENNIFER SOLOMON

Digitally signed by JENNIFER SOLOMON
Date: 2020.11.05 13:40:14 -05'00'

Jennifer Solomon
Eastern Regional Administrator
Federal Aviation Administration

Right of Appeal
This FONSI/ROD presents the Federal Aviation Administration's findings and 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.

Any party having a substantial interest may appeal this order to the United States Court of Appeals for the District of Columbia Circuit or in the court of appeals of the United States for the circuit in which the person resides or has its principal place of business, upon petition filed within 60 days after entry of this order in accordance with 49 U.S.C. §46110.

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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CHAPTER FIVE: ENVIRONMENTAL CONSEQUENCES

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ACRONYMS AND ABBREVIATIONS

AAC	Aircraft Approach Category
AACPS	Anne Arundel County Public Schools
AAD	Average Annual Day
AC	Advisory Circular
ACBM	Asbestos-containing building materials
ACEIT	Airport Construction Emissions Inventory Tool
ACHP	Advisory Council on Historic Preservation
ACM	Asbestos containing materials
ACOP	Airfield Capacity Optimization Plan
ACRP	Airport Cooperative Research Program
ADG	Airplane Design Group
ADT	Average Daily Traffic
AEDT	Aviation Environmental Design Tool
AEE	FAA Office of Environment and Energy
AGL	Above Ground Level
AIP	Airport Improvement Program
ALP	Airport Layout Plan
ALSF-II	Approach Lighting System with Sequence Flashing Lights
ALV	Airfield Lighting Vault
ANOMS	Airport Noise and Operations Monitoring System
ANZ	Airport Noise Zone
AOA	Airport Operations Area
APE	Area of Potential Effect
APU	Auxiliary Power Unit
AQPP	Air Quality Planning Program
ARFF	Aircraft Rescue and Firefighting
ASDE-X	Airport Surface Detection Equipment, Model X
ASPM	Aviation System Performance Metrics
ASPRP	Airfield Standards and Pavement Rehabilitation Project
ASR	Airport Surveillance Radar
AST	Aboveground storage tank
ASTM	American Society for Testing and Material
ATADS	Air Traffic Activity Data System
ATC	Air Traffic Control
ATCT	Airport Traffic Control Tower
AZP	Airport Zoning Permit
BGE	Baltimore Gas and Electric
BMC	Baltimore Metropolitan Council
BMP	Best Management Practices
BOD	Biochemical Oxygen Demand
BWI Marshall	Baltimore Washington International Thurgood Marshall Airport
CAA	Clean Air Act
CAEP	Committee on Aviation Environmental Protection
CBRS	Coastal Barrier Resources System
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CEQ	Council on Environmental Quality

ACRONYMS AND ABBREVIATIONS

CESQG	Conditionally Exempt Small Quantity Generator
CFR	Code of Federal Regulations
cfs	cubic feet per second
CH_4	Methane
CIP	Capital Improvement Program
CLV	Critical Lane Volume
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_{2e}	Carbon dioxide equivalent
COMAR	Code of Maryland
CRCF	Consolidated Rental Car Facility
CT	Census Tract
CTP	Consolidated Transportation Program
CWA	Clean Water Act
CZMA	Coastal Zone Management Act of 1972
CZMP	Coastal Zone Management Program
dB	Decibel
dBA	A-weighted Decibel
DBH	Diameter at breast height
DME	Distance Measuring Equipment
DNL	Day-Night Average Sound Level
DOE	Determination of Eligibility
DOT	Department of Transportation
DRP	Anne Arundel County Department of Recreation and Parks
EA	Environmental Assessment
EAC/A	Elizabeth Anderson Comer Archaeology
EDMS	Emissions and Dispersion Modeling System
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EISA	Energy Independence and Security Act
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right to Know Act
ERNS	Emergency Release Notification System
ESA	Endangered Species Act
ESD	Environmental site design
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulation
FATO	Final Approach and Takeoff Area
FBO	Fixed Base Operator
FCA	Forest Conservation Act
FCP	Forest Conservation Plan
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FICAN	Federal Interagency Committee on Aviation Noise
FICON	Federal Interagency Committee on Noise
FIDS	Forest Interior Dwelling Species
FIFRA	Federal Insecticide Fungicide and Rodenticide Act
FIRM	Flood Insurance Rate Map

ACRONYMS AND ABBREVIATIONS

FMP	Forest Maintenance Plan
FOD	Foreign Object Debris
FONSI	Finding of No Significant Impact
FPPA	Farmland Protection Policy Acts of 1980 and 1995
FSD	Forest Stand Delineation
FWS	U.S. Fish and Wildlife Service
GA	General Aviation
GDP	General Development Plan
GHG	Greenhouse Gas
GIS	Geographic Information System
GISW	Glycol-Impacted Storm Water
GPS	Global Positioning System
GSE	Ground Support Equipment
GWP	Global Warming Potential
HC	Hydrocarbons
HCM	Highway Capacity Manual
HMTA	Hazardous Materials Transportation Act
HPP	Historic Preservation Plan
HUD	Department of Housing and Urban Development
Hz	Hertz
IART	Impervious Area Requiring Treatment
ICAO	International Civil Aviation Organization
ILS	Instrument Landing System
IMP	Institutional Management Plan
INM	Integrated Noise Model
IPaC	Information for Planning and Consultation
IPCC	Intergovernmental Panel on Climate Change
IT	Infiltration Trench
ITE	Institute of Transportation Engineers
JD	Jurisdictional Determination
JPA	Joint Federal /State Application
LBP	Lead-based paint
LOD	Limit of Disturbance
LOS	Level of Service
LOS	Line-of-Sight
LPST	Leaking petroleum storage tank
LQG	Large Quantity Generator
LUST	Leaking Underground Storage Tank
MAA	Maryland Aviation Administration
MAGLEV	Magnetic levitation
MAP	Million Annual Passengers
MBTA	Migratory Bird Treaty Act
MD	Maryland
MDE	Maryland Department of Environment
MDNR	Maryland Department of Natural Resources
MDOT	Maryland Department of Transportation
MEP	Maximum Extent Practicable
MEPA	Maryland Environmental Policy Act
mgd	million gallons per day
MHT	Maryland Historical Trust
MIHP	Maryland Inventory of Historic Properties
MOE	Measure of Effectiveness

ACRONYMS AND ABBREVIATIONS

MOU	Memorandum of Understanding
MOVES	Motor Vehicle Emissions Simulator
MRU	Multilateration Remote Unit
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MSL	Mean Sea Level
MT	metric tons
MTA	Maryland Transit Administration
MTN	Martin State Airport
NAAQS	National Ambient Air Quality Standards
NAD	North American Datum
NAGPRA	Native American Graves Protection and Repatriation Act
NAP	Noise Abatement Plan
NAVAIDs	Navigational Aids
NCP	Noise Compatibility Program
NEMA	National Electrical Manufacturers Association
NEPA	National Environmental Policy Act of 1969
NESHAP	National Emission Standard for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
NLCD	National Land Cover Database
NO_2	Nitrogen Dioxide
N_2O	Nitrous Oxide
NO_x	Nitrogen Oxides
NOA	Notice of Availability
NOAA	National Oceanic and Atmospheric Administration
NOC	Noise Oversight Committee
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPIAS	National Plan of Integrated Airport Systems
NPL	National Priorities List
NPS	National Park Service
NRC	National Research Council
NRCS	Natural Resource Conservation Service
NRD	Non-Rooftop Disconnect
NRHP	National Register of Historic Places
NRI	National Rivers Inventory
NWI	National Wetland Inventory
NWS	National Weather Service
O_3	Ozone
O&M	Operations and Maintenance
OAPM	Optimization of Airspace and Procedures in the Metroplex
OTC	Ozone Transport Commission
PA	Programmatic Agreement
Part 77	14 Code of Federal Regulations Part 77
Pb	Lead
PCC	Port
PDD	Program Definition Document
PEM	Palustrine Emergent
PFC	Passenger Facility Charge
PFO	Palustrine Forested
PM	Particulate matter
$PM_{2.5}$	Particulate Matter with a diameter of 2.5 microns or less

ACRONYMS AND ABBREVIATIONS

PM_{10}	Particulate Matter with a diameter of 10 microns or less
PMP	Pavement Management Program
ppm	parts per million
PSS	Palustrine Scrub-Shrub
PUB	Palustrine Unconsolidated Bottom
RACM	Reasonably Available Control Measures
RCRA	Resource Conservation and Recovery Act
RDC	Runway Design Code
REC	Recognized Environmental Conditions
RGGI	Regional Greenhouse Gas Initiative
ROFA	Runway Object Free Area
RON	Remain Overnight
ROT	Runway Occupancy Times
RPZ	Runway Protection Zone
RTP	Regional Transportation Plan
RTR	Remote Transmitter/Receiver
RU	Remote Unit
RVR	Runway Visual Range
SCMAGLEV	Superconducting MAGLEV
SDWA	Safe Drinking Water Act
SEL	Sound Exposure Level
SHA	State Highway Administration
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
SO_x	Sulfur oxides
SOC	Species of concern
SPCCP	Spill Prevention Control and Countermeasure Plan
SPL	Sound pressure level
SQG	Small Quantity Generator
SRE	Snow Removal Equipment
SSPRA	Sensitive Species Project Review Areas
STP	Shovel Test Pit
SWDA	Solid Waste Disposal Act
SWM	Stormwater Management
SWMF	Storm Water Management Facility
SWPPP	Storm Water Pollution Prevention Plan
TA	Time-Above a Specified Level
TACAN	Tactical Air Navigation
TAF	Terminal Area Forecast
TDG	Taxiway Design Group
THPO	Tribal Historic Preservation Officer
TIA	Traffic Impact Assessment
TIP	Transportation Improvement Plan
TIS	Traffic Impact Study
TMDL	Total Maximum Daily Load
TNW	Traditional Navigable Waters
TOFA	Taxiway Object Free Area
tpy	tons per year
TSCA	Toxic Substances Control Act
TSDF	Treatment, storage and disposal facility
TSS	Threshold Siting Surface
TSS	Total Suspended Solids
USACE	U.S. Army Corp of Engineers
USC	United States Code
USDA	U.S. Department of Agriculture

ACRONYMS AND ABBREVIATIONS

USFWS	U.S. Fish and Wildlife Service
UST	Underground Storage Tank
USGCRP	United States Global Change Research Program
USGS	United States Geological Survey
V/C	Volume to Capacity
VFR	Visual Flight Rules
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compound
VOR	Very High Frequency Omnidirectional Range
VORTAC	VOR Collocated with TACAN
VSR	Vehicle Service Roadway
WHMP	Wildlife Hazard Management Plan
WHPA	Wellhead Protection Area
WHS	Wildlife and Heritage Service
WQC	Water Quality Certification
WSSC	Wetlands of Special State Concern
WUS	Waters of the U.S.

Chapter 1: BACKGROUND AND PROPOSED ACTION

The Maryland Department of Transportation (MDOT) Maryland Aviation Administration (MAA), owner and operator of Baltimore/ Washington International Thurgood Marshall Airport (BWI Marshall Airport), located in Anne Arundel County, Maryland, is preparing this Environmental Assessment (EA) and Section 4(f) Determination to assist the Federal Aviation Administration (FAA) in evaluating potential environmental effects resulting from proposed improvements at BWI Marshall Airport. This EA and Section 4(f) Determination is being completed in accordance with the *National Environmental Policy Act of 1969* (NEPA), which requires environmental review of proposed Federal actions. MDOT MAA is requesting a revision to the Airport Layout Plan (ALP) and is proposing improvements at BWI Marshall Airport that would be eligible for Federal funding, which are both considered Federal actions.

In addition to NEPA, this EA and Section 4(f) Determination is being prepared in accordance with the Council on Environmental Quality implementing regulations [(CEQ); 40 Code of Federal Regulations (CFR) 1500-1508]; FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*; FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions*; and all applicable special purpose laws, e.g., Section 106 of the National Historic Preservation Act.

The EA and Section 4(f) Determination will also satisfy the requirements of the Maryland Environmental Policy Act (MEPA) (Annotated Code of Maryland, Natural Resource Article, 1-301 to 1-305). Per the MDOT regulations to implement MEPA, an environmental effects report will not be required, however, a MEPA checklist was completed and is provided in **Appendix O**.

For this EA and Section 4(f) Determination, the required content and related information is organized in the following manner: **Chapter 1** provides background information as well as the Proposed Action; **Chapter 2** describes the purpose and need for the Proposed Action and supporting materials; **Chapter 3** discusses the alternatives considered and why they were either dismissed from further evaluation or carried forward for detailed environmental analysis; **Chapter 4** describes the existing conditions of potentially impacted environmental resources; **Chapter 5** identifies and evaluates the potential environmental consequences of the alternatives carried forward for detailed analysis; **Chapter 6** documents the public and agency outreach conducted for the EA and Section 4(f) Determination; and **Chapter 7** provides a list of preparers.

A Draft EA and Draft Section 4(f) Determination for Proposed Improvements 2016-2020 at BWI Marshall Airport was published on January 5, 2018. A public workshop was held on January 25, 2018 and comments were accepted from the public through February 5, 2018 (See Chapter 6, Public and Agency Involvement for details). An Updated Draft EA and Draft Section 4(f) Determination is being reissued for the following reasons:

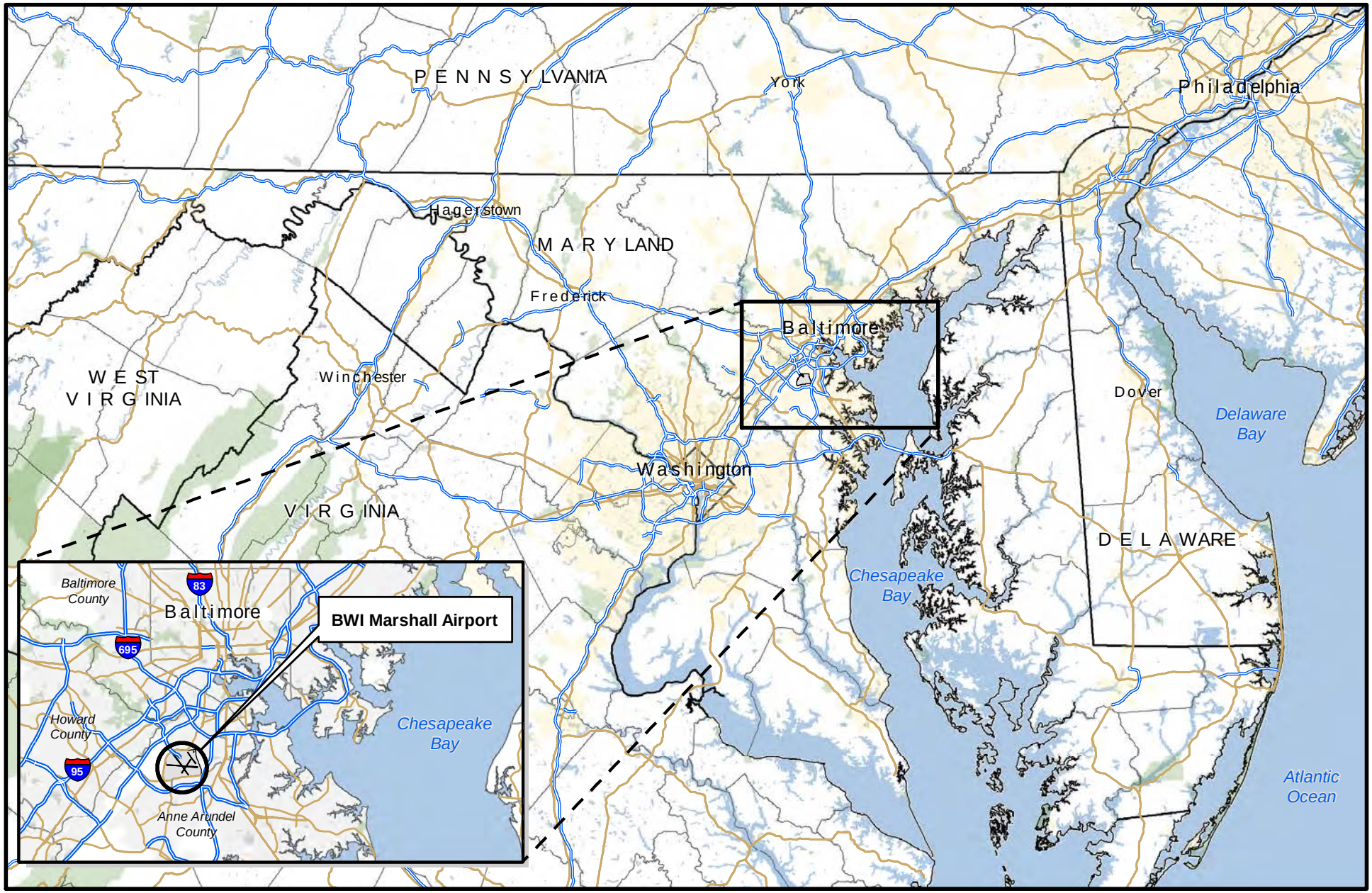
- *To ensure the public is provided an additional review of the Draft EA as a result of the changes made to address public comments received on the January 2018 Draft EA;*
- *To include an updated analysis on the accuracy of the radar data used in the noise analysis, as provided in Appendix K-4, in response to public comments on the January 2018 Draft EA;*
- *To include additional coordination conducted with Anne Arundel County related to impacts to Section 4(f) resources, including new impacts to the BWI Trail determined as a result of refined preliminary design;*
- *To update the aviation activity forecast with modified fleet plans that have occurred since the January 2018 Draft EA forecast, which was completed in 2016 (Refer to* ***Appendix C, Aviation Activity Forecast,*** *Attachment 2 for the Updated BWI ALP Phase I Improvements EA Aviation Activity Forecast);*
- *To update the existing conditions to 2018 (previously 2016), incorporating an updated aviation activity forecast which includes the Midfield Cargo Facility project (environmentally approved by the FAA October 23, 2018) as part of the baseline;*
- *To address cumulative impacts related to additional projects that have been environmentally approved by the FAA since the Draft EA publication (Refer to* ***Appendix E, BWI Marshall Airport Planning Documentation****, Attachments 5 and 6 for the 2017 and 2018 approved NEPA documents); and*
- *To include updated project plans and preliminary design, including updates to limits of disturbance related to planning that has continued since the Draft EA publication.*

Finally, the construction of the projects evaluated in the January 2018 Draft EA has been delayed and therefore completion of these projects is now expected in 2022. Consequently, a shift in the years of analysis from 2020 and 2025 to 2022 and 2027 is also warranted. MDOT MAA acknowledges the COVID-19 pandemic has impacted aviation activity. The ultimate effect of this pandemic is unknown at the writing of this document. To complete this environmental review MDOT MAA is moving forward with the Aviation Activity Forecast approved for this EA and Section 4(f) Determination.

1.1 Background

BWI Marshall Airport is a large hub primary commercial service airport as defined in the FAA's National Plan of Integrated Airport Systems (NPIAS), meaning that it enplanes a minimum of one percent of the total United States (US) enplanements annually. Dedicated in 1950 as Friendship International Airport, BWI Marshall Airport has been owned and operated by the State of Maryland since 1972.

BWI Marshall Airport is located approximately 10 miles southwest of Baltimore, Maryland (MD) and 27 miles northeast of the District of Columbia (Washington, D.C.), as shown in **Figure 1.1-1**. The Airport consists of approximately 3,600 acres in the northwest portion of Anne Arundel County, MD. The main Airport campus, containing the runways, terminal complex, and landside/support



LEGEND

- Interstate
- Highway / Major Road
- Park / Wilderness Area / Recreation Area
- State Boundary
- County Boundary

Location Map
Figure 1.1-1

N

0 5 10 20 Miles

Source: ESRI

facilities (approximately 3,200 acres), is bordered on the west, north, and east by Aviation Boulevard (MD 170/MD 162) and by Dorsey Road (MD 176) on the south. Interstate 195 (I-195) provides access to the passenger terminal. Approximately 400 acres of airport property is located to the north, west, south, and southeast of the main Airport campus. Defense contractor Northrop Grumman is located adjacent to the northwest of the Airport campus and accesses the airfield via a secured gate and Taxilane W.

1.1.1 Existing Airport Facilities

BWI Marshall Airport includes airfield, passenger terminal, landside, air cargo, general aviation, and support facilities. Each of these components are described in more detail in the following subsections.

1.1.1.1 Airfield Facilities

Airfield facilities include those areas that accommodate the movement of aircraft, such as runways, taxiways, aprons, deicing facilities, and helipads. The general airfield layout of BWI Marshall Airport is illustrated on **Figure 1.1-2**.

Runways

There are two parallel runways (Runway 15R-33L and Runway 15L-33R) and one crosswind runway (Runway 10-28). The runway dimensions and details, including the Runway Design Code (RDC) are included in **Table 1.1.1**. The RDC is used to determine appropriate FAA design standards.[1] The components of the RDC are the Aircraft Approach Category (AAC) and the Airplane Design Group (ADG). The AAC is determined by the design aircraft approach speed and the ADG is based on the wing span or tail height of the largest, referred to as 'design', aircraft expected to operate on the runway and accompanying taxiways.

Table 1.1.1
Runway Details

Runway	Dimensions	RDC
15R-33L	9,500'x150'	D-V-1,200
10-28	10,502'x150'	D-V-600
15L-33R	5,000'x100'	B-III-4,000

The design aircraft for Runways 15R-33L and 10-28, the Boeing 777-200, is categorized as a D-V aircraft. D-V aircraft have an approach speed between 141 knots and 166 knots, a tail height between 60 feet and 65 feet, and wingspan between 171 feet and 213 feet. While FAA design standards are based on the design aircraft, BWI Marshall Airport should be designed to meet ADG V standards.

The design aircraft for Runway 15L-33R is the De Havilland Dash 8. Runway 15L-33R is classified as a B-III runway and is typically used by general aviation aircraft. B-III aircraft have an approach speed of between 91 knots and 120 knots, and either a tail height between 30 feet and 44 feet or a wingspan of between 79 feet and 117 feet.

The last component of the RDC relates to visibility minimums. The visibility minimum in this application is the minimum horizontal distance the pilot must be able to see in order to distinguish the runway and associated lighting.[2] The minimum visibility is expressed in Runway Visual Range (RVR), which is an instrumentally derived value that represents the horizontal distance in feet that the approaching pilot will see down the runway.[3] A RVR of 5,000 is approximately equivalent to a visibility of one mile.

LEGEND

Airport Property Boundary

Airfield Facilities
Figure 1.1-2

N

0 375 750 1,500 Feet

Source: Aerial - MDOT MAA (2018)

Taxiways

Taxiway and taxilane width and fillet standards are determined by the Taxiway Design Group (TDG). TDG is based on the undercarriage dimensions of an aircraft, and is also sometimes used to determine runway to taxiway and taxiway/taxilane separation standards.

The majority of the taxiways for the primary air carrier. Runways 10-28 and 15R-33L are designed to meet ADG V and TDG 6 design standards. However, there are a few that do not meet ADG V criteria, including:

- Taxiway A (ADG IV/TDG 5)
- Taxiway T adjacent to Concourse A (ADG IV/TDG 6)
- Taxiway S, portion that serves air cargo (ADG V/TDG 5)
- Taxilane W (ADG II/TDG 2)

Each runway is accompanied by a parallel taxiway system that serves a majority or the full-length of each runway, as well as connector and stub taxiways, as needed.

The majority of the taxiways for the General Aviation (GA) Runway (15L-33R) were designed to meet the former ADG III requirements. The 50-foot width of the taxiways all meet new TDG 3 requirements. However, none of the fillets on the connectors meet the current FAA design standards for taxiway edge geometry. Runway 15L-33R is accompanied by a parallel taxiway system on each side that serves the full-length of the runway, as well as connector and stub taxiways.

Navigational Aids

A number of navigational aids (NAVAIDs) assist pilots in operating aircraft at BWI Marshall Airport. The locations of the existing NAVAIDs relevant to this EA and Section 4(f) Determination are illustrated in **Figure 1.1-3** and described in the following paragraphs.

All runways are equipped with an Instrument Landing System (ILS) that allows for precision approaches to the Airport. Instrument Landing Systems are categorized depending on their accuracy. A Category I ILS includes approach lighting, a localizer (horizontal guidance), a glide slope (vertical guidance), and a middle and outer marker (distance from the runway) while a Category III ILS includes the Category I components, and also provides vertical guidance to and along the runway surface. The category of a given runway is assigned to each runway end. All runway ends include a Category I ILS with the Runway 10 end also being equipped with a Category II ILS. The Runway 33L end is also equipped with a Special Authorization (S.A.) Category II ILS.

Aircraft movement at BWI Marshall Airport is monitored by the Airport Surveillance Radar (ASR) located in the northwest quadrant of the Airport. The radar aids air traffic controllers in directing traffic.

Approach capabilities are provided and supported by the Very High Frequency Omnidirectional Range with Tactical Air Navigation (VORTAC) and Distance Measuring Equipment (DME). The VORTAC is located on the airfield southeast of the Runway 10-28 and Runway 15R-33L intersection and is used for terminal en route navigation purposes. The VORTAC is equipped with a DME that allows the pilots to determine their distance to or from the VORTAC when in the air.

TERMINOLOGY LEGEND
ALSF - Approach Lighting System with Sequenced Flashing Lights
ASR - Airport Surveillance Radar
GS - Glide Slope
LOC - Localizer
MALS - Medium Intensity Approach Light System
MALSR - Medium Intensity Approach Light System - Including R/W Alignment Indicator Lights
PAPI - Precision Approach Path Indicator
WSK - Wind Sock
RVR - Runway Visual Range

Hanover
Baltimore-Washington Pkwy
New Ridge Rd
Aviation Blvd
195
97
Glen Burnie
LOC
DME
MALSR
WSK
RVR
REIL
GS
PAPI
ASR
ALSF-II
ASOS
VORTAC
WALSR

LEGEND
Navigational Aid
Airport Property Boundary

Existing Navigational Aids
Figure 1.1-3

N
0 1,000 2,000 4,000 Feet

Source: Aerial - MDOT MAA (2018)

1.1.1.2 Passenger Terminal Facilities

The passenger terminal is made up of the main terminal building, concourses, aircraft gates, and adjacent aircraft parking apron pavement. The main terminal building houses administrative offices and the Airport Traffic Control Tower (ATCT). There are four domestic concourses (A, B, C, and D), a commuter concourse, and an international concourse (E). The terminal has 71 full aircraft gates and four additional arrival only gates spread throughout the concourses.

1.1.1.3 Landside Facilities

Landside facilities include vehicle parking and access roads. Vehicle parking is provided in multiple locations including several satellite surface parking lots as well as a daily garage and an hourly garage that are located adjacent to the terminal. Primary vehicular access to BWI Marshall Airport is provided via I-95, I-695, and I-195 from the north, northwest, and northeast, respectively, while access from the west and south is provided via the Baltimore/Washington Parkway (MD 295), Route 100, and I-97.

1.1.1.4 Air Cargo Facilities

The air cargo facilities at BWI Marshall Airport are located in three primary areas: North Cargo Complex; Elm Road Cargo Complex; and the Midfield Cargo Facility. The North and Elm Road Cargo Complexes are located adjacent to one another north of the terminal building, south of Aviation Boulevard, and along Elm Road. The Midfield Cargo Facility is located south of Runway 10-28 and west of Runway 15R-33L, along Mathison Way. Cumulatively the cargo complexes include approximately 140 acres, inclusive of the 2018 Midfield Cargo Facility project.

1.1.1.5 General Aviation Facilities

The GA facilities at BWI Marshall Airport are located in the northeast quadrant of the Airport. The GA facilities include an executive terminal, storage hangars, automobile parking, and aircraft parking apron. A single Fixed Base Operator (FBO), Signature Flight Support, operates at BWI Marshall Airport. The services provided by the FBO include flight instruction, aircraft rental, maintenance, and storage as well as fueling services.

1.1.1.6 Support Facilities

Support facilities at BWI Marshall Airport include airline / aircraft support facilities and MDOT MAA support facilities. The airline / aircraft support facilities include ground support equipment (GSE), aircraft deicing, aircraft fueling and fuel storage, and flight kitchens. The MDOT MAA support functions include aircraft rescue and firefighting (ARFF), Airport maintenance, Airport police and security, and bus maintenance. These functions are a necessary part of operating the Airport on a day-to-day basis. The BWI Marshall Airport Fire & Rescue Department provides firefighting and rescue services for aircraft and the Airport area. Additional services are also provided to surrounding counties through a mutual aid agreement.

1.1.2 Airport Layout Plan

An Airport Layout Plan (ALP) documents the existing airport facilities and shows proposed future airport development. The ALP is prepared by the airport sponsor and submitted to the FAA for review and approval.

The FAA conditionally approved the ALP for BWI Marshall Airport in April 2015. The ALP

identifies multiple phases of improvements needed at BWI Marshall Airport to comply with FAA design standards and meet projected demand (see *Appendix E, Attachment 1* for the FAA Conditionally Approved ALP). Phase 1 represents the near-term improvements needed over the next approximate five-year timeframe. Subsequent phases represent the longer-term vision of the facilities, are less well defined, and will require future evaluation and refinement as future activity levels warrant. They will also be subject to separate environmental approvals prior to any implementation.

All proposed improvements under consideration in this EA and Section 4(f) Determination are collectively identified as the Phase 1 Improvements on the BWI Marshall Airport ALP. *Chapter 3, Alternatives*, details various project alternatives and the process completed to vet alternatives to arrive at the Proposed Action. The 2015 ALP was revised to reflect the Proposed Action and was submitted to FAA for review in Fall 2019.

1.2 Proposed Action

The Proposed Action consists of the following projects as shown on **Figures 1.2-1, 1.2-2, and 1.2-3**. The components of the Proposed Action include the following, as defined by need:

Meet FAA Design Standards

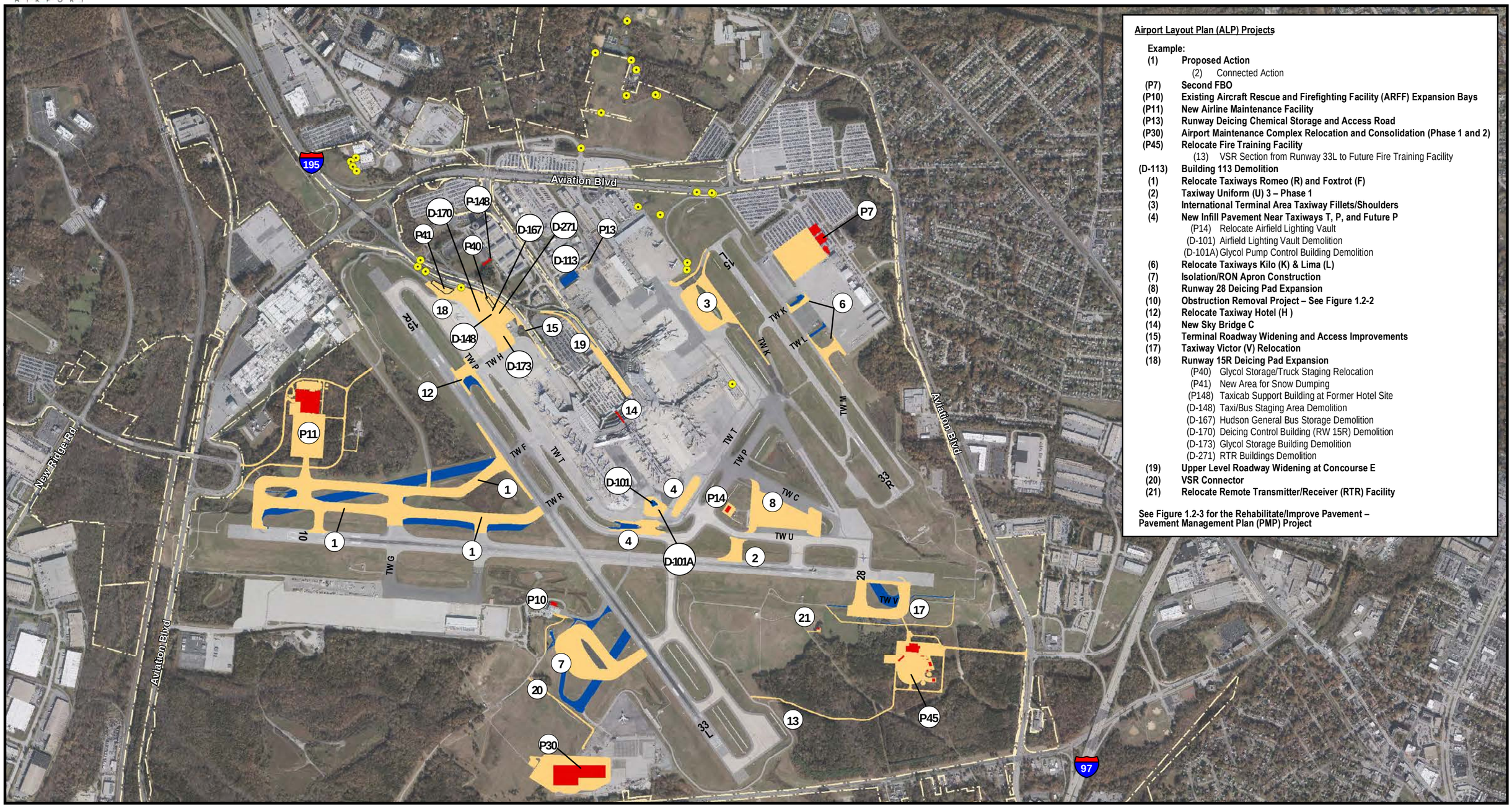
- Improve taxiway fillets/shoulders in the International Terminal Area; [3]
- Construct new infill pavement near Taxiways T, P and 'Future P' (Runway 4-22 has been converted to Taxiway P but was previously referred to as Future P) [4];
- Relocate Taxiway K and Re-establish Taxiway L [6];
- Relocate Taxiways R and F [1];
- Relocate Taxiway V [17];
- Expand Runway 28 Deicing Pad [8]; and
- Remove Part 77 Obstructions: for on-airport property clear the primary, approach (50:1) and transition surfaces; for off-airport properties clear to the threshold siting surface (34:1) (see Figure 1.2-2) [10]; and
- Clear trees in the VORTAC critical area to a 1,200-foot radius.

Enhance Airfield Safety and Efficiency

- Construct Taxiway U3 [2];
- Relocate Taxiway H [12];
- Construct Isolation/ Remain Overnight (RON) Apron [7];
- Construct vehicle service roadway (VSR) connector south of the former Runway 4 end [20];
- Expand existing ARFF indoor parking [P10];
- Relocate fire training facility [P45];
- Rehabilitate/improve pavement in accordance with the latest Pavement Management Plan (see Figure 1.2-3); and
- Relocate the remote transmitter/receiver (RTR) facility [21].

Accommodate Existing and Anticipated Passenger Demand

- Expand Runway 15R Deicing Pad [18];
- Construct Second FBO [P7];



Airport Layout Plan (ALP) Projects

Example:
- **(1) Proposed Action**
  - (2) Connected Action
- **(P7) Second FBO**
- **(P10) Existing Aircraft Rescue and Firefighting Facility (ARFF) Expansion Bays**
- **(P11) New Airline Maintenance Facility**
- **(P13) Runway Deicing Chemical Storage and Access Road**
- **(P30) Airport Maintenance Complex Relocation and Consolidation (Phase 1 and 2)**
- **(P45) Relocate Fire Training Facility**
  - (13) VSR Section from Runway 33L to Future Fire Training Facility
- **(D-113) Building 113 Demolition**
- **(1) Relocate Taxiways Romeo (R) and Foxtrot (F)**
- **(2) Taxiway Uniform (U) 3 – Phase 1**
- **(3) International Terminal Area Taxiway Fillets/Shoulders**
- **(4) New Infill Pavement Near Taxiways T, P, and Future P**
  - (P14) Relocate Airfield Lighting Vault
  - (D-101) Airfield Lighting Vault Demolition
  - (D-101A) Glycol Pump Control Building Demolition
- **(6) Relocate Taxiways Kilo (K) & Lima (L)**
- **(7) Isolation/RON Apron Construction**
- **(8) Runway 28 Deicing Pad Expansion**
- **(10) Obstruction Removal Project – See Figure 1.2-2**
- **(12) Relocate Taxiway Hotel (H)**
- **(14) New Sky Bridge C**
- **(15) Terminal Roadway Widening and Access Improvements**
- **(17) Taxiway Victor (V) Relocation**
- **(18) Runway 15R Deicing Pad Expansion**
  - (P40) Glycol Storage/Truck Staging Relocation
  - (P41) New Area for Snow Dumping
  - (P148) Taxicab Support Building at Former Hotel Site
  - (D-148) Taxi/Bus Staging Area Demolition
  - (D-167) Hudson General Bus Storage Demolition
  - (D-170) Deicing Control Building (RW 15R) Demolition
  - (D-173) Glycol Storage Building Demolition
  - (D-271) RTR Buildings Demolition
- **(19) Upper Level Roadway Widening at Concourse E**
- **(20) VSR Connector**
- **(21) Relocate Remote Transmitter/Receiver (RTR) Facility**

See Figure 1.2-3 for the Rehabilitate/Improve Pavement – Pavement Management Plan (PMP) Project

LEGEND

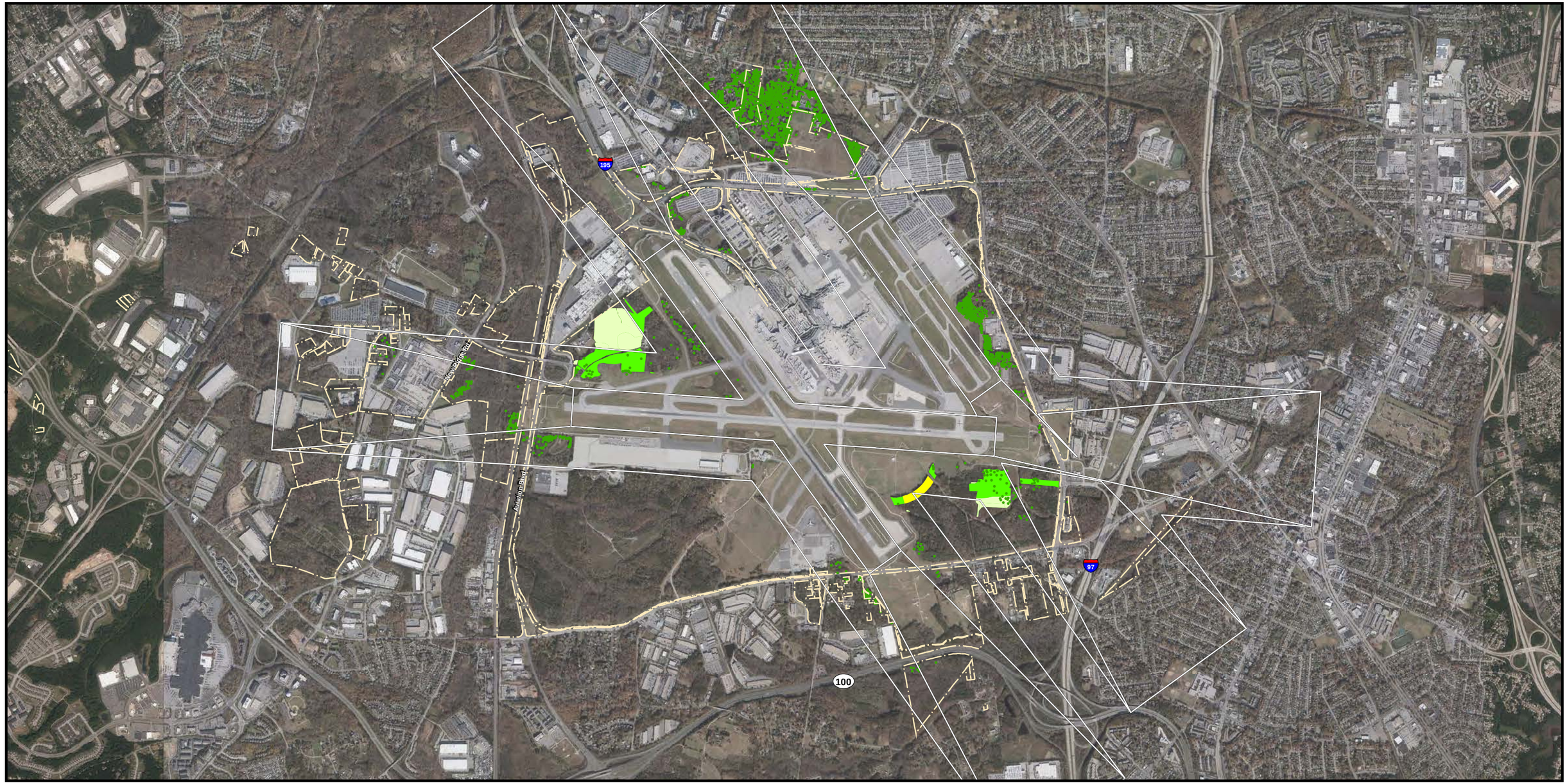
- Airport Property Boundary
- Pavement Improvements
- Proposed Structures
- Demolition
- Pole/Sign/Obstruction Light (To Be Relocated or Removed)

Proposed Action
Figure 1.2-1

N

0 750 1,500 3,000 Feet

Source: Aerial - MDOT MAA (2018)



LEGEND

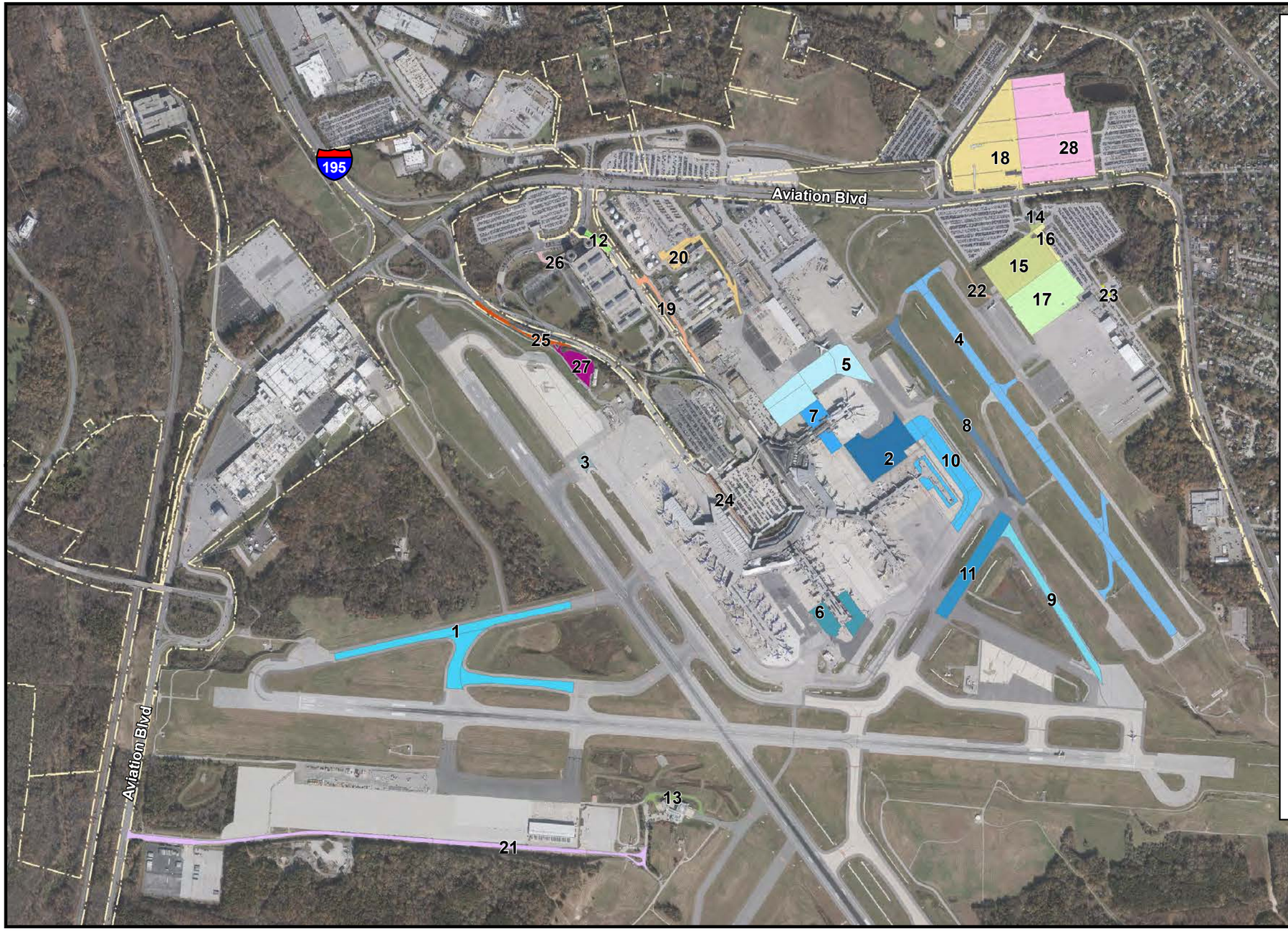
- Airport Property Boundary
- Part 77 (Primary, Approach and Transitional Surface Limits)
- Tree Obstruction Removal (2014 FMP Part 77 Conflict Areas)
- Tree Removal for Phase I Improvements
- Obstruction Removal (2015 ALP Obstruction Points)
- Tree Removal for VORTAC Critical Area

Proposed Action - Vegetation
Figure 1.2-2

N

0 1,250 2,500 5,000 Feet

Source: Aerial - MDOT MAA (2018)



Recommended 10-Year CIP Projects

Airside

1 Taxiways F, G and R Mill and Overlay (17-01)
2 Ramp DE & Taxilanes N & N1 Mill and Overlay (17-02)
3 Taxiway H Mill and Overlay (18-03)
4 RW 15L & Associated Taxiways Mill and Overlay (19-01)
5 Taxilane AA & Ramp E Mill and Overlay (19-02)
6 Gate C PCC Restoration & Reconstruction (20-02)
7 Gate E PCC Restoration (20-03)
8 Taxiways S and J Overlay (20-04)
9 Taxiway B Mill and Overlay (21-01)
10 Ramp DY Mill and Overlay (21-02)
11 Taxiway P Mill and Overlay (21-03)

Landside

12 Elm Road (At Terminal Road) Mill and Overlay (17-01)
13 ARFF Road Reconstruction (17-02)
14 Long-Term B Parking 02A (Booths to Main Lot) Mill and Overlay (18-01)
15 Long-Term B Parking 05 (Northwest Section) Reconstruction (18-02)
16 Long-Term B Parking 06A (Entrance Aisle to Main Lot) Reconstruction (18-03)
17 Long-Term B Parking 07 (Southeast Section) Mill and Overlay (18-04)
18 Long-Term A Parking 01 (West Section) Mill and Overlay (19-01)
19 Cargo Service Road Mill and Overlay (19-02)
20 Fuel Farm Road and Park Mill and Overlay (19-03)
21 Mathison Way Mill and Overlay (19-04)
22 Burma Road (RW 15L Hold Pad to GA Apron) Reconstruction (20-01)
23 Compressed Natural Gas (CNG) Facility Pavement Reconstruction (20-02)
24 Arrivals (Hourly Garage to Pedestrian Bridge #2) and Departures (Executive Managers Lot to Elm Road_ Roadway Mill and Overlay (20-03)
25 I-195 Inbound (Aviation Blvd On-Ramp to Taxi Lot and Adjacent to Employee Lot) Mill and Overlay (20-04)
26 Sheraton Parking Mill and Overlay (20-05)
27 Taxi Lot Pavement Mill and Overlay (20-06)
28 Long Term A Parking 02 (Center Section) Mill and Overlay (21-01)

LEGEND

Airport Property Boundary

Proposed Action – Rehabilitate/Improve Pavement – Pavement Management Plan (PMP)
Figure 1.2-3

N

0 600 1,200 2,400 Feet

Source: Aerial - MDOT MAA (2018)

- Construct new airline maintenance facility [P11];
- Increase runway deicing chemical storage and construct access road [P13];
- Building 113 Demolition [D-113]; and
- Relocate and consolidate airport maintenance complex [P30].

Improve Customer Service

- Construct new Sky Bridge C [14];
- Widen terminal roadway [15]; and
- Widen upper level roadway at Concourse E [19].

Connected Actions

Connected actions are those which are closely related to the proposed action and will not occur unless the proposed action occurs. Many connected actions, including ALP identified actions and additional actions, are required to implement the various components of the Proposed Action. **Table 1.2.1** lists the anticipated connected actions by project component.

1.3 Requested Federal Actions

This EA and Section 4(f) Determination, which was prepared for the FAA by MDOT 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 1050.1F.

This EA and Section 4(f) Determination 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 ALP Phase 1 Improvements of the current ALP, and approval of use of Federal funds for these projects at BWI Marshall Airport, as applicable.

The specific requested federal actions associated with the preparation and submission of this EA and Section 4(f) Determination by MDOT MAA include:

- FAA unconditional approval of the Proposed Action, identified as the Sponsor's Preferred Alternative, pursuant to 49 USC 40103(b) and 47107(a)(16). The FAA's approval includes a determination that the EA and Section 4(f) Determination satisfies the applicable environmental statutes and regulations, including those identified in FAA Orders 1050.1F and 5050.4B.
- Funding in the form of an Airport Improvement Program (AIP) grant. Environmental approval would allow MDOT MAA to establish eligibility for funding through the Federal AIP funds for eligible airport development, assuming the independent program requirements are met (49 U.S.C. Section 47101 et seq.).

Based on the environmental findings in this EA and Section 4(f) Determination, the FAA will either issue a Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS) or prepare a Finding of No Significant Impact (FONSI) that will support and explain the decision on the Proposed Action. Should the FAA issue a FONSI, Federal financial participation for the design and construction of the Proposed Action would then be requested.

Table 1.2.1

Connected Actions

Project Name	Anticipated Connected Actions[1]
(P11) New Airline Maintenance Facility	• Provide perimeter roadway in the northwest quadrant of the Airport
(P45) Relocate Fire Training Facility	• (13) Provide VSR from Runway 33L to the relocated training facility • Provide VSR from the relocated training facility to Runway 28 • Provide VSR from the relocated training facility to Aviation Boulevard • Construct new MDOT MAA training facilities, including a fire training area and classroom building
(1) Relocate Taxiways F and R	• Rebuild portions of Taxiways G and R1 to connect Runway 10-28 to the relocated Taxiway R • Build Taxiway R2 to provide additional connection between Runway 10-28 and proposed Taxiway R • Build Taxiway F1 to provide additional connection between new Taxiway R and relocated Taxiway F • Relocate FAA Equipment Shelters for the High Intensity Approach Lighting System with Sequenced Flashing Lights (ALSF-2), its associated infrastructure, and co-located FAA facilities outside of the Runway and Taxiway Object Free Areas (ROFA and TOFA)
(4) New Infill Pavement Near Taxiways P, 'Future P', and T	• Rebuild Taxiway E 300 feet to the east • Reposition VSR • (D-101) Demolish and (P14) relocate existing Airfield Lighting Vault (ALV) • (D-101A) Demolish and relocate Glycol Pump Control Building • Provide new infrastructure from the Airport Traffic Control Tower (ATCT) for software upgrades
(7) Isolation / RON Apron Construction	• Reconfigure ARFF access road around the apron area • Install blast fence
(8) Runway 28 Deicing Pad Expansion	• Relocate blending station and glycol storage tank
(12) Relocate Taxiway H	• Demolish existing Taxiway H exit pavement • Re-designate Taxiway H segment adjacent to Runway 15R deicing pad pavement

Table 1.2.1

Connected Actions

Project Name	Anticipated Connected Actions[1]
(18) Runway 15R Deicing Pad Expansion	• (P40) Relocate Glycol Storage/Truck Staging, including (D-173) demolition of the existing building • (P41) Provide new area for snow dumping • (P148) Provide Taxicab Support Building at Former Hotel Site, including taxi / bus staging area • (D-167) Demolish Hudson General Bus Storage and (D-148) demolish existing taxi/bus staging area. • Relocate Airport Surface Detection Equipment, Model X (ASDE-X) • Relocate Gate A1 • (D-271) Remove FAA Remote Transmitter/Receiver (RTR) facility and demolish existing buildings (RTR facility to be relocated to optimize RTR signal as part of the Proposed Action) • (D-170) Demolish deicing control building

Note: [1] Anticipated Connected Actions include those specifically identified on the 2019 ALP (ALP project number provided), as well as additional actions required to implement the Proposed Action projects.

Endnotes

[1] FAA, Advisory Circular (AC) 150/5300-13A, Change 1, *Airport Design*, 2/26/14, p. 13.

[2] FAA, AC 150/5300-13A, Change 1, *Airport Design*, 2/26/14, p. 35.

[3] FAA, AC 97-1A, *Runway Visual Range (RVR)*, 9/28/77, p. 1.

Chapter 2: PURPOSE AND NEED

Defining the Purpose and Need is essential in providing a sound justification for the Proposed Action. In addition, the Purpose and Need is used as the primary foundation to develop reasonable alternatives to the Proposed Action.

2.1 Project Purpose and Need

This section provides a description of the purpose and need for the Proposed Action.

2.1.1 Purpose

The purpose of implementing the Proposed Action is to meet various FAA design standards, enhance airfield safety and efficiency, accommodate existing and anticipated passenger demand, and improve customer service at BWI Marshall Airport.

2.1.2 Need

The 2011 *Baltimore / Washington International Thurgood Marshall Airport Master Plan* developed projections of activity levels for both aircraft operations and passengers that would use the airport and associated those levels with the need for additional facilities to maintain efficient and safe operations while achieving a quality level of service. Within the Master Plan, the timing for commercial (passenger and cargo) and non-commercial (general aviation and military) improvements is tied to specific activity levels. The Proposed Action includes those improvements required to accommodate the projected activity levels through 2022. These activity levels are forecasted based on historical growth at the Airport.

MDOT MAA recognizes that the unprecedented impacts of the COVID-19 pandemic will affect near-term activity levels at BWI Marshall Airport. The majority of improvements under review in this EA and Section 4(f) Determination are not connected to activity level but are needed to meet FAA standards and to enhance airfield safety and efficiency. The improvements that are included to address existing and anticipated passenger demand, serve to enhance the Airport's level of service to the public. If demand for a project is not realized, when funding becomes available, the project would not be built.

The specific needs for the Proposed Action are discussed in the following sections. After each description the number associated with each improvement on Figure 1.2-1 is identified to allow the reader to easily connect the description to the figure.

2.1.2.1 Meet FAA Design Standards

Improvements are needed because certain aspects of BWI Marshall Airport do not meet FAA design standards as defined in Advisory Circular (AC) 150/5300-13A, Change 1, *Airport Design*. Furthermore, objects on and off airport property penetrate the imaginary surfaces defined in CFR Title 14 Part 77- *Safe, Efficient Use, and Preservation of the Navigable Airspace* (Part 77). The following information defines these standards and the associated deficiencies at BWI Marshall Airport.

Runway to Taxiway Separation and Taxiway Fillets and Shoulders Design Standards

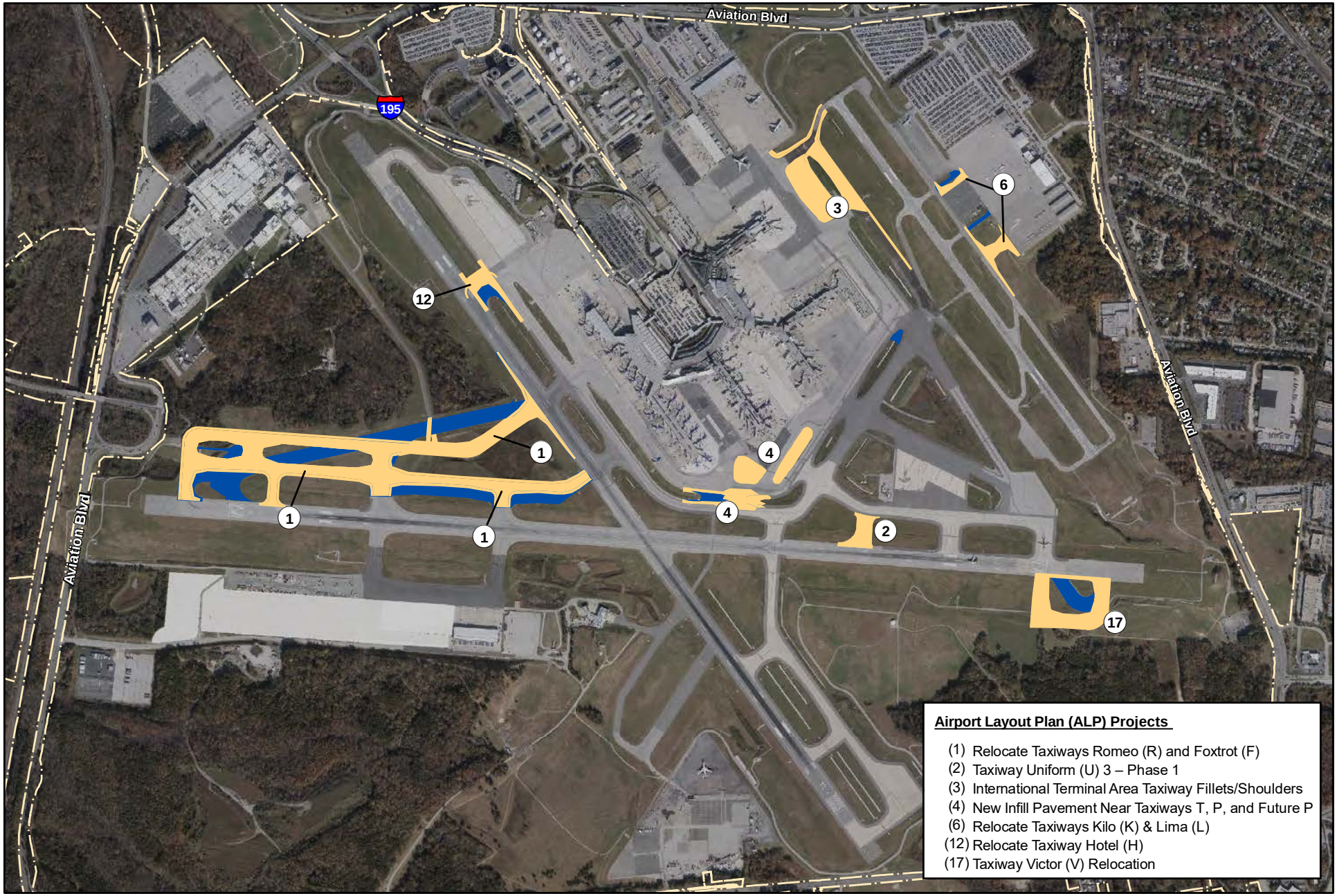
The FAA airport design standards require certain separation distances between airfield elements, such as runways and taxiways, to accommodate the safe movement of aircraft using the airfield. Modifications to existing runway-to-taxiway separation, and taxiway fillets and shoulders are needed at BWI Marshall Airport in several airfield locations to meet FAA AC 150/5300-13A, Change 1, *Airport Design*, standards. The specific needs as illustrated in **Figure 2.1-1** include: International Terminal area taxiway fillets and shoulders need to be updated to accommodate the larger aircraft that use Concourse E [3]; new infill pavement is needed near Taxiways T, P and 'Future P' to provide 35' wide standard ADG V and TDG 6 taxiway shoulders (current taxiways have either no taxiway shoulders or sub-standard 25' shoulders), and to accommodate a new VSR [4]; and portions of Taxiways K and L need to be relocated and re-established, respectively, to prevent direct access from the general aviation apron to Runway 15L-33R, reducing the likelihood of runway incursions [6]. 'Future P' refers to the segments of former Runway 4-22 that were converted to a taxiway (Taxiway P).

Improvements to pavement near Taxiways T, P and 'Future P' will require some demolition of existing building and equipment. Specifically, the current airfield lighting vault (ALV) causes a conflict for aircraft circulation on and around the terminal ramp to and from the Concourse B-C apron [P14]. In the current location, TDG 6 aircraft cannot taxi past the ALV on the ramp and the area is not under ATCT control.

Taxiway R is parallel to Runway 10-28 and currently separated by 400'. Taxiway R needs to be reconstructed to a separation of 502' from Runway 10-28 (500' standard separation plus a 2' elevation adjustment) to meet FAA design standards for a TDG 6 taxiway adjacent to an ADG V runway having a Category II/III approach. With the shifting of Taxiway R, Taxiway F and accompanying connector taxiways need to be realigned as part of a dual parallel taxiway system for Runway 10-28 [1]. Taxiway F is not currently parallel to Taxiway R and would be reconstructed at a separation of 350' from the new Taxiway R to exceed the minimum standard taxiway-to-taxiway separation of 312' for a TDG 6 taxiway. Additionally, the current intersection of Taxiway F with Runway 15R-33L is not at a standard 90-degree angle and must be adjusted to meet this requirement. The new configuration of dual parallel Taxiways F and R will reconfigure this intersection to meet the 90-degree angle taxiway entrance standard. Lastly, Taxiway V needs to be demolished and relocated further from Runway 10-28 to meet the FAA design standard of 502' for runway/taxiway separation [17].

Runway 28 Deicing Facility

The Runway 28 deicing pad does not meet current FAA design standards in AC 150/5300-14C, *Design of Aircraft Deicing Facilities*. The current separation between taxiway centerlines within the existing deicing pad is between 150' and 165', and the FAA standard taxiway-to-taxiway separation for ADG V taxiways is 267'. To provide the appropriate aircraft separation on the deicing pad while maintaining the current capacity and number of parking spots, the deicing pad needs to be expanded. The deicing pad cannot be reconfigured to meet current



LEGEND

- Airport Property Boundary
- Pavement Improvements
- Demolition

Taxiway Relocations and Improvements
Figure 2.1-1

N

0 370 740 1,480 Feet

Source: Aerial - MDOT MAA (2018)

design standards and maintain its current capacity within the existing footprint [8].

14 CFR Part 77 – Penetrations to Navigable Airspace

Part 77 defines the standards used to determine if an object is an obstruction to air navigation. Any object that exceeds the height of the Part 77 defined imaginary surfaces is considered an obstruction. Objects that are determined to be obstructions are presumed to be hazards to air navigation unless further aeronautical study concludes that the objects are not a hazard.

A variety of imaginary surfaces are defined in Part 77 based on the type of airport. The Part 77 primary, transitional and approach surfaces are relevant to this EA and Section 4(f) Determination because objects penetrate these surfaces at BWI Marshall Airport. Figure 1.2-1 shows the non-vegetative obstructions (poles, signs, and/or obstruction lights) to be relocated or removed while Figure 1.2-2 illustrates the Part 77 primary, approach and transitional surfaces as well as the associated vegetative obstructions. The following paragraphs describe these surfaces and related obstructions that need to be addressed through removal [10].

Part 77 – Primary Surface

At BWI Marshall Airport, the primary surface extends 200 feet beyond each runway end and has a width of 500 feet on either side of the runway centerline. "The elevation of any point on the primary surface is the same as the elevation of the nearest point on the runway centerline."[1] Obstructions to the primary surface for Runways 15R-33L and 15L-33R include vegetation and man-made obstructions, including NAVAIDs. There are no primary surface obstructions to Runway 10-28.

Part 77 – Approach Surface

The approach surface dimensions relate to the type of aircraft approach procedure available as well as the runway category. The approach surface is centered on the extended centerline of the runway, beginning at the end of the primary surface and extending to a width determined by the runway category and available approach procedures. There are approach surface obstructions to all three runways. There are vegetation obstructions to all six runway approaches as well as man-made obstructions in the approaches to the Runway 28, 15R, and 15L ends.

Part 77 – Transitional Surface

The transitional surface is a surface that extends outward and upward from the sides of the primary surface and the approach surfaces upwards at a slope of 7 to 1. Each of the three runways has vegetative obstructions to the transitional surface while Runways 15R-33L and 15L-33R also have man-made obstructions to their transitional surfaces.

VORTAC Critical Area

To eliminate restrictions on the BAL VORTAC at BWI Marshall Airport, the 1,000-foot critical area radius around the VORTAC must be increased to 1,200 feet. The VORTAC is located south of Runway 10-28 and east of Runway 15R-33L, 750 feet from the Runway 28 glide slope.

New restrictions have been placed on the BAL VORTAC due to out-of-tolerance conditions resulting from the relocation of the Runway 28 glide slope closer to the VORTAC in 2016.

In a 2016 analysis of the BAL VORTAC, it was concluded that the main sources of obstructions causing out-of-tolerance conditions on the VORTAC are from the surrounding trees and the Runway 28 glide slope. However, the newest restriction existed prior to the glide slope relocation, and therefore it was determined that the surrounding trees are the likely source of reflection.

The 1,000-foot critical area is currently cleared. However, the trees beyond the 1,000-foot critical area have grown and penetrate the two-degree vertical angle siting criteria by almost a full degree. The clearing of the VORTAC critical area to 1,200 feet is needed to eliminate the obstructions affecting the operation of the VORTAC. Allowing the obstructions to remain would continue to create interference concerns with the VORTAC signal, affecting aircraft navigation.

2.1.2.2 Enhance Airfield Safety and Efficiency

There are several projects needed to improve the safety and efficiency of airfield and airport operations.

Taxiway Relocations and Improvements

In order to meet FAA AC 150/5300-13A, *Airport Design*, design standards, relocations and improvements to several taxiways are needed to modify runway / taxiway intersections to reduce the risk of runway incursions as shown in Figure 2.1-1. A runway incursion is defined as an unintentional or unauthorized presence of an object, including aircraft, on a runway that could increase the risk for an accident. Relocations of Taxiways H and K, and re-establishment of a new Taxiway L are needed to remove direct access from the terminal and apron areas to a runway, reducing the potential for incursions [12] and [6].

Certain new taxiways and taxiway relocations are needed to reduce arrival runway occupancy times. Runway occupancy time, as it relates to arriving aircraft, is the time spent by aircraft from when an aircraft commits to landing until they exit the runway so that another aircraft can land or depart. Extended occupancy time reduces runway system efficiency. New Taxiway U3 is needed to reduce runway occupancy time related to arrivals to Runway 10 to enhance safety and allow a more efficient travel path to the terminals when the entire runway length is not needed for an arrival operation [2]. This project would not affect the number of operations within the forecast period. Relocation of Taxiway H is also needed to reduce runway occupancy time for arrivals to Runway 33L [12].

Vehicle Service Roadways

The existing roadway system lacks an efficient connection through the northwest quadrant of the Airport from the main terminal to Stoney Run Road. The perimeter roadway system associated with the New Airline Maintenance Facility is needed to make this connection.

The existing roadway system lacks an efficient connection through the southern portion of the airfield from the midfield cargo area to the Runway 33L end. A VSR south of the former Runway 4 end is needed to make this connection [20].

Pavement Management Program

BWI Marshall Airport maintains a routine Pavement Management Program (PMP) where the status and condition of all airside and landside pavements are reviewed,

tested, and improvement schedules determined. **Figure 2.1-2** shows the locations of the proposed pavement improvements. Pavement repairs are needed because the pavement has deteriorated to unacceptable levels. Should these individual failing pavements be removed or replaced as part of a separate project prior to the implementation of the PMP, the individual pavement improvement project would no longer be needed.

Fire Protection Improvements

The existing ARFF facility currently does not have sufficient office space to meet existing needs and does not have adequate area to allow for indoor parking for emergency vehicles. Due to the limited parking area for emergency response vehicles, there is often the need to double park vehicles which in-turn increases emergency response times. Two additional parking bays are needed to accommodate parking needs [P10].

A total reconstruction of the Fire Training Facility is necessary due to the extensive design standard changes that have been issued since the existing facility was constructed in 1986 [P45]. An upgrade to the facility was performed in 2006, however the current design standards (FAA AC 150/5220-17B, *Aircraft Rescue and Fire Fighting [ARFF] Training Facilities*) require a larger burn area than currently exists, resulting in the need for a complete redesign of the facility.[2] A new facility location was chosen to avoid conflicts with the future planned realignment of Mathison Way as shown on the ALP. To accommodate the relocated Fire Training Facility a new VSR will be needed from the end of Runway 33L to allow an airfield connection to the relocated facility [13]. Additionally, a new VSR from Aviation Boulevard (MD 162) to the new facility and a new VSR from Runway 28 to the new facility will be needed.

Isolation / Remain Overnight Improvements

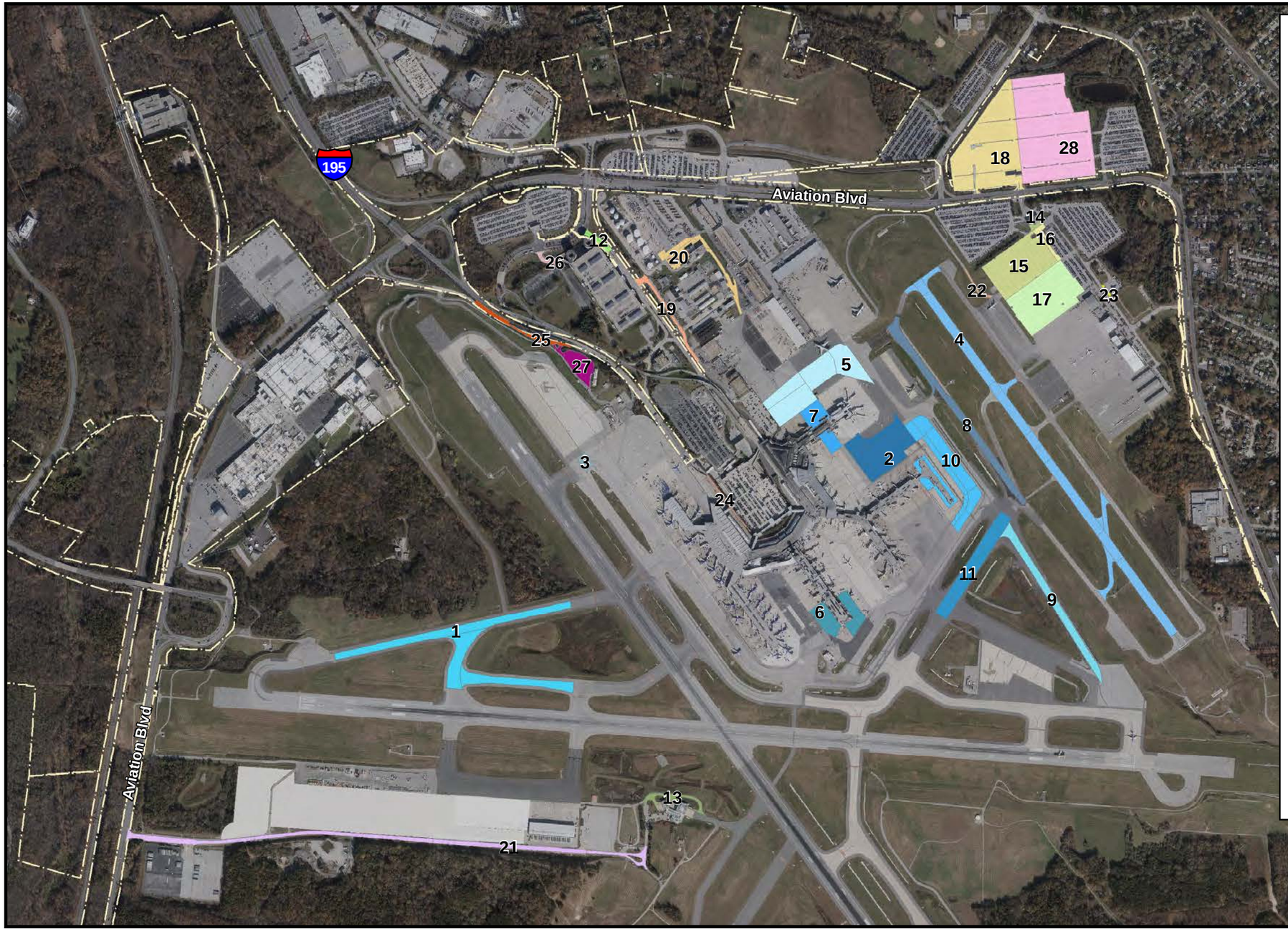
There is need for an area to isolate aircraft upon arrival to the Airport as well as an area to be used for ADG V aircraft parking that must remain overnight.

A dedicated Isolation / Remain Overnight (RON) Apron is needed for inspection and clearance of suspicious aircraft and overnight parking of these aircraft and other irregular operations [7]. It is common airport protocol to direct pilots to remote sites when arriving aircraft are suspected of being a public safety / security threat to gain clearance before being granted access to the terminal area.

According to the 2011 Master Plan, construction of various ongoing and proposed projects routinely affects the RON spots available for aircraft parking. A dedicated RON Apron is needed to avoid the need to double park aircraft during these times. Additionally, airlines have indicated the need for more aircraft parking spaces during deicing events.

Remote Transmitter/ Receiver (RTR) Improvements

The Remote Transmitter/Receiver (RTR) is part of a system, which consists of two separate installations: a remote transmitter and a remote receiver. Over time, terminal development has impacted the performance of the existing RTR at the Airport, which is located northwest of the terminal facilities, east of the Runway 15R deicing pad and south of Friendship Road.



Recommended 10-Year CIP Projects

Airside

1 Taxiways F, G and R Mill and Overlay (17-01)
2 Ramp DE & Taxilanes N & N1 Mill and Overlay (17-02)
3 Taxiway H Mill and Overlay (18-03)
4 RW 15L & Associated Taxiways Mill and Overlay (19-01)
5 Taxilane AA & Ramp E Mill and Overlay (19-02)
6 Gate C PCC Restoration & Reconstruction (20-02)
7 Gate E PCC Restoration (20-03)
8 Taxiways S and J Overlay (20-04)
9 Taxiway B Mill and Overlay (21-01)
10 Ramp DY Mill and Overlay (21-02)
11 Taxiway P Mill and Overlay (21-03)

Landside

12 Elm Road (At Terminal Road) Mill and Overlay (17-01)
13 ARFF Road Reconstruction (17-02)
14 Long-Term B Parking 02A (Booths to Main Lot) Mill and Overlay (18-01)
15 Long-Term B Parking 05 (Northwest Section) Reconstruction (18-02)
16 Long-Term B Parking 06A (Entrance Aisle to Main Lot) Reconstruction (18-03)
17 Long-Term B Parking 07 (Southeast Section) Mill and Overlay (18-04)
18 Long-Term A Parking 01 (West Section) Mill and Overlay (19-01)
19 Cargo Service Road Mill and Overlay (19-02)
20 Fuel Farm Road and Park Mill and Overlay (19-03)
21 Mathison Way Mill and Overlay (19-04)
22 Burma Road (RW 15L Hold Pad to GA Apron) Reconstruction (20-01)
23 Compressed Natural Gas (CNG) Facility Pavement Reconstruction (20-02)
24 Arrivals (Hourly Garage to Pedestrian Bridge #2) and Departures (Executive Managers Lot to Elm Road_ Roadway Mill and Overlay (20-03)
25 I-195 Inbound (Aviation Blvd On-Ramp to Taxi Lot and Adjacent to Employee Lot) Mill and Overlay (20-04)
26 Sheraton Parking Mill and Overlay (20-05)
27 Taxi Lot Pavement Mill and Overlay (20-06)
28 Long Term A Parking 02 (Center Section) Mill and Overlay (21-01)

LEGEND

Airport Property Boundary

Rehabilitate/Improve Pavement - Pavement Management Plan (PMP)
Figure 2.1-2

N

0 600 1,200 2,400 Feet

Source: Aerial - MDOT MAA (2018)

A new RTR site is needed to improve and optimize the RTR signal, as the existing RTR site at BWI Marshall Airport is susceptible to signal loss due to interference from surrounding buildings; supplementary antennae have had to be provided, and some frequencies have been moved to offsite facilities in order to mitigate previous signal loss [21]. In addition to the previously known signal issues, new development underway may further impede signal coverage to several locations on the Airport if it remains at the existing site. The proposed equipment shelter is needed for the electronics and rack equipment for the facility and storage needed at the site.

Additionally, the proposed expansion of the Runway 15R deicing pad (see Section 2.1.2.3) would result in the demolition of the existing RTR facility.

2.1.2.3 Accommodate Existing and Anticipated Passenger Demand

There are several improvements needed to address existing and anticipated airfield, terminal, general aviation, and support facility demand. These improvements are needed to allow BWI Marshall Airport to provide a quality level of service to the airlines and the traveling public in keeping with MDOT MAA's focus on customer service. Without the proposed improvements, operations would continue to grow as there are no constraints to continued growth, i.e., the airfield, general aviation, terminal, landside, and support facilities can accommodate additional operations without improvements. However, without the proposed improvements, inefficiencies would become more apparent and the airport user experience would be of lower quality.

Remain Overnight Parking Positions

The 2011 Master Plan identified a demand for 17 positions @ 25 million annual passengers (MAP), 21 positions @ 31 MAP, and 24 positions @ 37 MAP. There are currently 16 existing RON parking positions at the Airport. The Concourse A Expansion project, which is currently underway, will eliminate eight of those positions (eight remaining).

The proposed Airline Maintenance Facility will provide eight additional positions for a single airline. The Runway 15R Deicing Pad Expansion will add six additional RON positions for an Airport total of 22 RON positions. The incremental expansion of the Runway 15R Deicing Pad to provide the six additional positions will capitalize on construction economies of scale, maximize available land use, and minimize operational disruption.

While various locations around the airport were considered for additional RON parking, no other location would meet the immediate RON needs. Alternative locations considered would require substantial relocation of existing air cargo and airport support facilities. While these locations have been identified on the approved ALP for future development phases, they will not be pursued until additional demand requires their development. Additionally, FAA Airport Traffic Control has identified the Runway 15R deicing pad RON area as also being favorable for extended aircraft holds during inclement weather (e.g. thunderstorms) when operations are in easterly flow and Runway 15R is the primary departure runway.

Airfield Improvements

Runway 15R Deicing Pad [18]

The existing Runway 15R deicing pad needs to be expanded to enhance the utility of the pad, improve operations, and support simultaneous deicing, RON parking, and aircraft queuing. A glycol (deicing fluid) storage / truck staging area will need to be relocated and a new area for snow dumping constructed adjacent to the Runway 15R deicing pad expansion to support the expanded deicing operations in this area. With this improvement, the taxicab administration building and associated parking operations, and the Hudson General Bus Storage buildings will also need to be demolished and relocated. Additionally, various existing equipment, storage, and buildings need to be demolished and/or relocated to accommodate the expansion.

The Runway 15R deicing pad expansion is independent of the Runway 28 deicing pad expansion. The Runway 28 deicing pad expansion is needed to meet FAA design standards while maintaining the current capacity, and the Runway 15R deicing pad expansion is needed to accommodate existing and anticipated passenger demand.

General Aviation Facility Improvements

Additional FBO space is needed to accommodate General Aviation activities. In 2005, MDOT MAA solicited developer interest for a Second FBO at the Airport through a Request for Proposal (RFP) [P7]. MDOT MAA awarded a developer the opportunity to develop a 10-acre site north of the existing FBO. However, given the timing of award, MDOT MAA notified the firm that the Second FBO would be unavailable for development until further planning efforts and processes concluded, including environmental approval. It should also be noted that the current FBO site is nearing capacity, particularly for corporate aircraft parking. However, when MDOT MAA offered the existing operator the opportunity to expand the FBO north for additional parking, they declined.

The 2011 Master Plan identified that for general aviation facility needs, the aircraft parking apron is sufficient, but additional hangars are needed for based and transient aircraft requesting hangar space as compared to using apron tie-downs. Expansion of hangars and the accompanying GA apron to the north results in the loss of auto parking spots in the long-term parking lot. While there would be a loss of auto parking spots, there would be sufficient spots remaining to meet auto parking needs.

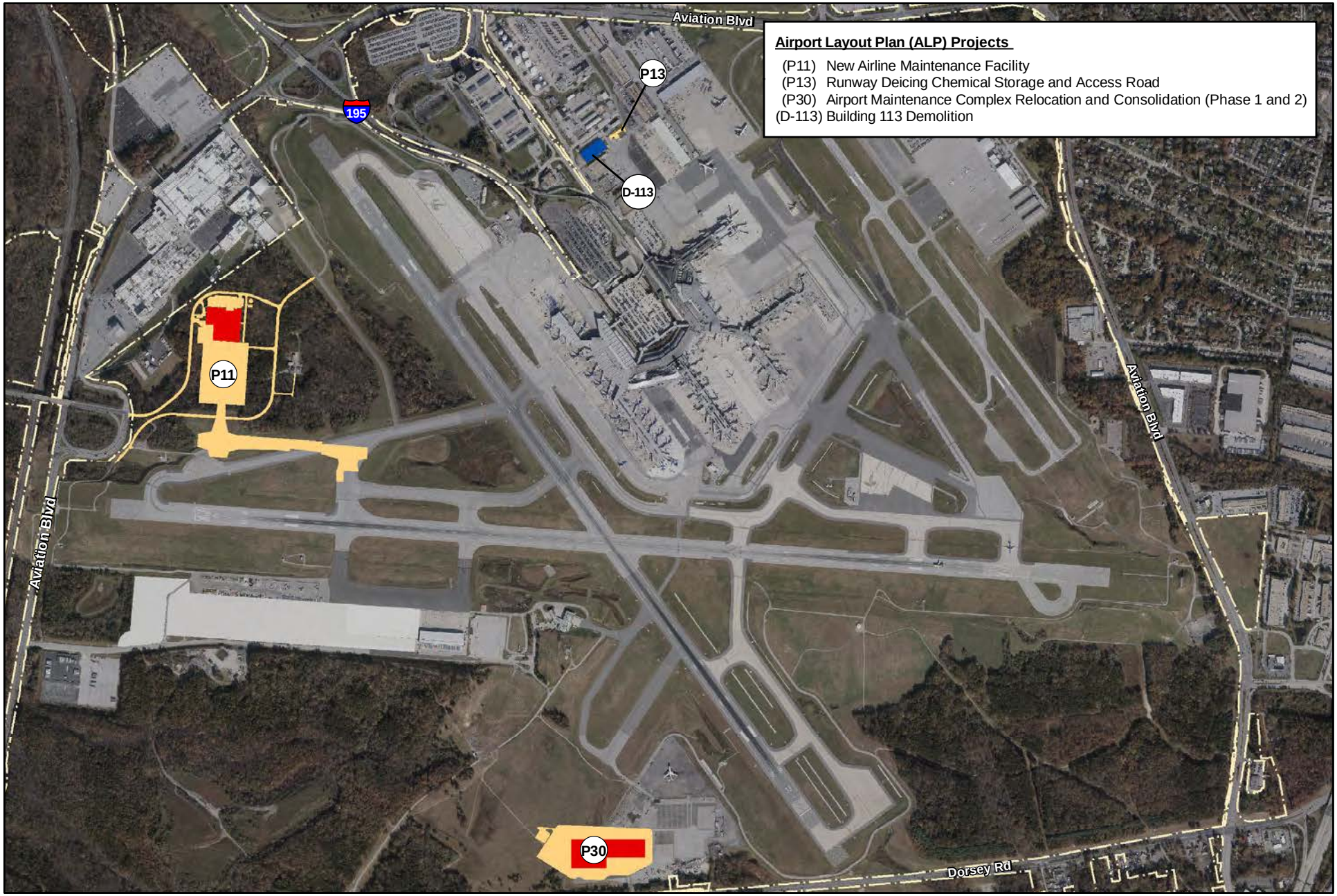
While these GA improvements would not affect anticipated GA operations during the forecast period, they would improve GA level of service by providing improved places for maintenance and protection of aircraft from the elements.

Support Facility Improvements

There are multiple support facility improvements needed as shown on **Figure 2.1-3**. The need for each of these improvements are detailed in the information that follows.

New Airline Maintenance Facility

An additional airline maintenance facility is needed for Southwest Airlines (SWA) and specifically their ADG III aircraft [P11]. SWA is the largest operator at BWI Marshall, accommodating over 65% of passengers. SWA needs maintenance facilities to perform incidental and periodic maintenance on their aircraft operating in and out of BWI Marshall



LEGEND

- Airport Property Boundary
- Pavement Improvements
- Proposed Structures
- Demolition

Support Facility Improvements
Figure 2.1-3

N

0 375 750 1,500 Feet

Source: Aerial - MDOT MAA (2018)

Airport. SWA would use the proposed facility to maintain aircraft scheduled to operate at BWI Marshall Airport. The proposed facility would not be used for heavy maintenance (e.g., extensive service and disassembly) or by aircraft destined for another airport; it would not be economical to fly aircraft to BWI Marshall Airport just for such periodic and incidental maintenance.

Currently SWA performs maintenance at aircraft gates. There is insufficient space at the gates and within the terminal apron to efficiently perform needed maintenance activities. These maintenance activities are not as efficient as they would be if performed in a consolidated well-lit hangar facility. Additionally, workers are currently exposed to inclement weather which is a safety concern.

Beyond the need to make maintenance operations more efficient and safe for workers, the apron space currently used for maintenance operations is needed to accommodate irregular operations, and to allow for flexible gate assignments and additional remain overnight parking. Lastly, the proposed facility is needed to increase reliability of aircraft fleet maintenance, thereby allowing SWA to maintain flight schedules and minimize delay impacts on passengers.

A perimeter road will be needed to accommodate this facility and to provide a connection to the main terminal.

Building 113 Demolition

Additional airfield pavement area will be available for use in the vicinity of the Elm Road cargo area following the demolition of Building 113. The building needs to be demolished as the existing structure does not meet current building codes and it would not be cost-effective to upgrade the building for MDOT MAA use [D-113]. Demolishing the building would make available needed airfield area consistent with the relocation of airport maintenance facilities and airfield planning.

Airport Maintenance Complex

The airport maintenance complex needs to be relocated and consolidated to include a new Snow Removal Equipment building to provide appropriate storage for the equipment on-airport [P30]. Currently, equipment is stored outside and is exposed to the weather elements reducing the useful life of the equipment.

Deicing Chemical Storage

An additional 20,000-gallon storage tank is needed for runway deicing chemical storage to meet current and forecast demand. An additional access road to the storage area is needed to increase circulation to the existing and proposed storage tanks [P13]. The storage tank and roadway are needed for simultaneous tank loading and unloading operations during a snow event. The tank will also provide storage for the recovery of high concentration glycol for recycling.

2.1.2.4 Improve Customer Service

Improvements are needed to improve passenger and vehicular traffic movement around the terminal.

Concourse C Sky Bridge

Currently, to access Concourse C from the hourly parking garage, passengers / pedestrians must use the Sky Bridge at either Concourse B or Concourse D as there is no Concourse C Sky Bridge. To improve accessibility from the hourly parking garage to the terminal (Concourse C), a new Sky Bridge is needed to improve the connectivity

above that is already provided by Sky Bridges at Concourses A, B, and D [14].

Terminal Roadway Needs

Widening of the terminal roadway and other access improvements are needed to alleviate existing and projected traffic congestion that sometimes occurs along Interstate 195 (I-195) between Maryland Route 170 and the terminal during peak hours of aviation activity and thereby restore these roadways to a quality level of service [15]. The roadway widening is needed to alleviate congestion and queuing back-ups that can block the upper level roadways, while the additional access improvements are needed to segregate vehicle traffic in the terminal area, as detailed in the *BWI Marshall Lower Level Inbound Roadway Study* (***Appendix A, Traffic Studies,*** *Attachment 1***)**.

Concourse E Roadway

Upper Level Roadway improvements are also needed at Concourse E to alleviate existing and future traffic congestion, as detailed in the *BWI Marshall International Concourse Roadway Widening Study* (*Appendix A, Attachment 2*) [19]. The outer lanes of the existing terminal roadway need to be widened and the public (outer lanes) and commercial (inner lanes) vehicle operators need to be segregated to be consistent with the existing roadway layout between Concourses A and D.

2.2 Supporting Information

This section briefly presents information which supports the statement of Purpose and Need.

2.2.1 2011 Master Plan Update

After implementing the 1987 Master Plan recommended development programs, MDOT MAA initiated a Master Plan Update in late 2004.

The first phase of the Master Plan Update consisted of a long-range needs assessment. Conducted between 2005 and 2008, the assessment identified the 2005 status of facilities and services at BWI Marshall Airport and also projected future (2030) facility requirements based on passenger and aircraft activity forecasts. The second phase of the Master Plan Update was conducted between 2009 and 2010 and consisted of identifying airfield, terminal, and landside development alternatives to accommodate the projected increases in future aviation travel demand. Once the development alternatives were evaluated, the Master Plan Update effort concluded with the development of implementation plans consisting of ALP drawings and a financial analysis of projected facility development.

The Master Plan Update provided MDOT MAA with a recommended development plan that included improvements needed by 2015 and multiple additional phases. Phase 1 represents the near-term improvements needed over the next approximate five-year timeframe. Subsequent phases represent the longer-term vision of the facilities, are less well defined, and will require future evaluation and refinement as future activity levels warrant. They will also be subject to separate environmental approvals prior to any implementation.

2.2.2 Draft 2015 ALP Update Narrative Report

As a follow-up to the 2011 Master Plan Update, the Draft ALP Narrative Report outlined projects that were proposed to be completed by 2020. The proposed improvements were updated to reflect more current conditions and changes to the proposed development plan that had transpired since completion of the Master Plan Update in 2011. The ALP Update Narrative also included an updated forecast based on the 2013 Terminal Area Forecast (TAF).

Projects were categorized by airfield, terminal, landside, general aviation, and support facilities. Each project was described in detail including justification as to why the project is needed, other alternatives that were considered, and standards that will be used during design and construction. Additionally, Federal Aviation Regulations (FAR) Part 77 imaginary surfaces, ATCT line-of-sight, and navigational aid critical areas were assessed for potential impacts based on the proposed projects. Lastly, a proposed project schedule was documented for each improvement based on construction and potential completion date. ***Appendix B, Draft Airport Layout Plan (ALP) Update Narrative Report*** provides the Draft 2015 ALP update Narrative Report. Much of the justification for individual improvements included in this EA and Section 4(f) Determination were based upon information included in the Draft 2015 ALP Update Narrative Report.

2.2.3 Aviation Activity Forecast

The base year fleet mix was developed based on BWI Marshall Airport's Airport Noise and Operations Monitoring System (ANOMS) radar data scaled to match the most recent twelve months (May 2018 through April 2019) of ATCT counts from the FAA's OPSNET database, and the FAA 2018 TAF with adjustments to incorporate the most recent available base year operations data. In summary for the base year 2018, the total number of annual operations was 262,477, which is equivalent to 719.12 average daily operations. The future fleet mixes were built upon the base year fleet mix, the FAA's 2018 TAF, airline aircraft retirement and replacement plans, and the FAA Aerospace Forecast: Fiscal Years 2019-2039. The future fleet mixes also include new cargo operations at the Midfield Cargo Facility as identified in the October 2018 Proposed Midfield Cargo Facility Improvements Technical Report. The forecast provides fleet mixes for 2022 and 2027, the EA future years of analysis based on the anticipated construction schedule. **Table 2.2.1** summarizes the activity levels (annual takeoffs and landings) used in this EA and Section 4(f) Determination. *Appendix C* provides the original fleet mix reviewed by FAA on September 29, 2016 (*Appendix C, Attachment 3*), the updated aviation activity forecast (*Appendix C, Attachment 2*), and the FAA approval of the updated aviation activity forecast on November 18, 2019 (*Appendix C, Attachment 1*).

2.2.4 Comparison of Forecasts

The 2011 Master Plan Update forecasts were prepared prior to the 2008-2009 recession and associated airline consolidation and are therefore no longer current. The ALP Narrative updated the forecast to reflect these factors and is therefore much more representative of current conditions. **Table 2.2.2** provides a comparison of the ALP Forecast and EA Aviation Activity Forecast. As noted in

Chapter 1, completion of the Phase 1 projects, anticipated to occur in 2020 in the ALP Narrative, is now expected in 2022. The two forecasts are compared in the first year of Phase 1 project completion (2020 for ALP and 2022 for EA Update) and five years thereafter. The EA passenger enplanement forecasts are slightly higher than the ALP enplanement forecasts and the EA aircraft operations forecasts are slightly lower than the ALP forecasts. Consequently, the two forecasts are largely consistent, and the EA Aviation Activity Forecast supports the need for those Phase 1 projects that are intended to meet existing and anticipated passenger demand.

As noted in Section 2.1.2, the Phase 1 projects are intended to a) meet FAA standards, b) enhance safety and efficiency, c) accommodate existing and anticipated passenger demand, and d) improve customer service. Except for c) accommodate existing and anticipated passenger demand, the need for these projects is not dependent on Airport activity levels. Even with projects intended to accommodate existing and anticipated passenger demand, there is enough existing capacity to accommodate forecast future activity, albeit at lower levels of service. The comparison of the EA Aviation Activity Forecast and ALP Forecast demonstrates that the need for those projects is still justified.

Table 2.2.1
Aviation Activity Forecasts

Year	Air Carrier	Air Taxi	Total Commercial	General Aviation	Military	Total	Passenger Enplanements
Base Year (5/18-4/19)[1]	217,893	31,351	249,244	12,153	1,080	262,477	13,208,463
CY 2022[2]	235,034	23,483	258,517	11,789	961	271,268	14,080,882
CY 2027[2]	254,543	21,537	276,080	11,879	961	288,921	15,193,918

Notes:
[1] Operations data from FAA OPSNET for May 2018 through April 2019. Passenger enplanement data from BWI Monthly Statistical Summary, adjusted to remove non-revenue passengers.
[2] FAA 2018 TAF converted from Federal Fiscal Year ending September 30 to calendar year.

Sources: Table C.3 in Appendix C, Attachment 2.

Table 2.2.2
Aviation Activity Forecast Comparison

ALP Forecast		EA Forecast		Percent Difference
Passenger Enplanements				
Year	**Enplanements**	**Year**	**Enplanements**	
2020	12,570,031	2022	14,080,882	12.0%
2025	14,459,905	2027	15,193,918	5.1%
Aircraft Operations				
Year	**Operations**	**Year**	**Operations**	
2020	297,414	2022	271,268	-8.8%
2025	325,344	2027	288,921	-11.2%

Sources: Table 2.2.1 and Appendix B, Draft Airport Layout Plan (ALP) Update Narrative Report.

As described in *Section 2.1.2, Need*, MDOT MAA will monitor operational levels as the world rebounds from the COVID-19 pandemic. If there is no demand to build certain projects included in the Proposed Action, when funding becomes available, those projects would not be built. However, because the nature of the recovery to this pandemic is unknown, MDOT MAA is maintaining the Aviation Activity Forecast approved for this EA and Section 4(f) Determination.

As described in Chapter 1, the projects identified in Phase 1 represent the near-term improvements needed over the next approximate five-year timeframe. Subsequent phases represent the longer-term vision of the facilities, are less well defined, and will require future evaluation and refinement as future activity levels warrant. Thus, only the Master Plan Update Phase 1 improvements were reviewed for development of this EA and Section 4(f) Determination. Subsequent phases will be subject to separate environmental approvals prior to any implementation.

Endnotes

[1] 14 Code of Federal Regulations Part 77 – Safe, Efficient Use and Preservation of the Navigable Airspace, 7/21/10, §77.19 (c).

[2] FAA, AC 150/5220-17B, *Aircraft Rescue and Fire Fighting (ARFF) Training Facilities*, 9/30/10.

Chapter 3: ALTERNATIVES

The evaluation of reasonable alternatives to the Proposed Action is considered the heart of the NEPA process. To comply with NEPA, alternatives must be rigorously explored and objectively evaluated. This chapter describes the alternatives evaluation process and results for BWI Marshall Airport. Alternatives were identified and examined to determine if they were reasonable and met the purpose and need.

3.1 Identification and Evaluation of Alternatives

Alternatives were identified, screened and either eliminated from further consideration or carried forward for environmental analysis. Both "action" and "no action" alternatives were considered. While a "no action" alternative may not address an identified area of need, evaluation of the "no action" alternative is required per CEQ regulations. The "no action" alternative serves as a basis of comparison with other alternatives retained for environmental analysis.

When identifying alternatives, it is customary to consider both off-site and on-site alternatives. Off-site alternatives typically consist of use of another form of transportation or use of another airport. Neither of these types of off-site alternatives would satisfy the needs identified at BWI Marshall Airport as the proposed improvements are necessary to allow the existing facilities to meet FAA design standards, to enhance airfield safety and efficiency, to accommodate existing and anticipated passenger demand, and to improve customer service at the existing Airport. Therefore, the following sections describe the on-site alternatives considered.

On-site alternatives were identified for the various airport components. Alternatives were then screened to determine if they would address the needs identified in *Chapter 2, Purpose and Need*. As individual components of the Proposed Action were analyzed, alternatives to accomplish each component were identified. Alternatives were developed by looking at unresolved conflicts concerning alternative uses of available resources or through advanced planning efforts where modifications to the 2015 ALP were considered. **Table 3.1.1** shows the airport components and the applicable needs. Those alternatives that did not meet the identified needs were eliminated from further consideration.

The identification and evaluation of alternatives is described in detail in the following sections. The alternatives are presented by purpose and need element: Meet FAA Standards; Enhance Airfield Safety and Efficiency; Accommodate Existing and Anticipated Passenger Demand; and Improve Customer Service. Although projects identified within later phases of the ALP are not ripe for review within this EA and Section 4(f) Determination, the planning of Phase 1 projects considered the location of these future projects so as not to preclude their future review and development.

Table 3.1.1

Airport Components and Applicable Needs

Airport Component	Applicable Needs/ Related Projects
Runway	Runway to taxiway separations do not meet current FAA design standards. *(1) Relocated Taxiways R & F* *(17) Taxiway V Relocation*
	Obstructions to Part 77 surfaces exist. *(10) Obstruction Removal Project*
Taxiway	Taxiway geometry and fillets are not in accordance with current FAA design standards. *(3) International Terminal Area Taxiway Fillets/Shoulders* *(4) New Infill Pavement Near Taxiways T, P, and Future P* *(6) Relocate Taxiways K & L*
	Certain taxiway locations do not meet standards for reduction of runway incursion risk. *(12) Relocate Taxiway H*
	Certain taxiway locations do not reduce arrival runway occupancy times and taxiway delays. *(2) Taxiway U3*
Terminal	Terminal roadway improvements are needed to alleviate congestion and queuing during peak hours of aviation activity, thereby restoring these roadways to a quality level of service and a more efficient movement of vehicular traffic. *(15) Terminal Roadway Widening and Access Improvements* *(19) Upper Level Roadway Widening at Concourse E*
	Concourse C does not have easy access to the hourly parking garage. *(14) New Sky Bridge C*
Pavement	Certain pavement has deteriorated to unacceptable levels as identified in the Pavement Management Plans dated September 2016 (Landside) and December 2016 (Airside). *PMP*
Airside Facilities	Aircraft lane separation on the deicing pad does not meet current FAA design standards. *(8) Runway 28 Deicing Pad Expansion*
	Additional RON spaces and an isolation apron area are needed to reduce double parking and provide more parking space during inclement weather conditions and to accommodate unexpected inspections, respectively. *(7) Isolation / RON Apron* *(P11) New Airline Maintenance Facility*
	Additional aircraft hold and deicing area is needed to increase airfield efficiency. (18) Runway 15R Deicing Pad Expansion
	Additional hangar space and airline maintenance facilities are needed to provide additional executive level facilities and support SWA maintenance needs for aircraft scheduled to operate at BWI Marshall, respectively. *(P11) New Airline Maintenance Facility*
	Airport maintenance needs to be consolidated to provide appropriate equipment protection from the elements and additional storage facilities are needed to store an adequate volume of deicing materials to support inclement weather operations. *(P30) Airport Maintenance Complex Relocation and Consolidation (Phase 1 and 2)*

Table 3.1.1

Airport Components and Applicable Needs

Airport Component	Applicable Needs/ Related Projects
Airside Facilities	An additional 20,000-gallon storage tank is needed for runway deicing chemical storage to meet current and forecast demand. *(P13) Runway Deicing Chemical Storage and Access Road*
	Existing facilities do not meet current building code and would make available needed airfield pavement area. *(D-113) Building 113 Demolition*
	The existing remote receiver (RR) facility is susceptible to signal loss due to interference from surrounding buildings and needs to be relocated. *(21) Relocate RTR Facility*
	The existing airside roadway system lacks an efficient connection through the southern portion of the airfield from the midfield cargo area to the Runway 33L end. *(20) VSR Connector*
General Aviation/Landside Facilities	Fire training facilities do not meet existing needs and current FAA design standards. *(P10) Existing ARFF Expansion Bays* *(P45) Relocate Fire Training Facility*
	Additional Fixed Base Operator space is needed for GA activities. *(P7) Second FBO*

Source: HNTB analysis, 2019.

3.2 Meet FAA Design Standards

Improvements are needed because certain aspects of BWI Marshall Airport do not meet airport design standards as defined in FAA AC 150/5300-13A, Change 1, *Airport Design*. Furthermore, objects on and off airport property penetrate the imaginary surfaces defined in CFR Title 14 Part 77, *Safe, Efficient Use, and Preservation of the Navigable Airspace* (Part 77). Alternatives to meet FAA standards are described in the following sub-sections.

3.2.1 Relocate Taxiways F and R (1)

Runway to taxiway separation modifications are needed between Runway 10-28 and Taxiway R to meet FAA AC 150/5300-13A, *Airport Design*, standards. Taxiway R is proposed to be shifted north to meet FAA design standards for an ADG V runway having a Category II/III approach. With the shifting of Taxiway R, Taxiway F and accompanying connector taxiways need to be relocated as well to maintain appropriate taxiway-to-taxiway centerline separation. Additionally, the current intersection of Taxiway F with Runway 15R-33L is not at a standard 90-degree angle and must be adjusted to meet this requirement. Taxiway F on the east side of Runway 15R-33L also must be relocated between Taxiways P and T to eliminate direct access from the apron to the runway. The relocation of Taxiway F on the east side of Runway 15R-33L was the subject of a separate environmental evaluation with a finding issued in 2017.

There are three alternatives considered for the Taxiways F and R relocations. In accordance with the ALP, Alternative 1 includes a full relocation of Taxiway F and relocation / extension of Taxiway R. Alternatives 2 and 3 provide variations to the taxiway relocations and extension that minimize impacts to stormwater management Pond B3, wetland areas, and Kitten Branch headwaters.

Alternative 1 – 2015 ALP

As shown in **Figure 3.2-1a**, this alternative would demolish and relocate Taxiway R 102 feet north of its current location and extend it to the Runway 10 end, to be at a separation distance of 502 feet from the Runway 10-28 centerline. Portions of Taxiways G and R1 would be reconstructed to connect Runway 10-28 to the relocated Taxiway R. A new Taxiway R2 would be constructed west of Taxiway G to provide an additional runway to taxiway connection. There would be a slight turn in relocated Taxiway R east of the intersection with Taxiway R1 to allow for a 90-degree intersection with Runway 15R-33L.

In addition to the relocation of Taxiway R, existing Taxiway F would be demolished and reconstructed parallel to Taxiway R at a 350-foot separation. The intersection of Taxiway F with Runway 15R-33L would be a standard 90-degree angle. This alternative would also include an extension to the south of existing Taxilane W to maintain connectivity with relocated Taxiway F.

The relocation of Taxiways R and F would provide a dual parallel taxiway system at the Runway 10 end, provide the FAA-standard 90-degree intersection for Taxiway F and Runway 15R-33L, and improve the overall efficiency of the airfield.

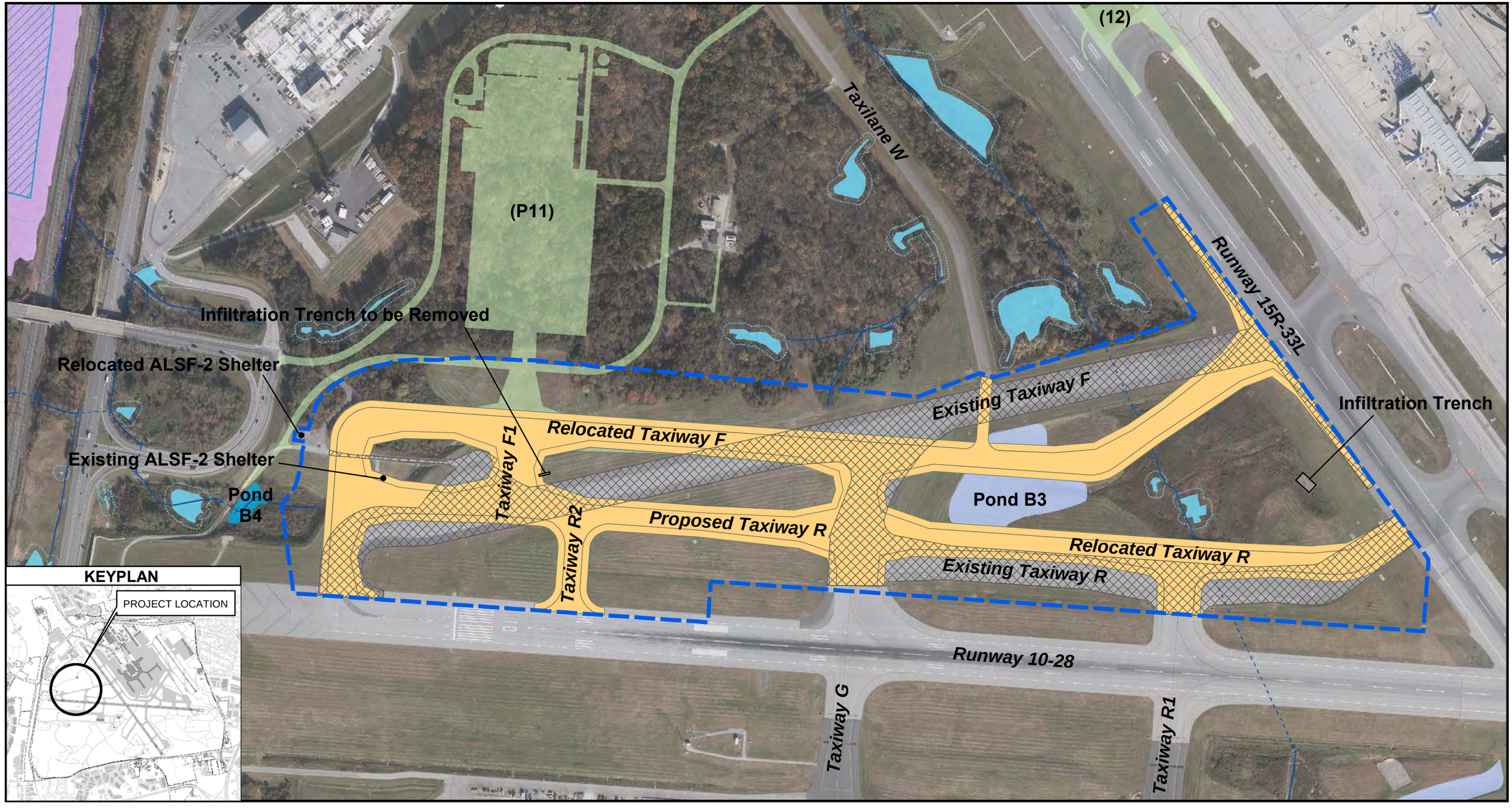
The relocation of the Taxiways east of Taxiway G would directly impact stormwater management Pond B3 and wetland areas located between the proposed relocated taxiways. The shift of Taxiway R north would require the reconstruction or extension of the culvert that carries Kitten Branch under existing Runway 10-28 and Taxiway R. The proposed connection of both Taxiways R and F to the Runway 10 end would also impact U.S. Army Corps of Engineers (USACE) jurisdictional Pond B4 and Bowden Branch, and require the relocation of the ALSF-2 shelter located north of the existing Taxiway F end. The ALSF-2 shelter and adjoining facilities contain the following FAA functions which must be addressed as part of the execution of this alternative:

- ALS equipment shelter, 20’ x 30’
- Communications node to three Multilateration Remote Units (MRUs)
- Equipment building
- ASDE Remote Unit (RU)
- Communications homerun to Terminal
- Switchgear and commercial power to site
- Storage building

This alternative would fully meet FAA design standards for runway to taxiway and taxiway to taxiway separation distances and runway to taxiway intersection angle.

Alternative 2 – Modified Taxiways F and R Relocation

Alternative 2 is a variation of Alternative 1 where Taxiway F is only relocated and reconstructed from approximately the intersection with Taxiway G to the Runway 10 end as shown on **Figure 3.2-1b**. Alternative 2 would avoid the Alternative 1 impacts to stormwater management Pond B3, wetland areas, and the existing Kitten Branch culvert. The segment of Taxiway F



LEGEND

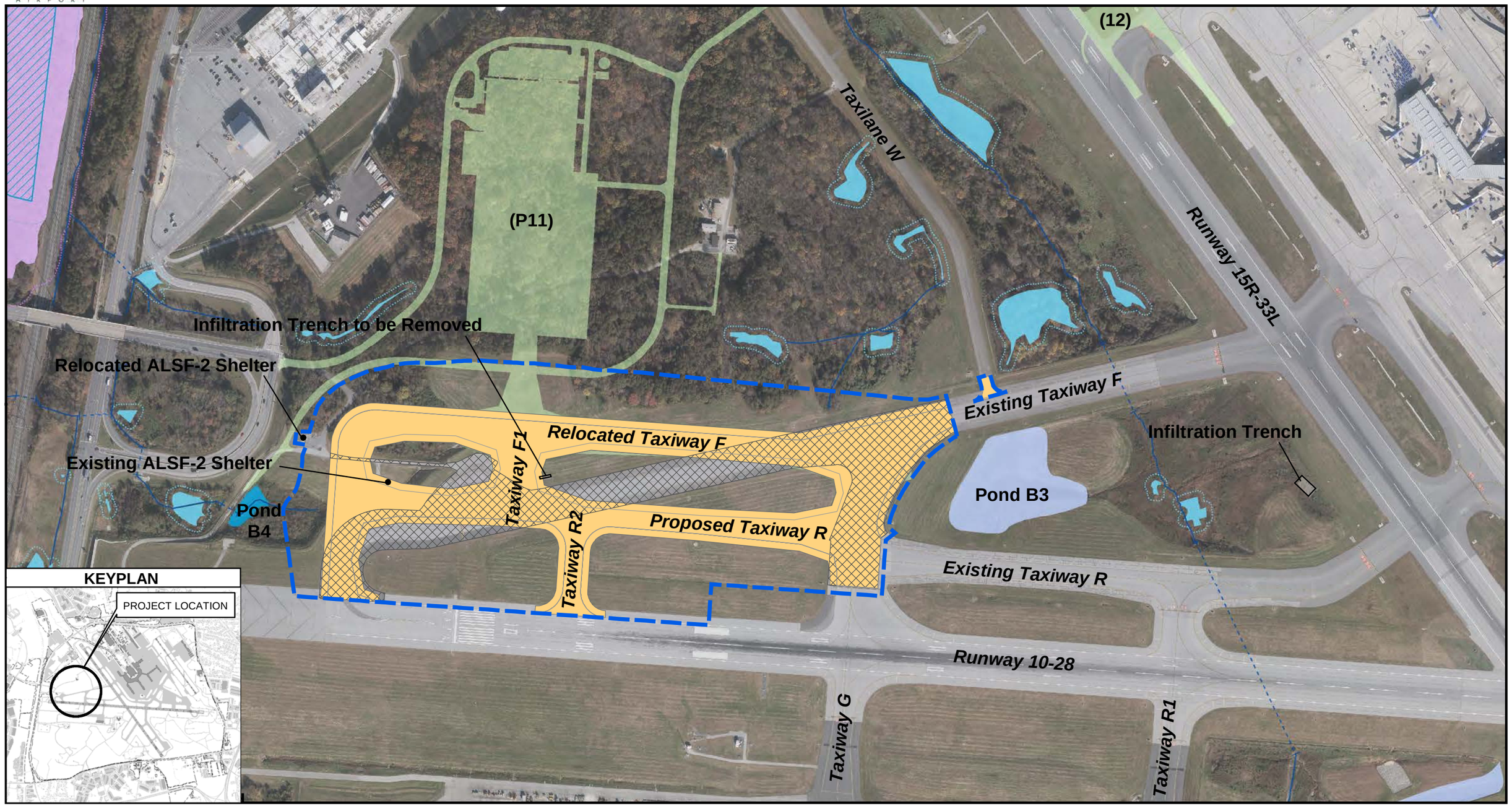
- New Impervious
- Impervious Removal
- Impervious Reconstructed
- Other EA Projects
- Limit of Disturbance
- Wetlands with 25' Buffers
- Stormwater Management Pond
- USACE Jurisdictional Pond
- Stream
- Culverted Stream
- Wetlands of Special State Concern with 100' Buffers (MAA-delineated)
- Wetlands of Special State Concern with 100' Buffers (MDNR data)

(1) Relocate Taxiways R and F - Alternative 1 – 2015 ALP
Figure 3.2-1a

N

0 200 400 800 Feet

Source: Aerial - MDOT MAA (2018), ADCI



LEGEND

- New Impervious
- Impervious Removal
- Impervious Reconstructed
- Other EA Projects
- Limit of Disturbance
- Wetlands with 25' Buffers
- Stormwater Management Pond
- USACE Jurisdictional Pond
- Stream
- Culverted Stream
- Wetlands of Special State Concern with 100' Buffers (MAA-delineated)
- Wetlands of Special State Concern with 100' Buffers (MDNR data)

(1) Relocate Taxiways R and F - Alternative 2
Figure 3.2-1b

N

0 200 400 800 Feet

Source: Aerial - MDOT MAA (2018), ADCI

north of stormwater management Pond B3 would remain in its current location as it already exceeds the required 350-foot separation with Taxiway R. The existing connection between Taxiway F and Runway 15R-33L would remain at a nonstandard angle.

Taxiway R would remain in its current location at a nonstandard separation between Runway 15R-33L and Taxiway G. West of Taxiway G to the Runway 10 end, Taxiway R would be extended and placed at a standard 350-foot separation from the relocated Taxiway F and 502-foot separation from Runway 10-28. This alternative would provide a standard separation for a portion of the relocated taxiways, but would not fully meet FAA design standards for runway-to-taxiway separation for Runway 10-28 and Taxiway R, as the Taxiway R segment east of Taxiway G would remain at a nonstandard 400-foot separation. Also, the creation of the offset intersection at Taxiway G and Taxiway R would not meet FAA design standards. Under this alternative, the current geometry of Taxiway F at Runway 15R-33L intersection would remain unresolved and not meet FAA design standards.

As with the 2015 ALP Alternative, the connection of the relocated taxiways to the Runway 10 end would impact USACE jurisdictional Pond B4 and Bowden Branch, and require the relocation of the ALSF-2 shelter and its associated functions described in Alternative 1 located north of the existing Taxiway F end.

Alternative 3 – Modified Taxiway F Relocation with 2015 ALP Taxiway R Relocation

In order to meet FAA design standards for Taxiway R while minimizing impacts to stormwater management Pond B3, this alternative would include relocation of a portion of Taxiway F, and the relocation and extension of the entire length of Taxiway R, as shown in **Figure 3.2-1c**. Taxiway F would be shifted north between Taxiway G and the Runway 10 end to meet taxiway-to-taxiway separation standards with Taxiway R. Taxiway R would be shifted north 102 feet of its current location and extended west to the Runway 10 end to provide a standard 502-foot taxiway-to-runway centerline separation with Runway 10-28.

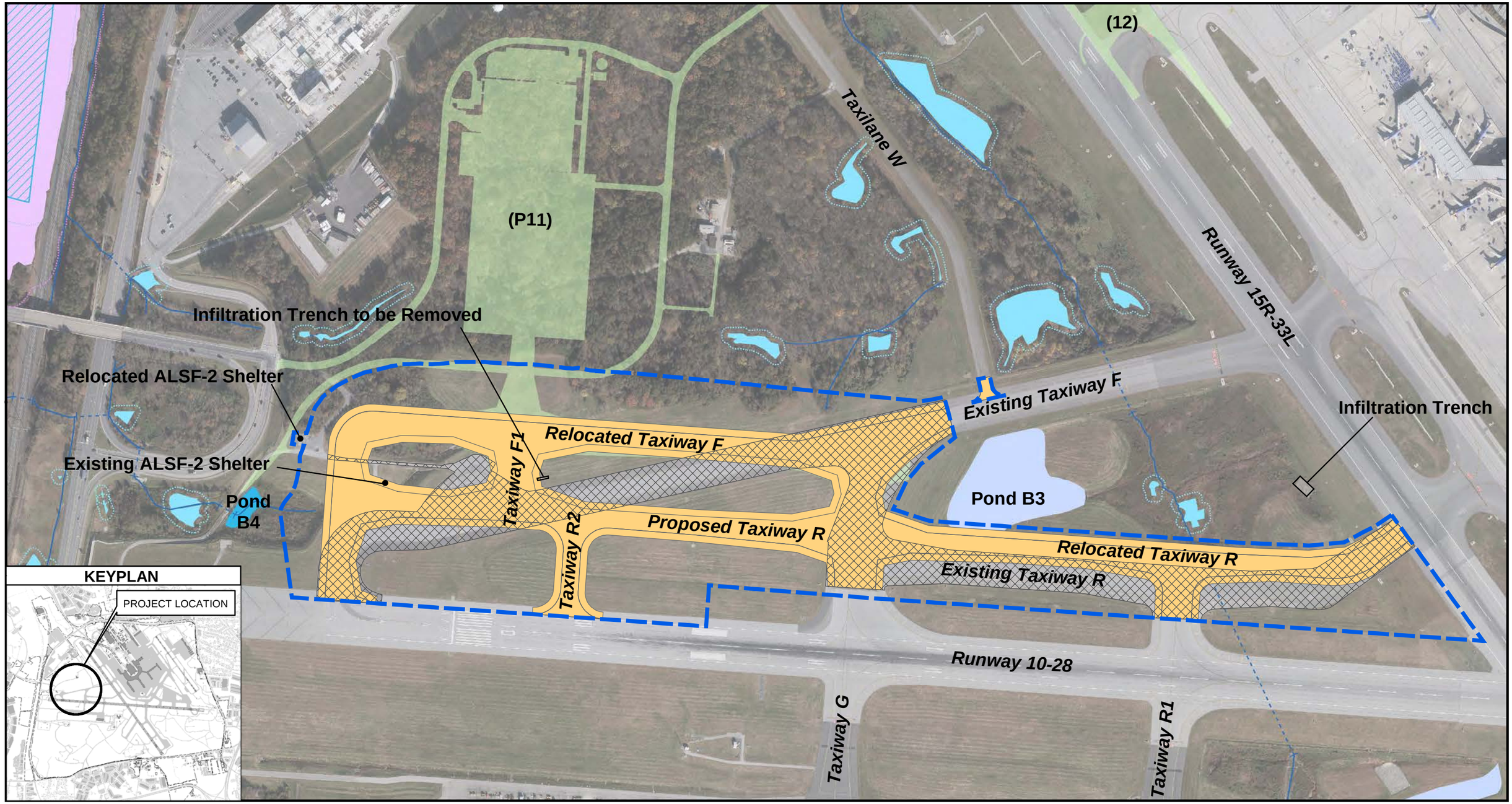
To meet FAA design standards for runway-to-taxiway separation, the relocation of Taxiway R in this alternative would impact stormwater management Pond B3 and wetland areas located between the taxiways. The shift of Taxiway R north would require the reconstruction or extension of the culvert that carries Kitten Branch under existing Runway 10-28 and Taxiway R.

As with the ALP Alternative, the shift of Taxiway R north would still require the reconstruction or extension of the culvert that carries Kitten Branch under existing Runway 10-28 and Taxiway R. However, this alternative would have fewer impacts to Pond B3 and the nearby wetlands than the ALP Alternative. The nonstandard intersection of Taxiway F and Runway 15R-33L would remain.

As with the 2015 ALP Alternative, the connection of the relocated taxiways to the Runway 10 end would impact USACE jurisdictional Pond B4 and Bowden Branch, and require the relocation of the ALSF-2 shelter and its associated functions described in Alternative 1 located north of the existing Taxiway F end.

No Action

The No Action Alternative would not address the runway to taxiway and taxiway to taxiway



LEGEND

- New Impervious
- Impervious Removal
- Impervious Reconstructed
- Other EA Projects
- Limit of Disturbance
- Wetlands with 25' Buffers
- Stormwater Management Pond
- USACE Jurisdictional Pond
- Stream
- Culverted Stream
- Wetlands of Special State Concern with 100' Buffers (MAA-delineated)
- Wetlands of Special State Concern with 100' Buffers (MDNR data)

(1) Relocate Taxiways R and F - Alternative 3
Figure 3.2-1c

N

0 200 400 800 Feet

Source: Aerial - MDOT MAA (2018), ADCI

separation deficiencies that currently exist between Runway 10-28 and Taxiway R and Taxiways F and R on the Runway 10 end to meet FAA design standards. Additionally, the intersection of Taxiway F and Runway 15R-33L would not be reconstructed at a 90-degree angle and would remain nonstandard.

3.2.2 International Terminal Area Taxiway Fillets/Shoulders (3)

Taxiway fillet and shoulder modifications are needed to meet updated standards within FAA AC 150/5300-13A, *Change 1, Airport Design*, as the most recent revision to this circular revised the requirements for design of taxiway fillets.

Alternative 1 – 2015 ALP

As shown on **Figure 3.2-2**, shoulder and fillet pavement would be added along Taxiways B, J, N, and S in the vicinity of the International Terminal area (Concourse E). Fillets would be designed to TDG 6 Standards from Taxiway J to Taxiway JJ. Additionally, portions of Taxiways B and S within this project area would be reconstructed in accordance with the PMP. While a portion of Taxiway B would be reconstructed, it would also be relocated (remarked) to maintain a 275-foot taxiway separation with Taxiway S allowing room for the 4-gate expansion of Concourse E in the future.

No Action

The taxiway fillets and shoulders in the vicinity of the International Terminal would not meet current FAA design standards under the No Action Alternative. A future conflict with the current location of Taxiway B and the future expansion of Concourse E would also remain.

3.2.3 New Infill Pavement Near Taxiways T, P and 'Future P' (4)

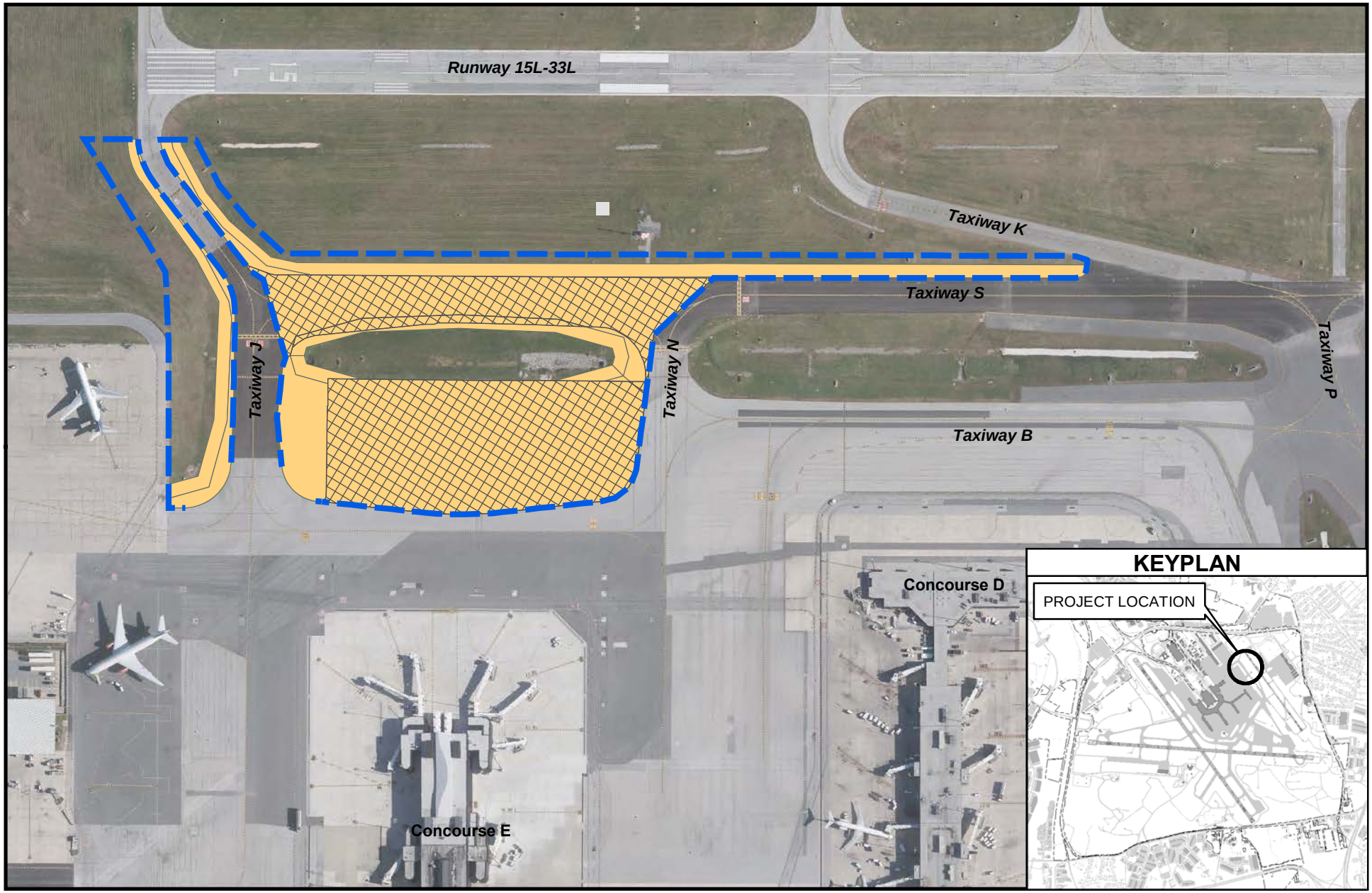
New infill pavement is needed near Taxiways T, P and 'Future P' to provide standard ADG V/TDG 6 taxiway separation and to accommodate a new VSR. 'Future P' refers to the segments of former Runway 4-22 that were converted to a taxiway (Taxiway P).

Some demolition of existing facilities would be needed to accommodate these improvements to Taxiways T, P and 'Future P'. Additionally, the current ALV causes a conflict for aircraft circulation on and around the apron to and from the Concourse B-C apron.

Alternative 1 – 2015 ALP

This alternative includes adding infill pavement to the existing ALV site and to the grassy area to the east bounded by Taxiways A and T, as shown in **Figure 3.2-3**. Additionally, Taxiway E would be demolished and relocated 300 feet east of its current location to better facilitate aircraft movements between the runways and terminal area. These improvements would provide standard ADG V/TDG 6 taxiway separations. This alternative would also accommodate a VSR to be repositioned further from Concourses C and D to maximize the utilization of gates at the end of the concourses. The infill pavement and relocated Taxiway E would result in the removal of three existing infiltration trenches and the relocation of stormwater inlets. Loss of water quality from the removal of the infiltration trenches would be accounted for in stormwater management design requirements.

In order to implement this alternative, the following connected actions would need to be completed:



LEGEND

- New Impervious
- Impervious Removal
- Impervious Reconstructed
- Other EA Projects
- Limit of Disturbance

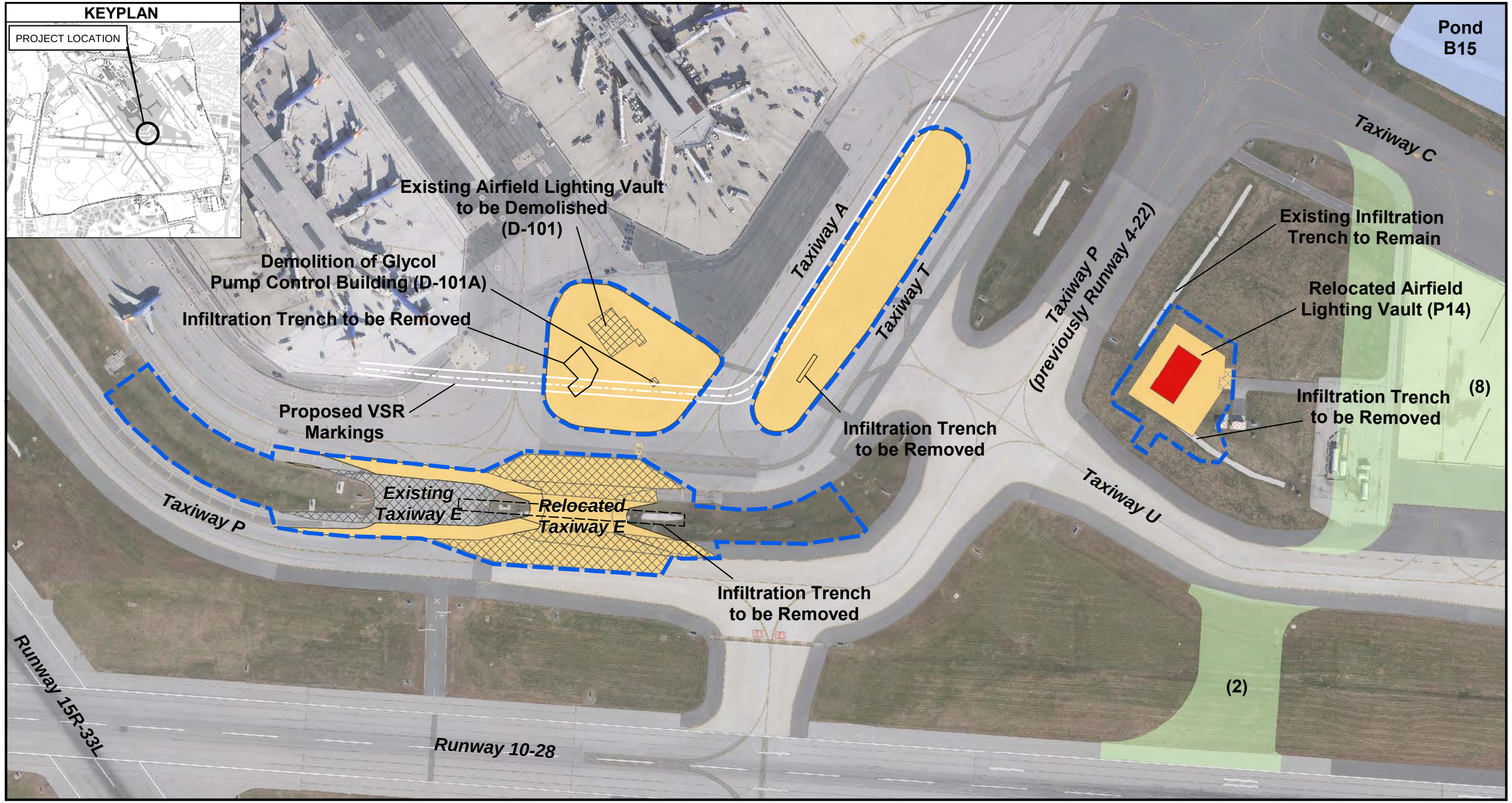
(3) International Terminal Area Taxiway Fillets/Shoulders - Alternative 1 – 2015 ALP

Figure 3.2-2

N

0 75 150 300 Feet

Source: Aerial - MDOT MAA (2018), ADCI



LEGEND

- New Impervious
- Impervious Removal
- Impervious Reconstructed
- Limit of Disturbance
- Stormwater Management Pond
- Other EA Projects

(4) New Infill Pavement Near Taxiways T, P and Future P - Alternative 1 – 2015 ALP
Figure 3.2-3

N

0 100 200 400 Feet

Source: Aerial - MDOT MAA (2018), ADCI

- *Airfield Lighting Vault (ALV) Relocation (P14)*

  The existing ALV location poses an obstacle for aircraft circulation around the terminal apron and limits TDG Group V aircraft movement past the building. The existing ALV which was originally designed as an ARFF Station, does not have a typical vault layout, and has outdated equipment. The ALV would be relocated east of its current location in the open area between Taxiway P and the Runway 28 Deicing Pad. The relocation of the ALV, in combination with the adjacent Runway 28 Deicing Pad Expansion project (see *Section 3.2.5*), would result in the removal of an existing infiltration trench. Loss of water quality from the removal of the infiltration trench would be accounted for in stormwater management design requirements. The *Airfield Lighting Vault (ALV) Relocation Conceptual Planning Study Final Report (May 2013)* (*Appendix E, Attachment 2*) discusses the relocation of the ALV to the location adjacent to the Runway 28 Deicing Pad.

- *Airfield Lighting Vault Demolition (D-101)*

  Following the ALV relocation project, the existing ALV site would be demolished to allow for the infill pavement project.

- *Glycol Pump Control Building Demolition (D-101A)*

  The existing glycol pump control building would be demolished, and relocated at a future time, if necessary. The Maryland Environmental Services (MES) building would be used for controls until it is determined that a new control building is needed. Should it be determined in the future that a new control building is needed, it would be subject to additional review under NEPA at that time. Additionally, two new glycol dump sites would be located at the Fuel Farm and on the expanded Runway 15R deicing pad.

No Action

The No Action Alternative would maintain taxiways with nonstandard separation and would also not provide the needed VSR, limiting the mobility around the ends of Concourses B and C, and not accommodating ground movement in the area by ADG V aircraft. The ALV and Glycol Pump Control Building would not be demolished and relocated under this alternative.

3.2.4 Relocate Taxiways K and L (6)

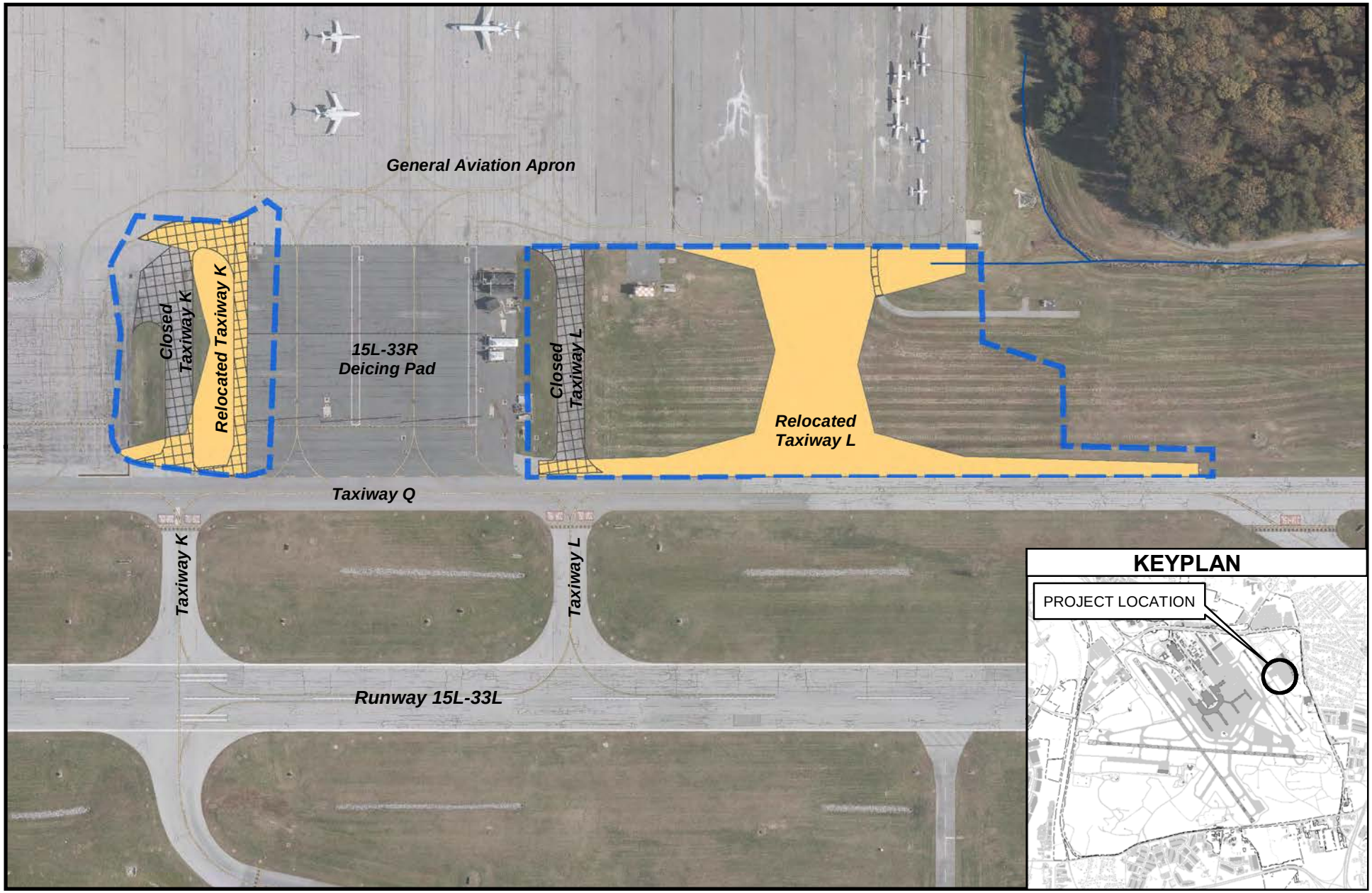
Taxiways K and L need to be relocated to meet Engineering Brief No. 75 FAA Design Standards, as defined in FAA AC 150/5300-13A, *Change 1, Airport Design*, to prevent direct access from the General Aviation (GA) complex to Runway 15L-33R, thus reducing the likelihood of runway incursions. Taxiway K has been temporarily relocated on the north side of the GA deicing pad, and Taxiway L was closed to avoid incursion risk.

Alternative 1 – 2015 ALP

As shown in **Figure 3.2-4**, the relocated taxiways would connect the GA apron to Runway 15L-33R via Taxiway Q. The alternative would eliminate the direct access from the GA Apron to Runway 15L-33R as there would be an offset of both Taxiways K and L once aircraft cross Taxiway Q. The taxiways would be designed to meet ADG III and TDG 4.

No Action

Although the existing alignments of Taxiways K and L are not currently in use, the pavement providing a direct connection



LEGEND

- New Impervious
- Impervious Removal
- Impervious Reconstructed
- Other EA Projects
- Limit of Disturbance
- Stream

(6) Relocate Taxiways K and L - Alternative 1 – 2015 ALP
Figure 3.2-4

N

0 50 100 200 Feet

Source: Aerial - MDOT MAA (2018), ADCI

between the GA apron and Runway 15L-33R would remain under the No Action Alternative.

3.2.5 Runway 28 Deicing Pad Expansion (8)

The Runway 28 Deicing Pad does not meet current design standards in FAA AC 150/5300-14C, *Design of Aircraft Deicing Facilities*. The deicing pad needs to be expanded to provide the appropriate aircraft separation while maintaining the current capacity and number of parking spots.

Alternative 1 – 2015 ALP

Figure 3.2-5a depicts the expansion of the Runway 28 deicing pad to the west. The current FAA AC requires an increased separation between deicing aircraft and expansion of the deicing pad would allow for the increased separation while maintaining the current capacity. The reconfiguration of the current deicing pad layout would eliminate an area currently used for snow dumping. A designated area for snow dumping would not be provided in this alternative. A snow melter would be located in one of the deicing lanes and therefore a lane would be lost during a snow event. Construction would include replacement of the existing hardstand pavement as this area has been identified in the PMP as having portions in fair condition and the deicing collection system would require reconfiguration based on the new parking positions.

Alternative 2 – 2015 ALP with Snow Dump Area

Alternative 2 is identical to Alternative 1 with the exception of an additional expansion to the east to allow for a snow dump area to store snow during inclement weather events. **Figure 3.2-5b** illustrates this alternative which would maintain the ability to dump snow in the Runway 28 Deicing Pad area.

No Action

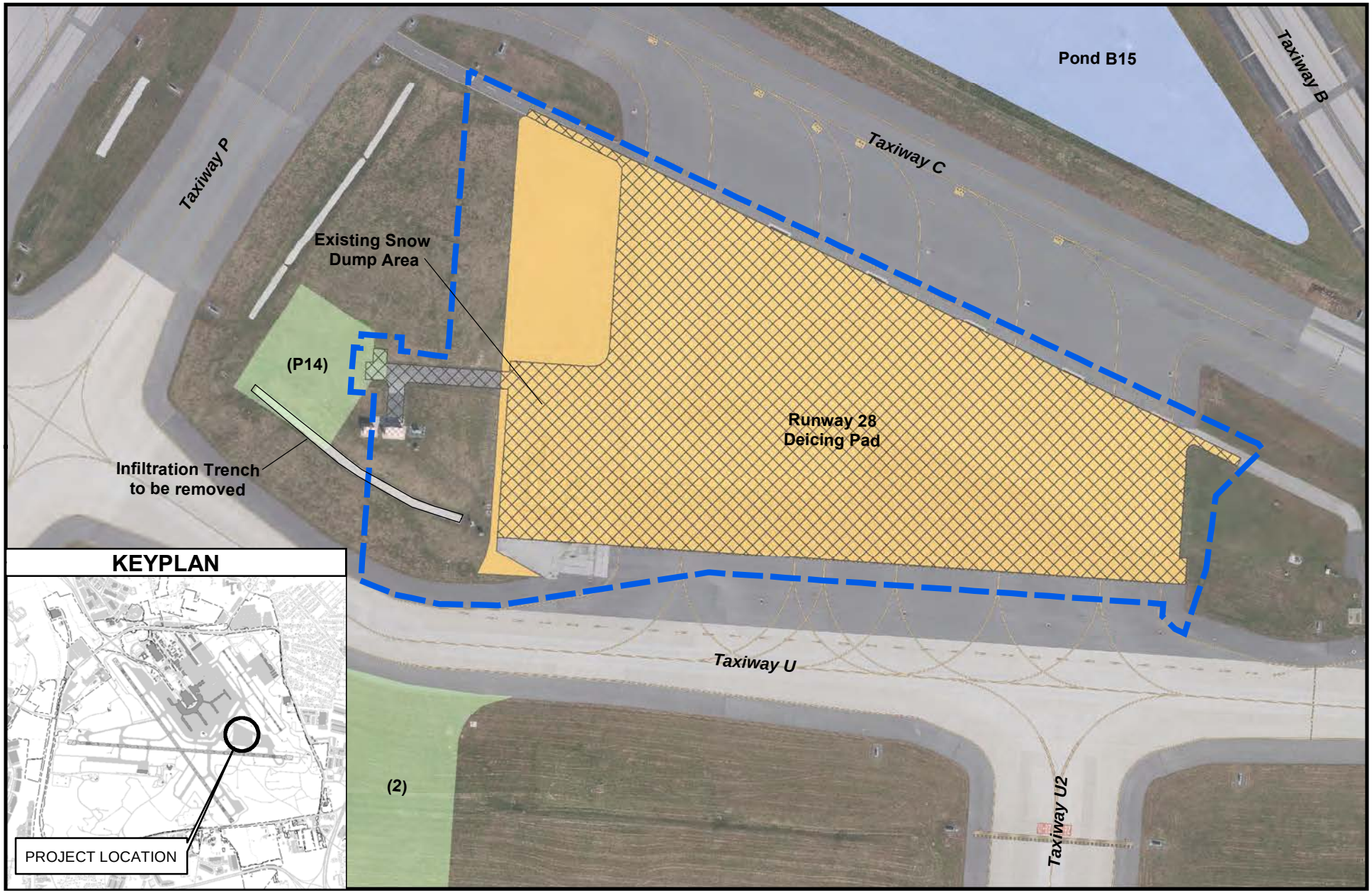
Under the No Action Alternative, the Runway 28 Deicing Pad would continue to not meet FAA design standards. Ultimately, without expansion, the deicing pad would need to be reconfigured to meet design standards and would result in a loss of deicing capacity.

3.2.6 Part 77 Obstruction Removal Project (10)

In order to meet FAR Part 77, which governs the safe and efficient use of navigable airspace in the vicinity of BWI Marshall Airport, both vegetative (trees) and non-vegetative obstructions (poles, signs, and/or obstruction lights) must be relocated or removed. The obstruction removal is required for obstructions which penetrate the Part 77 primary, approach and transitional surfaces. Obstructions to the primary surface for Runways 15R-33L and 15L-33R include vegetation and man-made obstructions, including NAVAIDS. There are vegetative obstructions to all six runway approaches as well as man-made obstructions in the approaches to the Runway 15R and 15L ends. All three runways have vegetative obstructions to their transitional surfaces while Runways 15R-33L and 15L-33R also have man-made obstructions to their transitional surfaces.

Alternative 1 – 2015 ALP

Figure 3.2-6a shows the current man-made and vegetative obstructions identified to be relocated or removed, respectively, in an obstruction analysis for BWI Marshall Airport using data collected and analyzed from aerial photogrammetry completed in 2005 and 2011. Survey data through aerial photogrammetry was collected for Runway



LEGEND

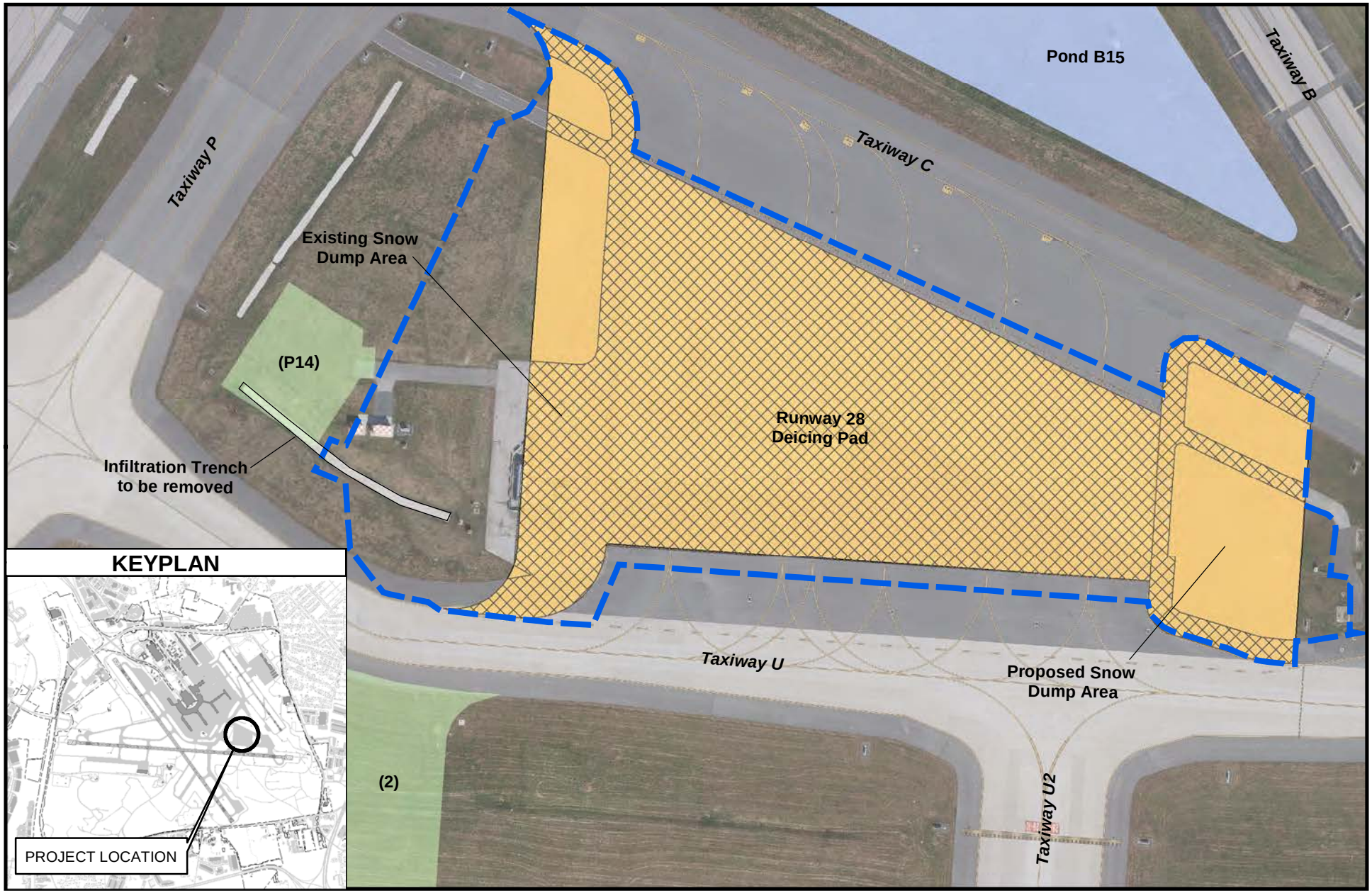
- New Impervious
- Impervious Removal
- Impervious Reconstructed
- Other EA Projects
- Limit of Disturbance
- Stormwater Management Pond

(8) Runway 28 Deicing Pad Expansion - Alternative 1 – 2015 ALP
Figure 3.2-5a

N

0 50 100 200 Feet

Source: Aerial - MDOT MAA (2018), ADCI



LEGEND

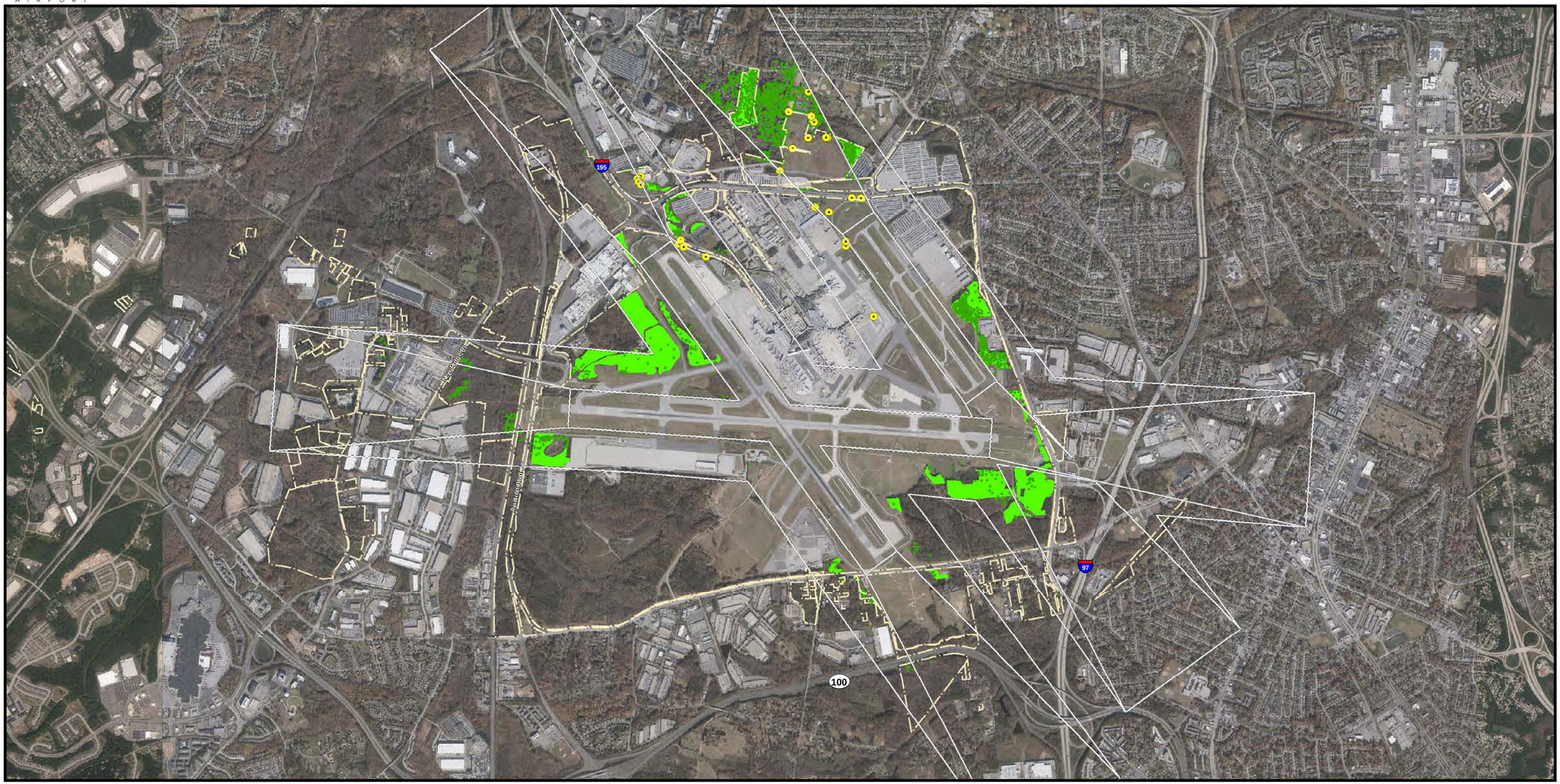
- New Impervious
- Impervious Removal
- Impervious Reconstructed
- Other EA Projects
- Limit of Disturbance
- Stormwater Management Pond

(8) Runway 28 Deicing Pad Expansion - Alternative 2
Figure 3.2-5b

N

0 50 100 200 Feet

Source: Aerial - MDOT MAA (2018), ADCI



LEGEND

- Airport Property Boundary
- Part 77 (Primary, Approach and Transitional Surface Limits)
- Pole/Sign/Obstruction Light (To Be Relocated or Removed)
- Tree Obstruction Removal (2014 FMP Part 77 Conflict Areas)
- Obstruction Removal (2015 ALP Obstruction Points)

(10) Part 77 Obstruction Removal - Alternative 1 - 2015 ALP
Figure 3.2-6a

N

0 1,250 2,500 5,000 Feet

Source: Aerial - MDOT MAA (2018)

15L-33R in 2005 and for Runways 15R-33L and 10-28 in 2011. To marry these data sets for analysis of existing and projected obstructions through 2020, 10 feet of tree growth was applied to tree elevations surveyed in 2005, rendering the 2005 data theoretically current with the 2011 data. Based on maximum tree heights and growth rates provided in the 2014 Forest Maintenance Plan (FMP) Update, tree heights were adjusted to reflect either maximum growth potential (if a specific tree species was known) or the most aggressive growth rate published in the FMP (two feet per year through 2020) if the tree species was unknown, see ***Appendix H, Biological Resources****, Attachment 3* for 2014 FMP Update. **Figure 3.2-6b** provides a graphical illustration of this methodology, which addresses the FAA/MDOT MAA agreed-upon approach to clearing on-airport obstructions that penetrate a 50:1 approach slope and off-airport obstructions that penetrate a 34:1 approach slope.

Applying these assumptions provided the most conservative/worst case obstruction removal alternative for the 2015 ALP. As illustrated in Figure 3.2-6a the vast majority of vegetative obstructions that penetrate the Part 77 approach and transitional surfaces are off of the Runway 15L end of Runway 15L-33R.

Alternative 2 – Minimize Vegetative Obstruction Removal

In the fall of 2016, a tree survey was performed on privately owned parcels off the Runway 15L end where permission was granted by the land owners to confirm the type, size, and location of the trees identified in the obstruction analysis. The survey had two goals - completion of a forest stand delineation for forest conservation purposes and to determine if the conservative/worst case obstruction removal alternative was valid or if some identified obstructions would never penetrate Part 77 surfaces based on field survey. **Figure 3.2-6c** illustrates vegetative obstructions off-airport property that are no longer considered to be obstructions based on the 2016 field survey data, as well as the remaining man-made and vegetative obstructions identified to be relocated and removed, respectively.

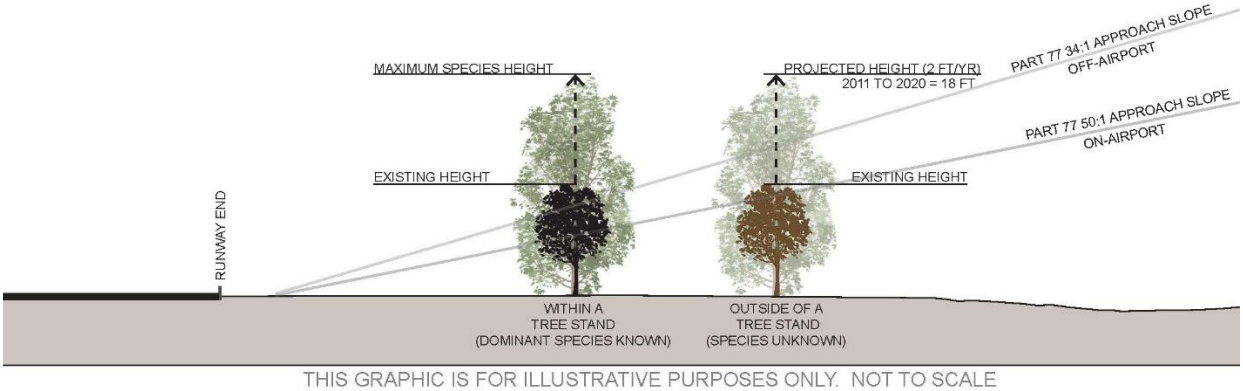
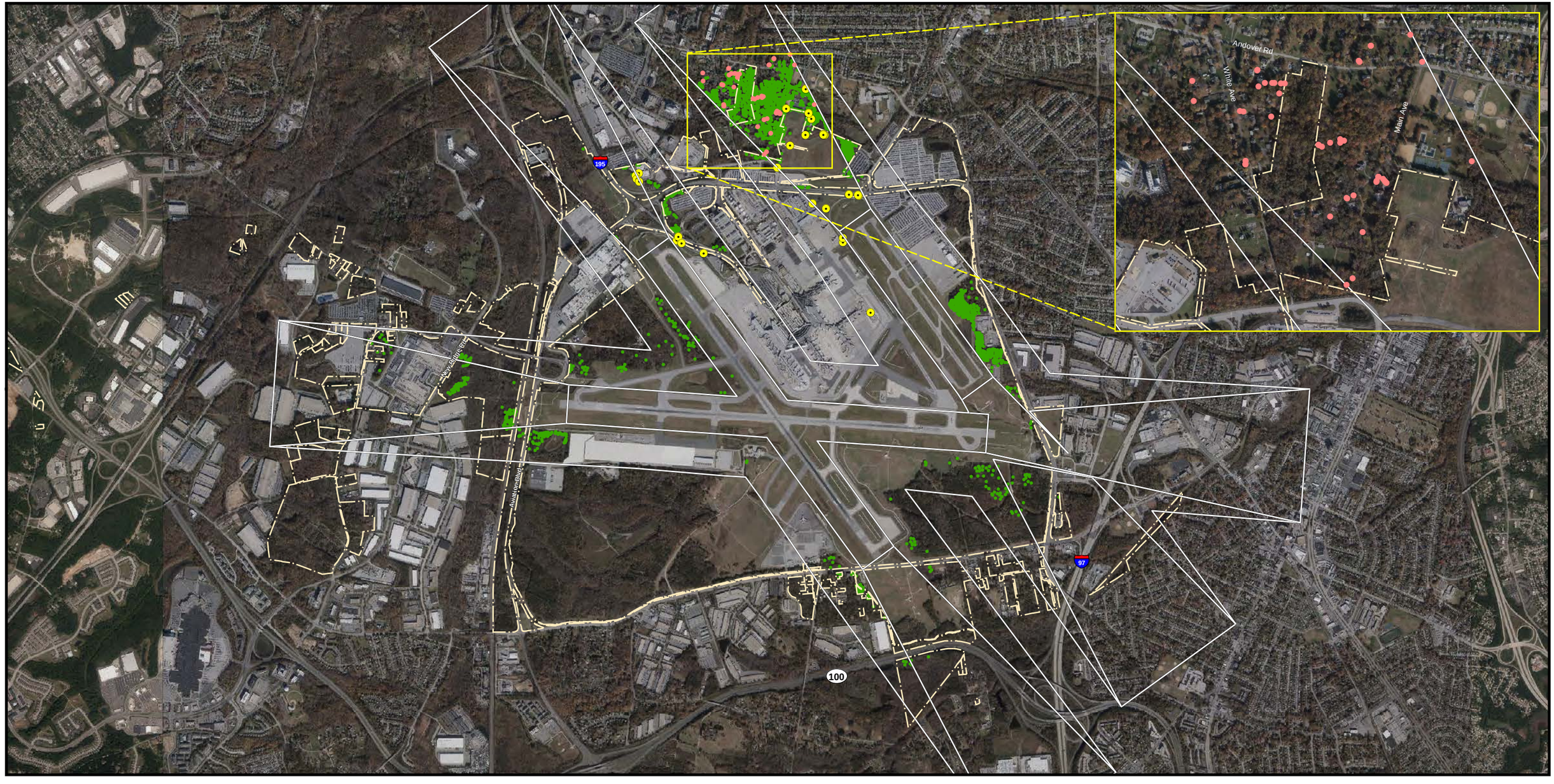


Figure 3.2-6b
Tree Growth Methodology



LEGEND

- Airport Property Boundary
- Part 77 (Primary, Approach and Transitional Surface Limits)
- Tree Obstruction Removal (2014 FMP Part 77 Conflict Areas)
- Obstruction Removal (2015 ALP Obstruction Points)
- Trees to Remain Under Alternative 2 (No longer considered to be obstructions per 2016 tree survey)
- Pole/Sign/Obstruction Light (To Be Relocated or Removed)

(10) Part 77 Obstruction Removal - Alternative 2
Figure 3.2-6c

N

0 1,250 2,500 5,000 Feet

Source: Aerial - MDOT MAA (2018)

Alternative 3 – Reduce Runway Length

Runway 15L-33R is 5,000 feet long and primarily used by general aviation and commuter airlines. The approach surface to the Runway 15L end must be cleared at a 50:1 slope to fully meet Part 77. In order to minimize the vegetative obstruction removal on private property this approach slope was moved southerly from the Runway 15L end toward the Runway 33R end until no off-property obstructions were encountered. The resulting runway length for Runway 15L-33R would be approximately 3,000 feet. As shown in **Figure 3.2-6d**, shortening Runway 15L-33R to an approximate 3,000-foot total length provides an alternative that minimizes the proposed tree clearing on private property off of the Runway 15L end.

While obstruction removal required on private property would be eliminated off the end of Runway 15L, Runway 15L-33R would be shortened to an inoperable length for use by the current operators. This alternative would not meet the purpose and need as it would not allow the Airport to accommodate existing and anticipated passenger demand.

No Action

Under the No Action Alternative, the penetrations to the Part 77 surfaces would remain. The No Action Alternative would not include the actions needed to address the Part 77 deficiencies and the safety concerns of the navigable airspace.

3.2.7 Taxiway Victor (V) Relocation (17)

Taxiway V needs to be demolished and relocated for increased separation from Runway 10-28 to meet FAA design standards for runway to taxiway separation.

Alternative 1 – 2015 ALP

The relocated Taxiway V would be constructed at a separation distance of 600 feet from the Runway 10-28 centerline, thus meeting FAA design standards for an ADG V runway. As shown in **Figure 3.2-7** the relocated taxiway would also provide more space for queuing of departures.

The relocated taxiway would impact the existing VSR which runs east-west just south of the existing taxiway. Therefore, this project would include relocation of the VSR to outside of the Taxiway Object Free Area (TOFA) as a connected action. Both the relocated taxiway and VSR would result in impacts to existing isolated wetlands which are not subject to Federal jurisdiction. Additionally, grading associated with the relocated taxiway would likely impact an existing infiltration trench. If impacted, the infiltration trench would be relocated or replaced by a stormwater facility of equal or greater capacity.

No Action

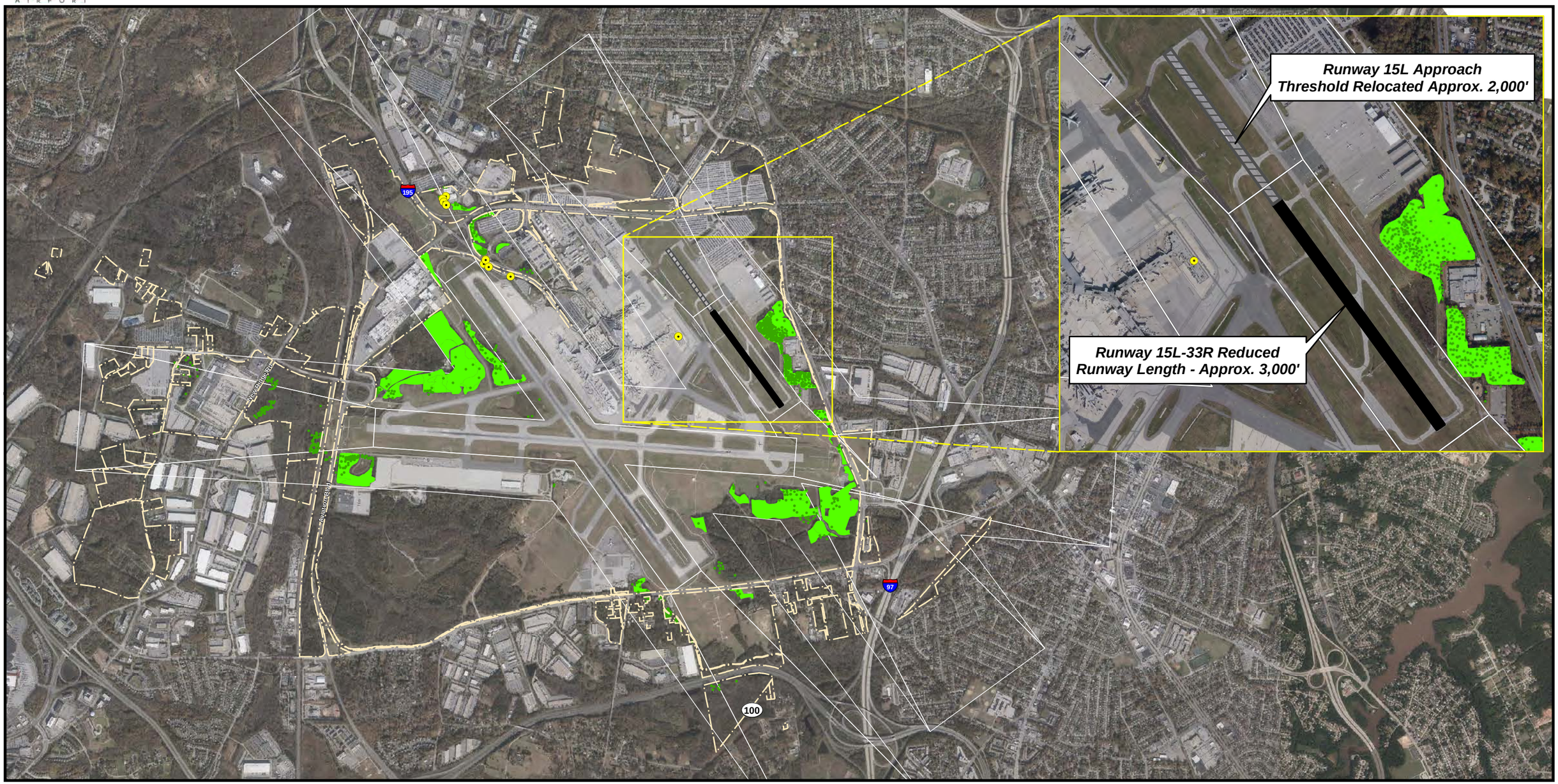
Taxiway V would remain at a nonstandard separation with Runway 10-28 and not meet FAA design standards under the No Action Alternative.

3.2.8 VORTAC Critical Area Clearing

To eliminate interference concerns created by existing forest stands just outside the 1,000-foot critical area of the VORTAC, trees within a 1,200-foot radius of the VORTAC need to be removed.

Alternative 1

As identified and detailed in the *Technical Memorandum – Existing VOR Facility and Proposed Taxiway Analysis* (February 2016) and FAA Memorandum on *Analysis of the*



LEGEND

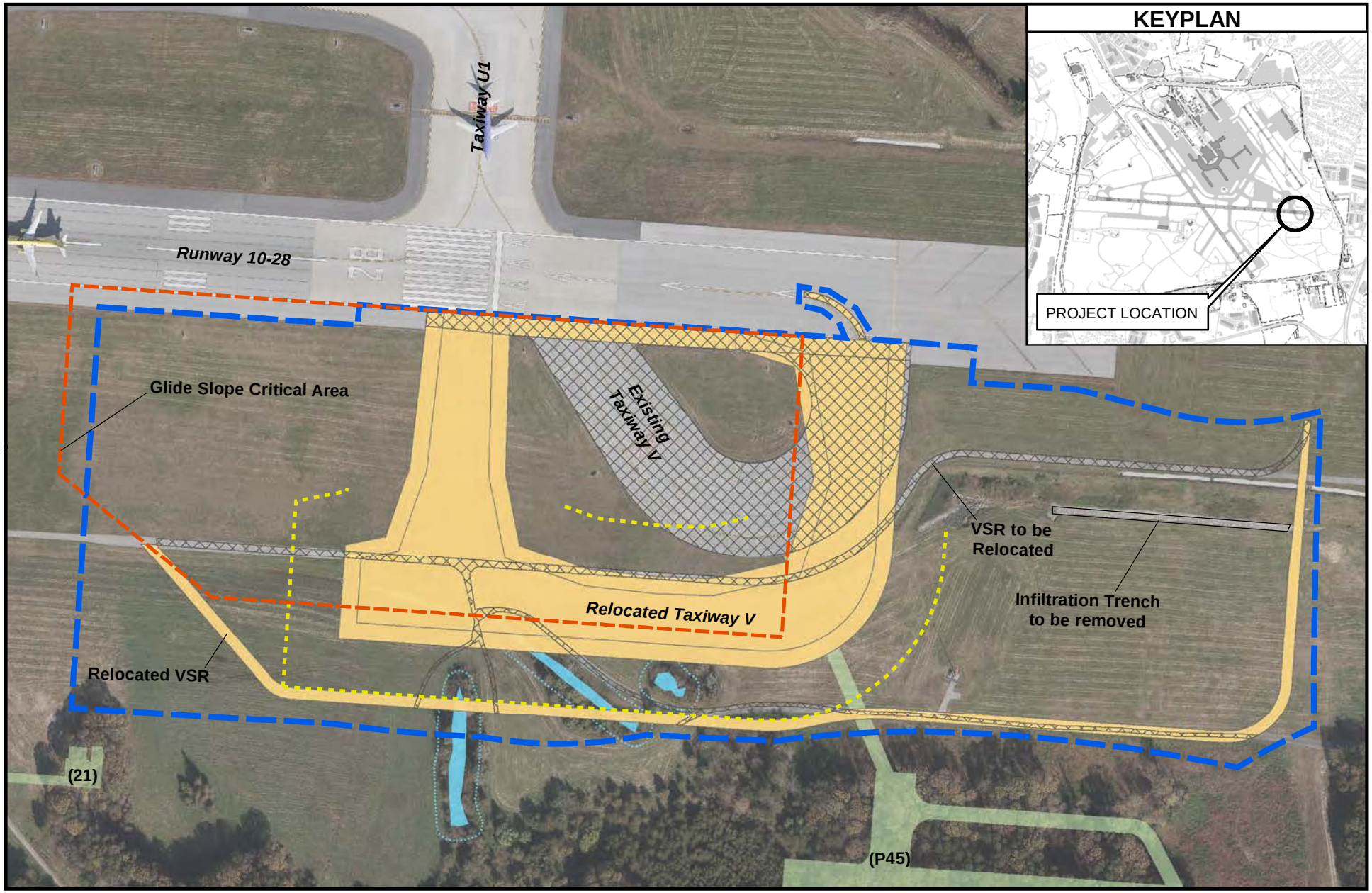
- Airport Property Boundary
- Part 77 (Primary, Approach and Transitional Surface Limits)
- Pole/Sign/Obstruction Light (To Be Relocated or Removed)
- Tree Obstruction Removal (2014 FMP Part 77 Conflict Areas)
- Obstruction Removal (2015 ALP Obstruction Points)

(10) Part 77 Obstruction Removal - Alternative 3
Figure 3.2-6d

N

0 1,250 2,500 5,000 Feet

Source: Aerial - MDOT MAA (2018)



LEGEND

- New Impervious
- Impervious Removal
- Impervious Reconstructed
- Other EA Projects
- Limit of Disturbance
- Wetlands with 25' Buffers
- Taxiway Object Free Area
- Glide Slope Critical Area

(17) Taxiway V Relocation - Alternative 1 - 2015 ALP
Figure 3.2-7

N

0 60 120 240 Feet

Source: Aerial - MDOT MAA (2018), ADCI

BAL VORTAC in Baltimore, MD, see *Appendix E, Attachment 3*, while the 1,000-foot VORTAC critical area is free of trees, because the trees just outside of the 1,000-foot critical area, but within 1,200 feet, have grown over the years, they now penetrate the two-degree vertical angle of FAA's siting standards. As such, the trees shown on **Figure 3.2-8** must be cleared to eliminate the out-of-tolerance conditions and allow the VORTAC to operate appropriately.

No Action

Under the No Action Alternative, the obstructions affecting the operation of the VORTAC would persist and continue to create interference concerns with the VORTAC signal, affecting aircraft navigation.

3.3 Enhance Airfield Safety and Efficiency

Alternatives to improve the safety and efficiency of airfield and airport operations are described in the following sub-sections.

3.3.1 Taxiway Uniform (U) 3 (2)

A new taxiway, Taxiway U3, is needed to reduce runway occupancy times related to arrivals on Runway 10 and thus improve runway system efficiencies.

Alternative 1 – 2015 ALP

This alternative proposes Taxiway U3 to be constructed 670 feet west of Taxiway U2, to connect Runway 10-28 to the recently relocated Taxiway U at a 502-foot separation. As shown in **Figure 3.3-1a**, the taxiway is positioned at a right angle and would reduce runway occupancy times (ROT), allowing for clear direction to pilots exiting from a Runway 10 arrival or departing from the Runway 28 end. Taxiway U3 would be constructed in concrete to alleviate the pavement degradation experienced on existing connectors.

Alternative 2 – High Speed Exit

This alternative would construct Taxiway U3 in the same location west of Taxiway U2, but angled as a high-speed exit for use by Runway 10 arrivals. As shown in **Figure 3.3-1b**, this alternative would reduce occupancy times related to Runway 10 arrivals to a slightly greater degree than Alternative 1, but would include a larger pavement footprint.

No Action

Under the No Action Alternative, runway occupancy times would not be reduced and increased airfield efficiency would not be achieved.

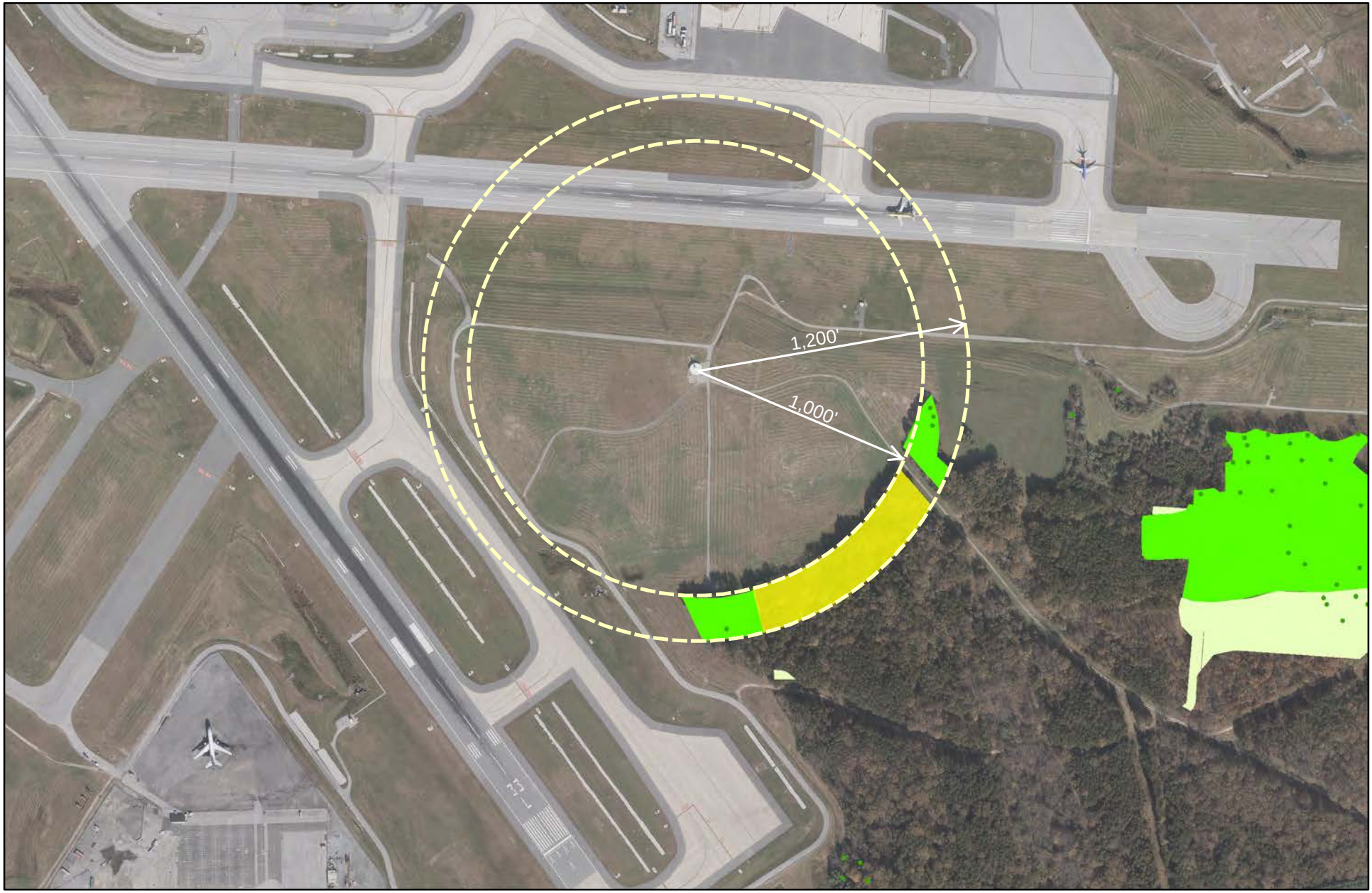
3.3.2 Isolation/RON Apron (7)

In order to isolate aircraft for inspection, an apron is needed south of the intersection of Runways 10-28 and 15R-33L.

Alternative 1 – 2015 ALP

This alternative includes converting a portion of the decommissioned Runway 4 end and Taxiway Y to a parking apron and isolation area for aircraft, as shown in **Figure 3.3-2a**. The project would provide two parking positions accommodating ADG V aircraft. The apron would include access across Runway 15R-33L to Taxiway D3.

This alternative would include relocating an existing ARFF access road around the proposed apron and installation of a blast fence and retaining wall. The relocated access road would in turn require the relocation of an RTR and ASDE-X. The proposed locations of these relocated NAVAIDs were not available for review in this EA and Section 4(f) Determination and will be



LEGEND

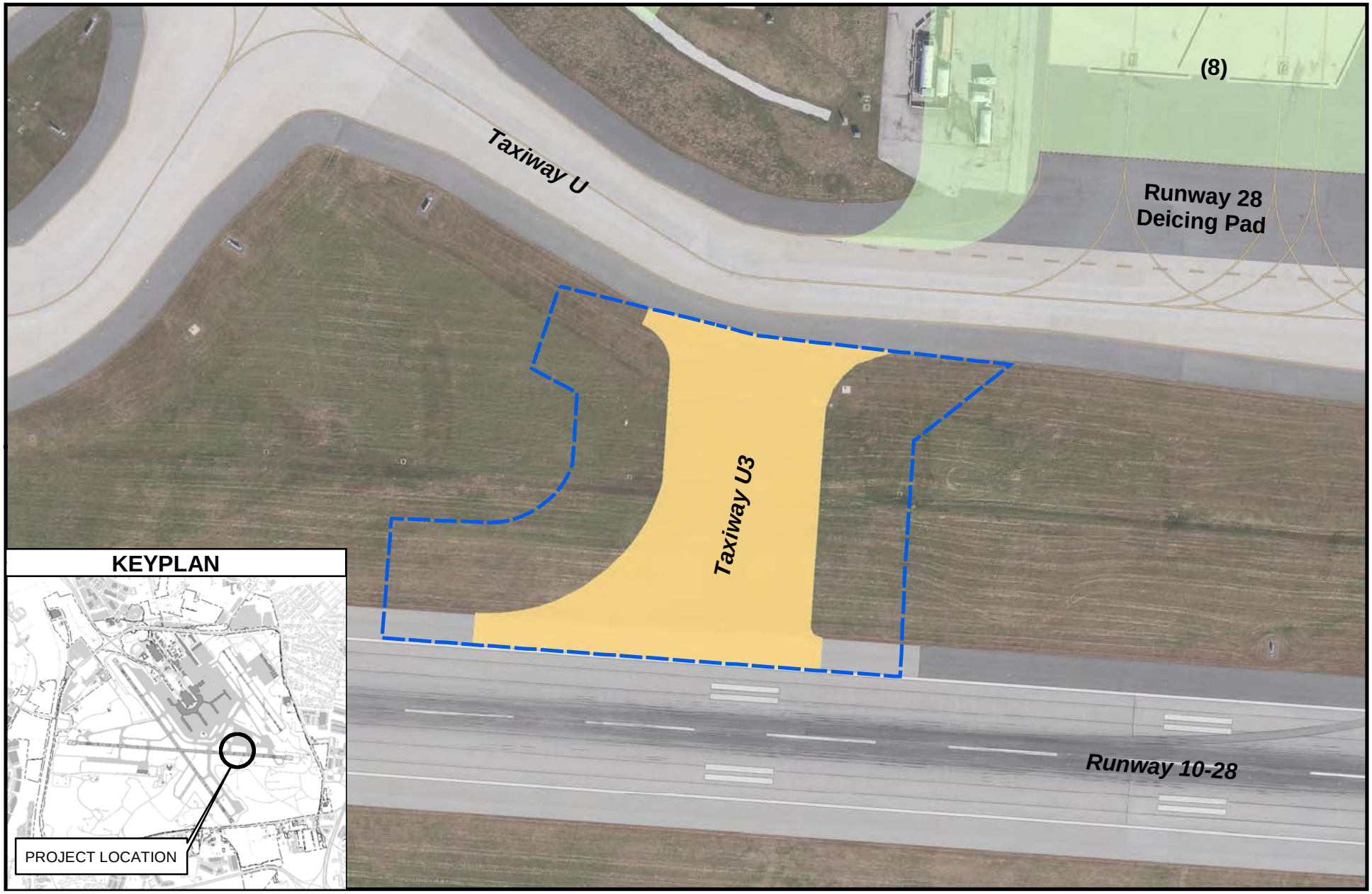
- Tree Removal for VORTAC Critical Area
- VORTAC Buffers
- Tree Obstruction Removal (2014 FMP Part 77 Conflict Areas)
- Tree Removal for Phase I Improvements
- Obstruction Removal (2015 ALP Obstruction Points)

VOR Critical Area Clearing– Alternative 1
Figure 3.2-8

N

0 145 290 580 Feet

Source: Aerial - MDOT MAA (2018)



LEGEND

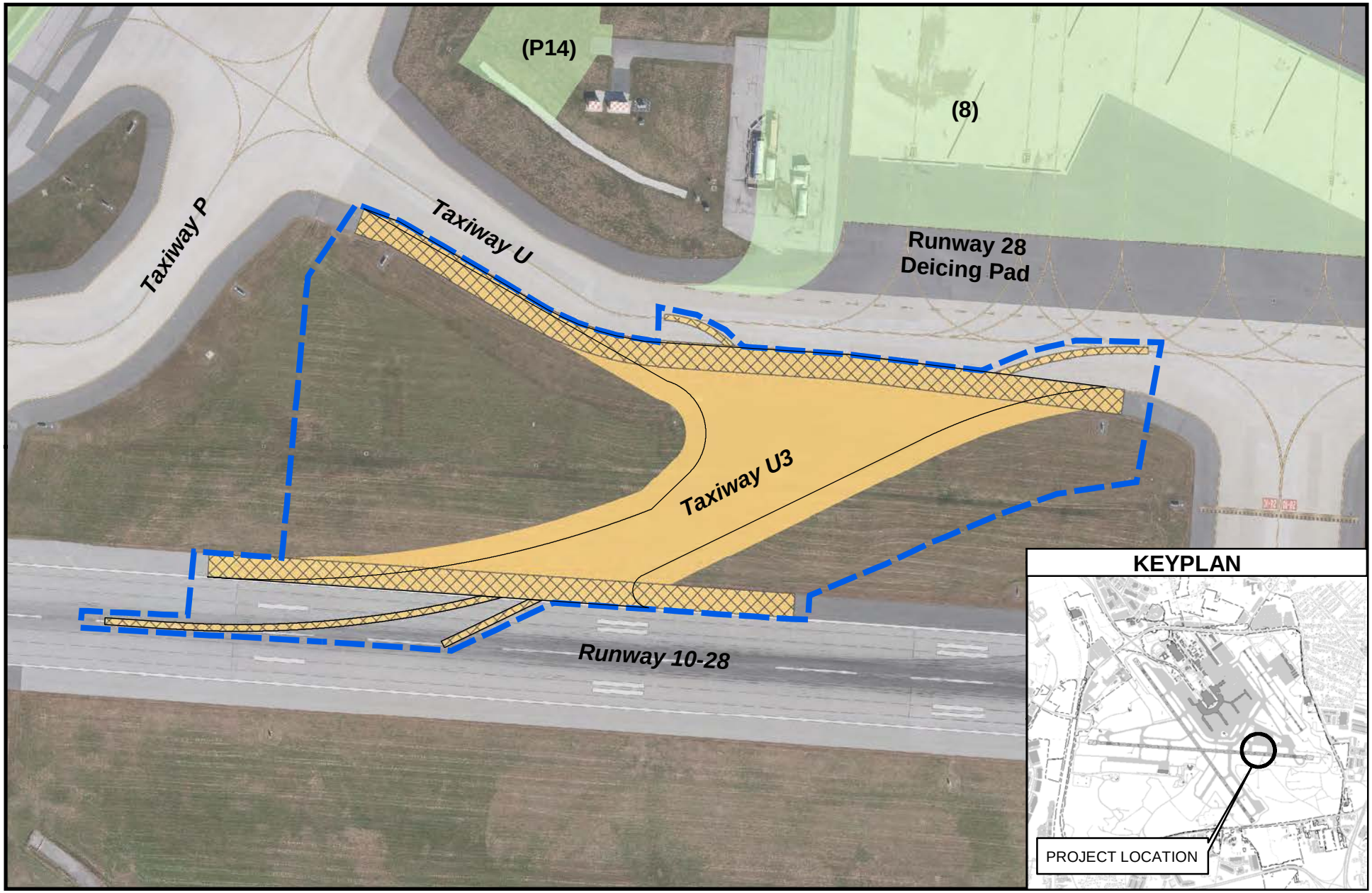
- New Impervious
- Impervious Removal
- Impervious Reconstructed
- Other EA Projects
- Limit of Disturbance

(2) Taxiway U3 - Alternative 1 - 2015 ALP
Figure 3.3-1a

N

0 37.5 75 150 Feet

Source: Aerial - MDOT MAA (2018), ADCI



LEGEND

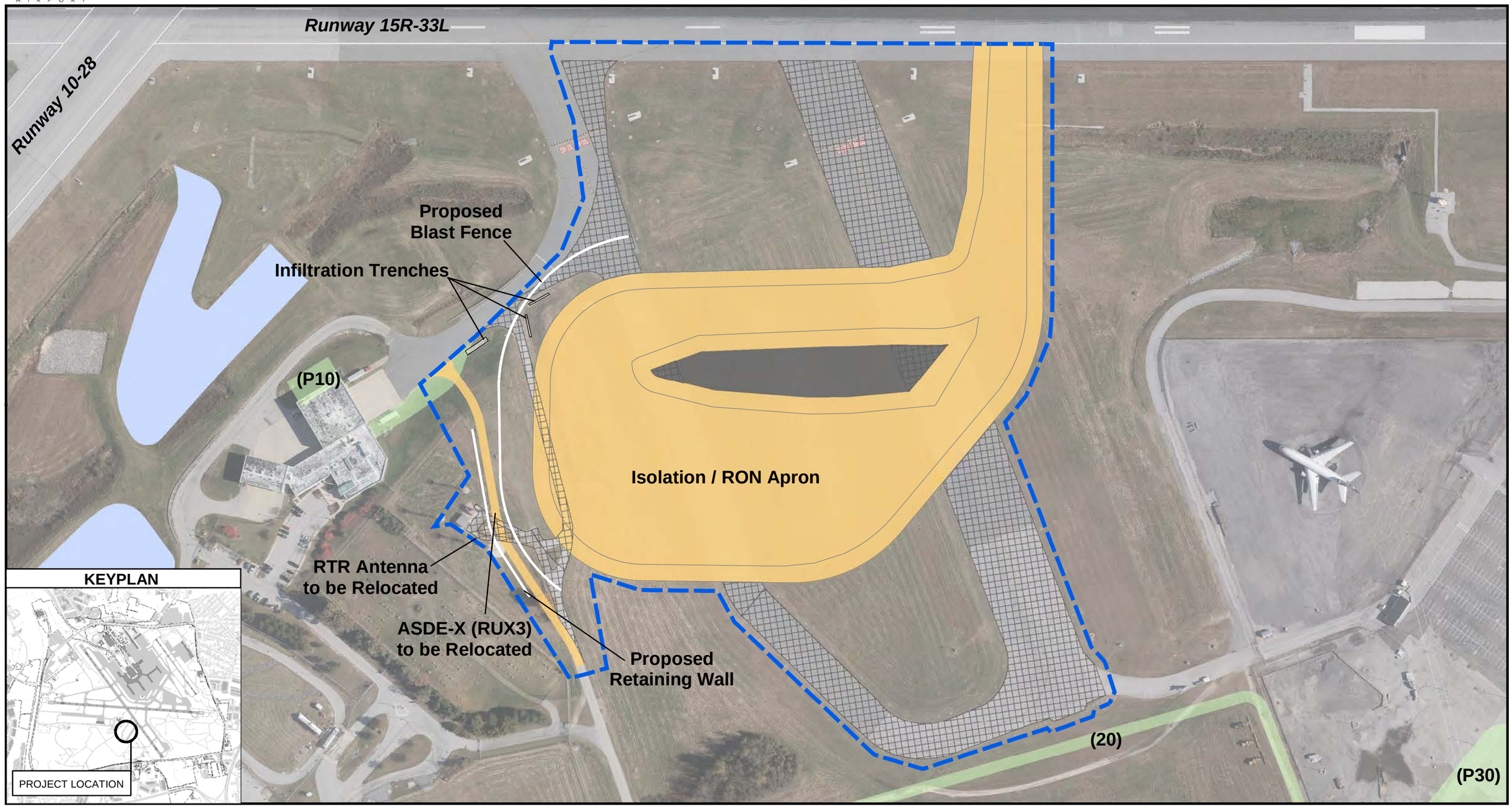
- New Impervious
- Impervious Removal
- Impervious Reconstructed
- Other EA Projects
- Limit of Disturbance

(2) Taxiway U3 - Alternative 2
Figure 3.3-1b

N

0 50 100 200 Feet

Source: Aerial - MDOT MAA (2018), ADCI



LEGEND

- New Impervious
- Impervious Removal
- Impervious Reconstructed
- Other EA Projects
- Limit of Disturbance
- Stormwater Management Pond

(7) Isolation/RON Apron - Alternative 1 - 2015 ALP
Figure 3.3-2a

N

0 100 200 400 Feet

Source: Aerial - MDOT MAA (2018), ADCI

considered in a future environmental review upon coordination with FAA, if necessary.

Alternative 2- Move ARFF Access Road

As shown in **Figure 3.3-2b**, Alternative 2 includes the same parking apron and isolation area as the ALP alternative, however, this alternative relocates the existing ARFF access road further west around the proposed apron to avoid the need to relocate the RTR and ASDE-X. This alternative would also require a blast fence and retaining wall.

No Action

Under the No Action Alternative, the need for an isolation apron would not be met.

3.3.3 Relocate Taxiway Hotel (H) (12)

Relocation of Taxiway H is needed to reduce ROT for arrivals to Runway 33L and thus improve runway system efficiencies. The relocation is also needed to remove direct access from the terminal and apron areas to Runway 15R-33L, reducing the potential for incursions and meeting FAA design standards.

Three alternatives are proposed for the relocation as a result of advanced planning efforts for BWI Marshall Airport. One alternative is proposed as shown on the ALP, the remaining two provide options to better coincide with potential Runway 33L threshold relocations in the future.

Alternative 1 – 2015 ALP

This alternative relocates Taxiway H 500 feet south of its existing location, as shown in **Figure 3.3-3a**. The relocated taxiway would reduce ROT and would eliminate direct access from the apron area to Runway 15R-33L in accordance with FAA design standards. This alternative would remove an existing infiltration trench and would relocate two stormwater inlets. Subsequent to the displacement of the Runway 15R landing threshold, BWI ATCT suggested that relocating Taxiway H would be optimal for traffic exiting Runway 33 upon landing.

Alternative 2 – 150 Feet North

As an alternative to the location shown on the ALP, Taxiway H would be relocated 150 feet north of its current location as shown in **Figure 3.3-3b**. This alternative would accommodate the expansion of the Runway 15R deicing pad and would have no effect on the circulation to and through the expanded deicing pad. This alternative would remove an existing infiltration trench and would relocate a stormwater inlet.

Alternative 3 – 500 Feet North

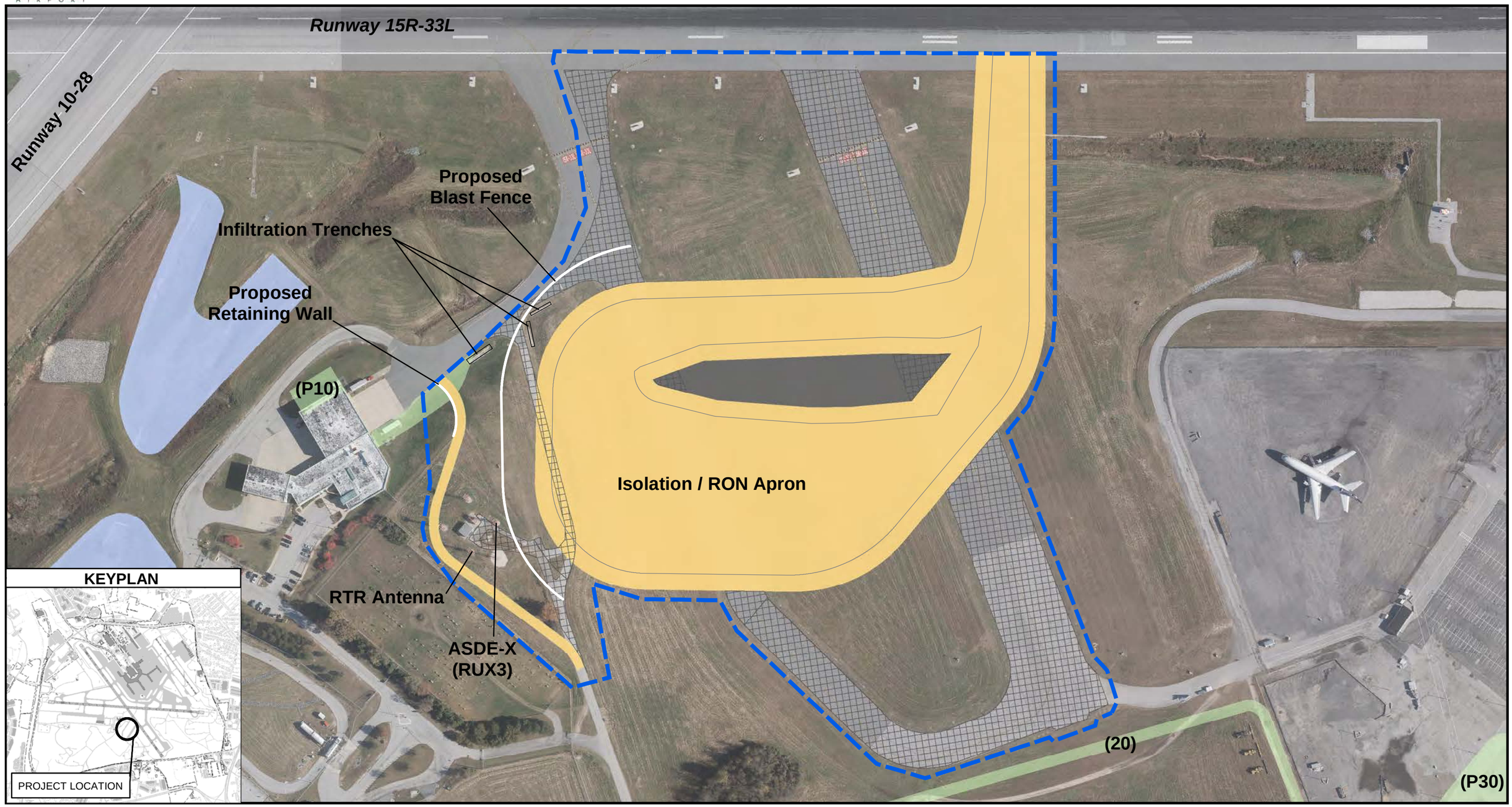
As with Alternative 2, this alternative would accommodate potential future changes to Runway 15R-33L. As shown in Figure **3.3-3c**, Alternative 3 would relocate Taxiway H 500 feet north of its existing location. This alternative would remove an existing infiltration trench and would relocate a stormwater inlet.

No Action

The No Action Alternative would not allow for the reduction in ROT and would not allow aircraft landing on Runway 33L to exit the runway after Taxiway F without taxiing the entire length of the runway.

3.3.4 Existing Aircraft Rescue and Firefighting Facility (ARFF) Expansion Bays (P10)

The existing ARFF facility currently does not have sufficient office space to meet existing needs and does not have adequate area to allow for indoor parking of emergency vehicles.



LEGEND

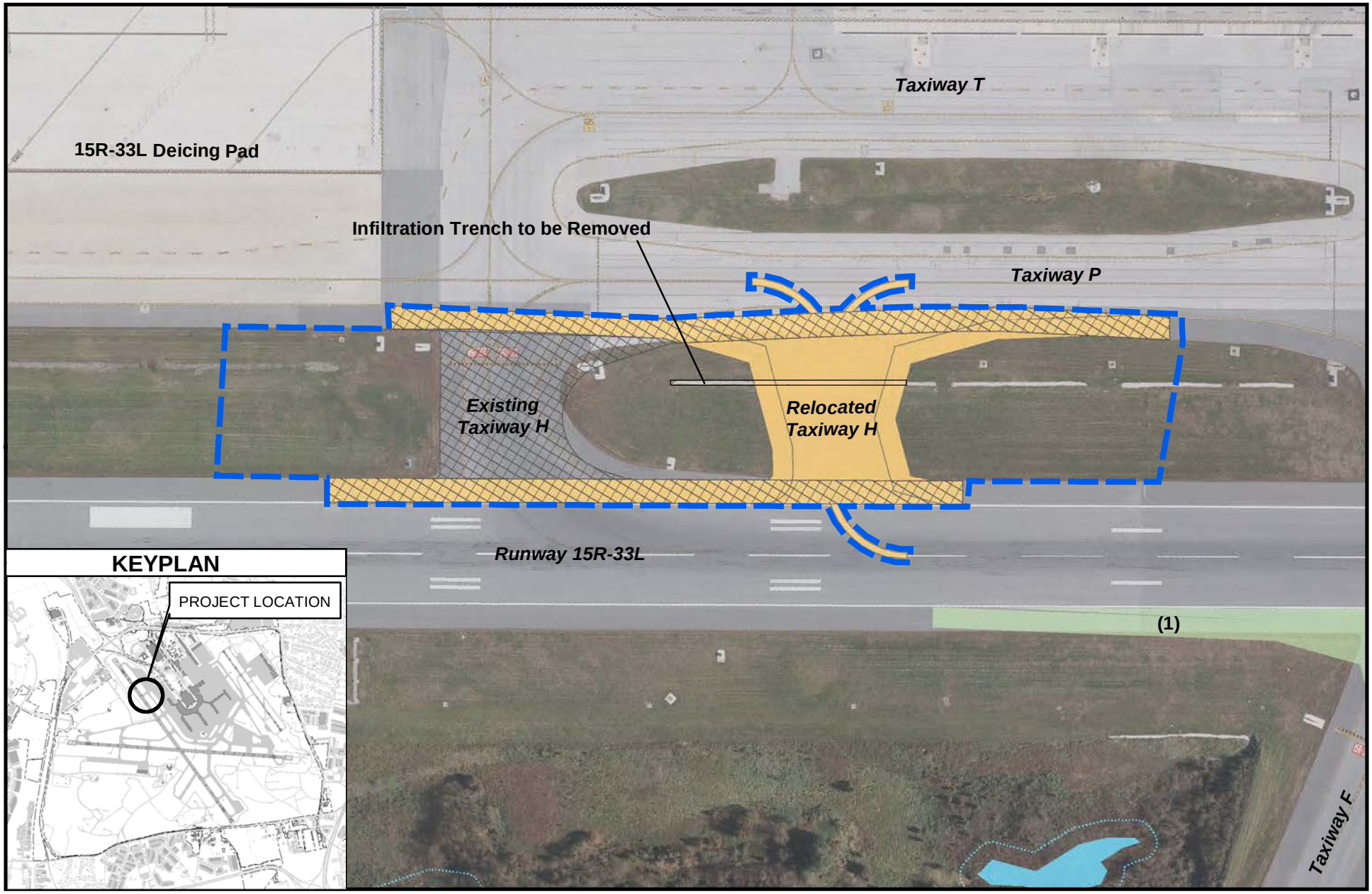
- New Impervious
- Impervious Removal
- Impervious Reconstructed
- Other EA Projects
- Limit of Disturbance
- Stormwater Management Pond

(7) Isolation/RON Apron - Alternative 2
Figure 3.3-2b

N

0 100 200 400 Feet

Source: Aerial - MDOT MAA (2018), ADCI



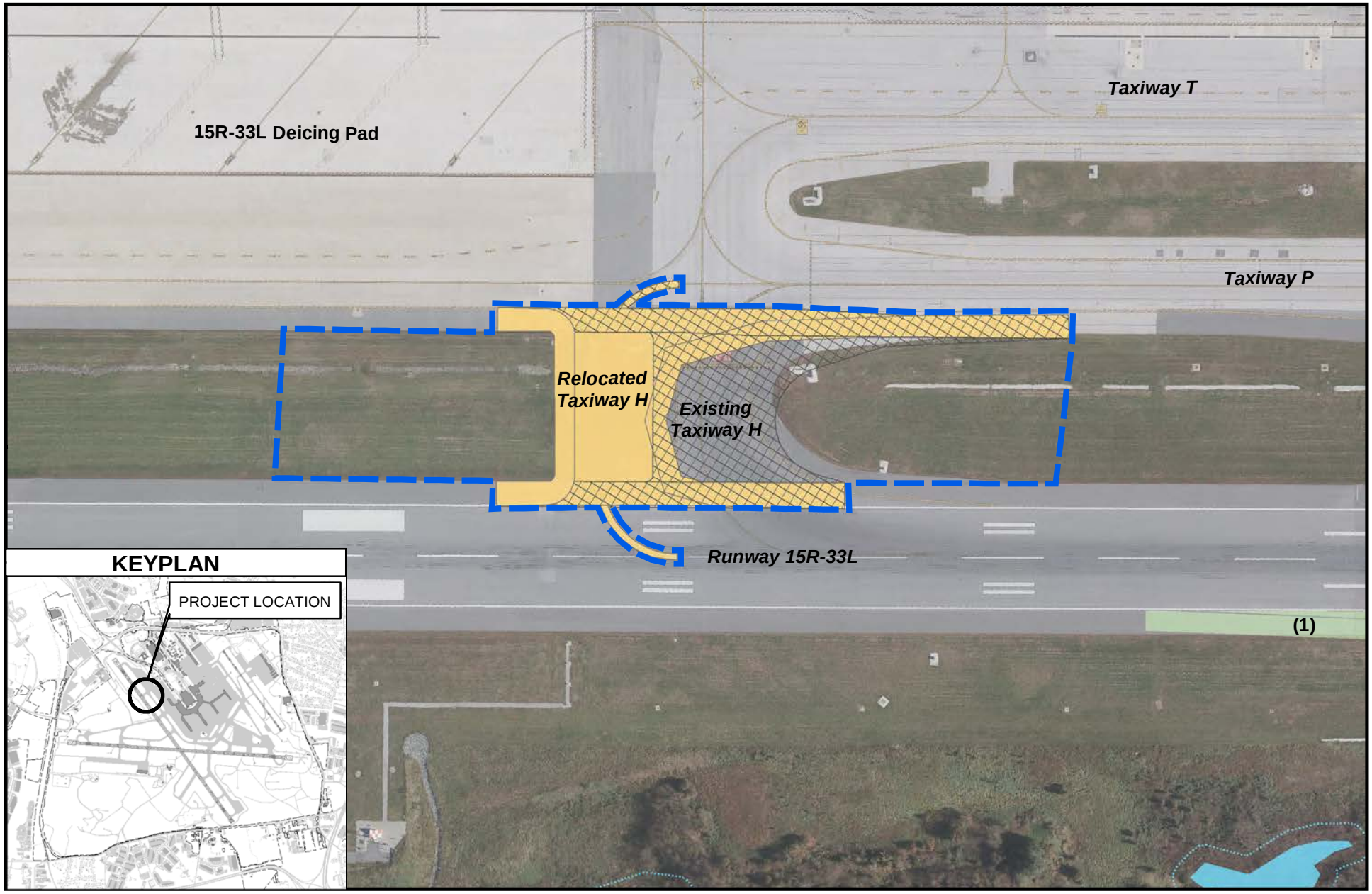
LEGEND

- New Impervious
- Impervious Removal
- Impervious Reconstructed
- Other EA Projects
- Limit of Disturbance
- Wetlands with 25' Buffers

(12) Relocate Taxiway H - Alternative 1 - 2015 ALP
Figure 3.3-3a

0 50 100 200 Feet

Source: Aerial - MDOT MAA (2018), ADCI



LEGEND

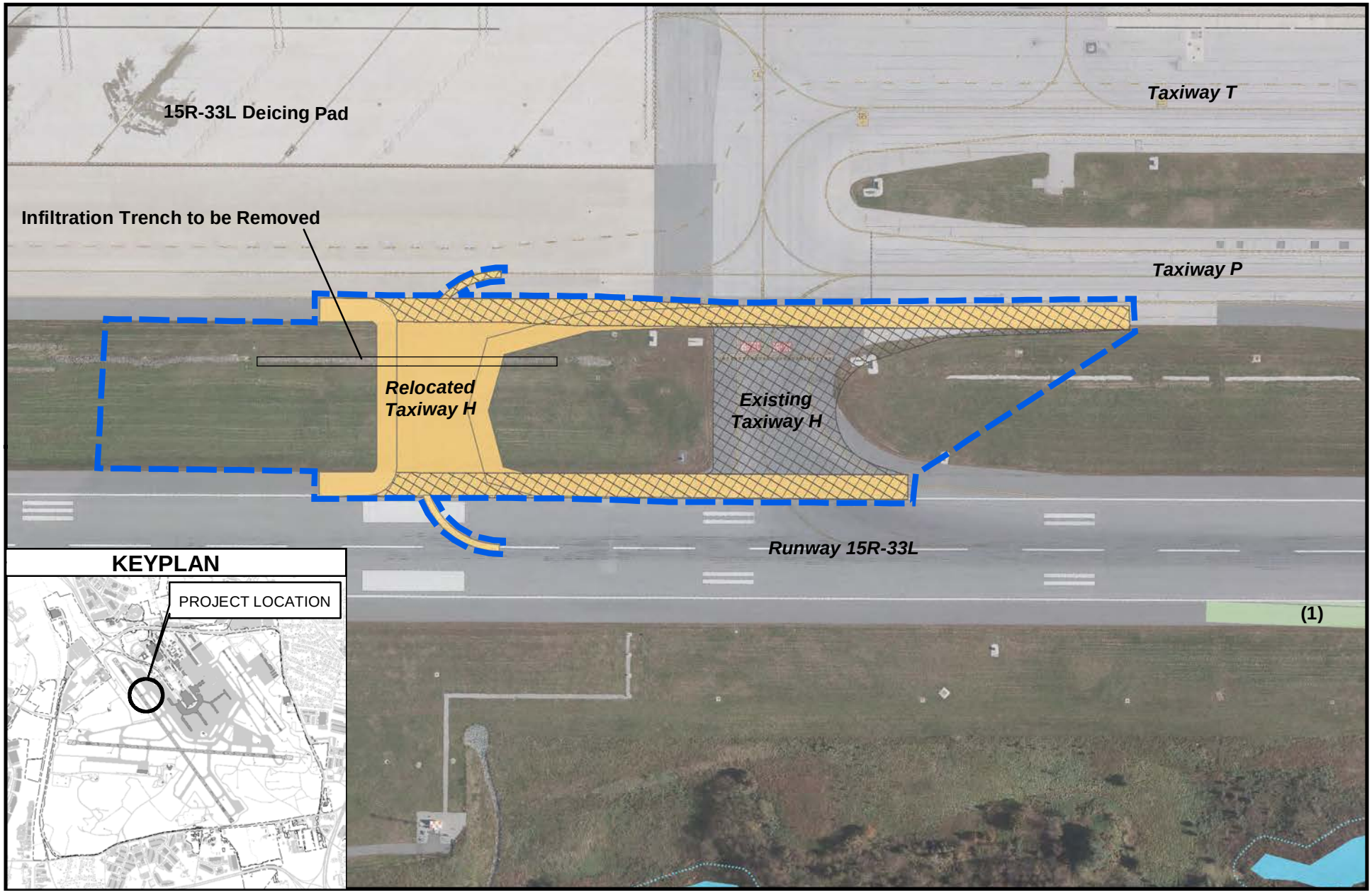
- New Impervious
- Impervious Removal
- Impervious Reconstructed
- Other EA Projects
- Limit of Disturbance
- Wetlands with 25' Buffers

(12) Relocate Taxiway H - Alternative 2
Figure 3.3-3b

N

0 50 100 200 Feet

Source: Aerial - MDOT MAA (2018), ADCI



LEGEND

- New Impervious
- Impervious Removal
- Impervious Reconstructed
- Other EA Projects
- Limit of Disturbance
- Wetlands with 25' Buffers

(12) Relocate Taxiway H - Alternative 3
Figure 3.3-3c

N

0 50 100 200 Feet

Source: Aerial - MDOT MAA (2018), ADCI

Alternative 1 – 2015 ALP

As shown in **Figure 3.3-4**, the ALP alternative would construct two parking bays and office space adjacent to the existing ARFF building for use by BWI Marshall Airport Fire and Rescue.

No Action

Under the No Action Alternative, the need for additional parking bays and office space at the ARFF would not be met. Additionally, the life expectancy of the emergency response vehicles would continue to be reduced since ample indoor parking would continue to remain unavailable.

3.3.5 Relocate Fire Training Facility (P45)

A relocation and reconstruction of the Fire Training Facility is necessary due to the extensive design standard changes that have been issued since the existing facility was constructed in 1986. Updated planning efforts by MDOT MAA have resulted in expanding the fire training facility concept into a broader MDOT MAA Training Facility that would house the fire training facility, as well as classrooms for overall MDOT MAA training purposes. In addition, this facility is expected to provide regional training capabilities for other first responder organizations. A new public access gate and modification to the Airport Operations Area (AOA) is also needed for access to public roadways.

It should be noted that the existing fire training facility along Mathison Way will not be demolished as part of the Proposed Action. Future NEPA documentation would be required prior to the demolition of the existing facility.

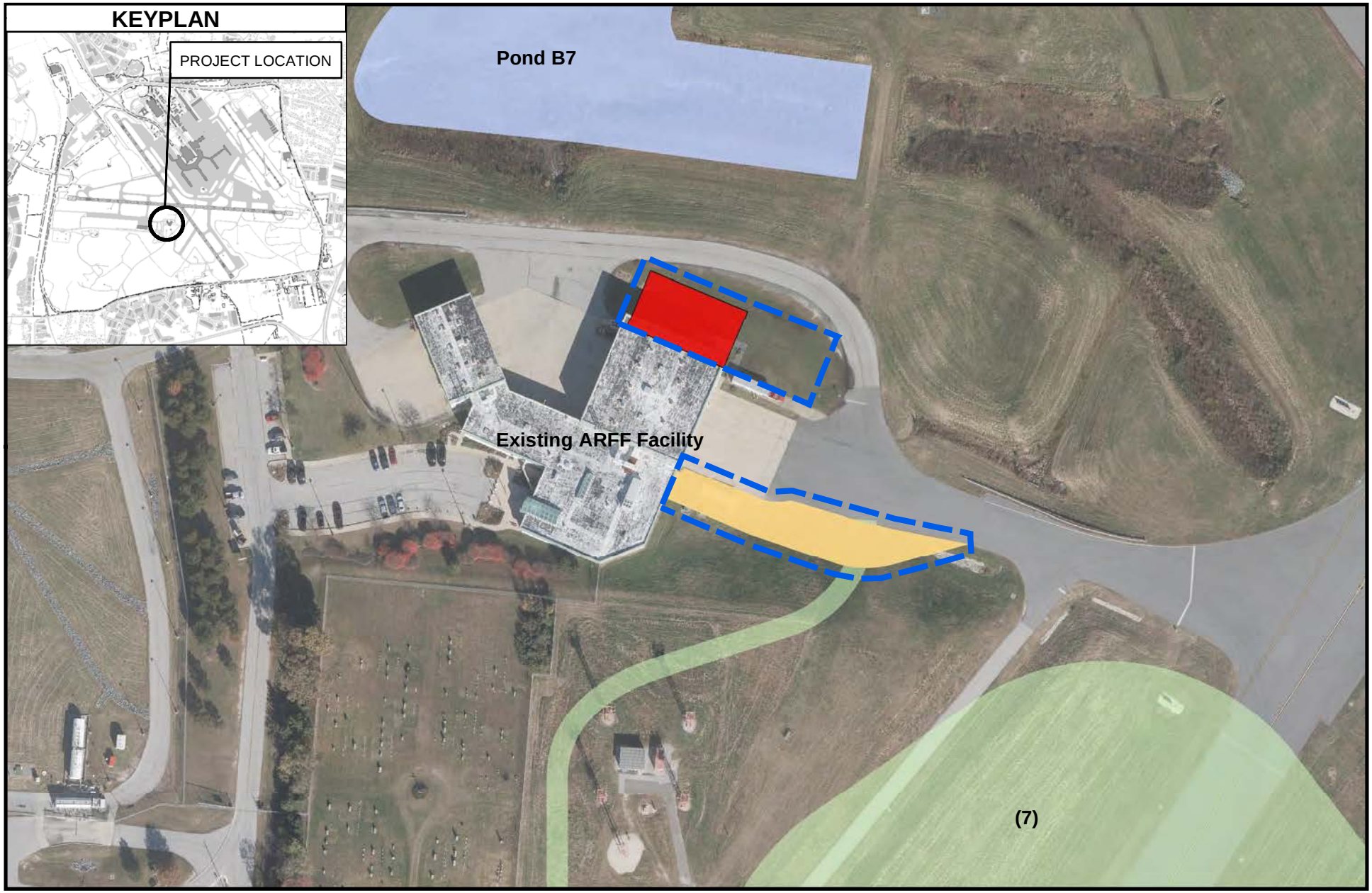
Alternative 1 – 2015 ALP

A new fire training facility location was chosen to avoid conflicts with the future proposed realignment of Mathison Way as shown on the ALP. The proposed facility would be located east of the Runway 33L end and south of Taxiway V, in the forested area as shown on **Figure 3.3-5a**. The facility would include a burn pit area, firefighting maneuvering area, training operations area, realistic interior fire building, training classrooms, and other necessary facilities. The facility would include appropriate storage for hazardous materials, and collection and treatment of aqueous film forming foam (AFFF) in keeping with state and local ground water and drinking water regulations.

VSRs would be constructed to provide connectivity from the fire training facility to the airfield and to public roadways. A VSR would tie in north to the existing VSR near Taxiway V. Forested and wetland areas would be impacted by this alternative. A VSR and new public access gate would need to be added as a project component to allow access to the facility from Aviation Boulevard. Additionally, a VSR would be constructed from the relocated facility south and west to meet up with an existing VSR at the Runway 33L end.

Alternative 2 – Modified 2015 ALP Alternative (shifts facility 970 feet east)

As shown in **Figure 3.3-5b**, Alternative 2 would shift the location of the facility approximately 970 feet east of the Alternative 1 location. This would reserve a larger, contiguous open area for future airport use by placing the facility closer to the airport perimeter while also reducing the length of public access VSR needed. This alternative would include the same facilities



LEGEND

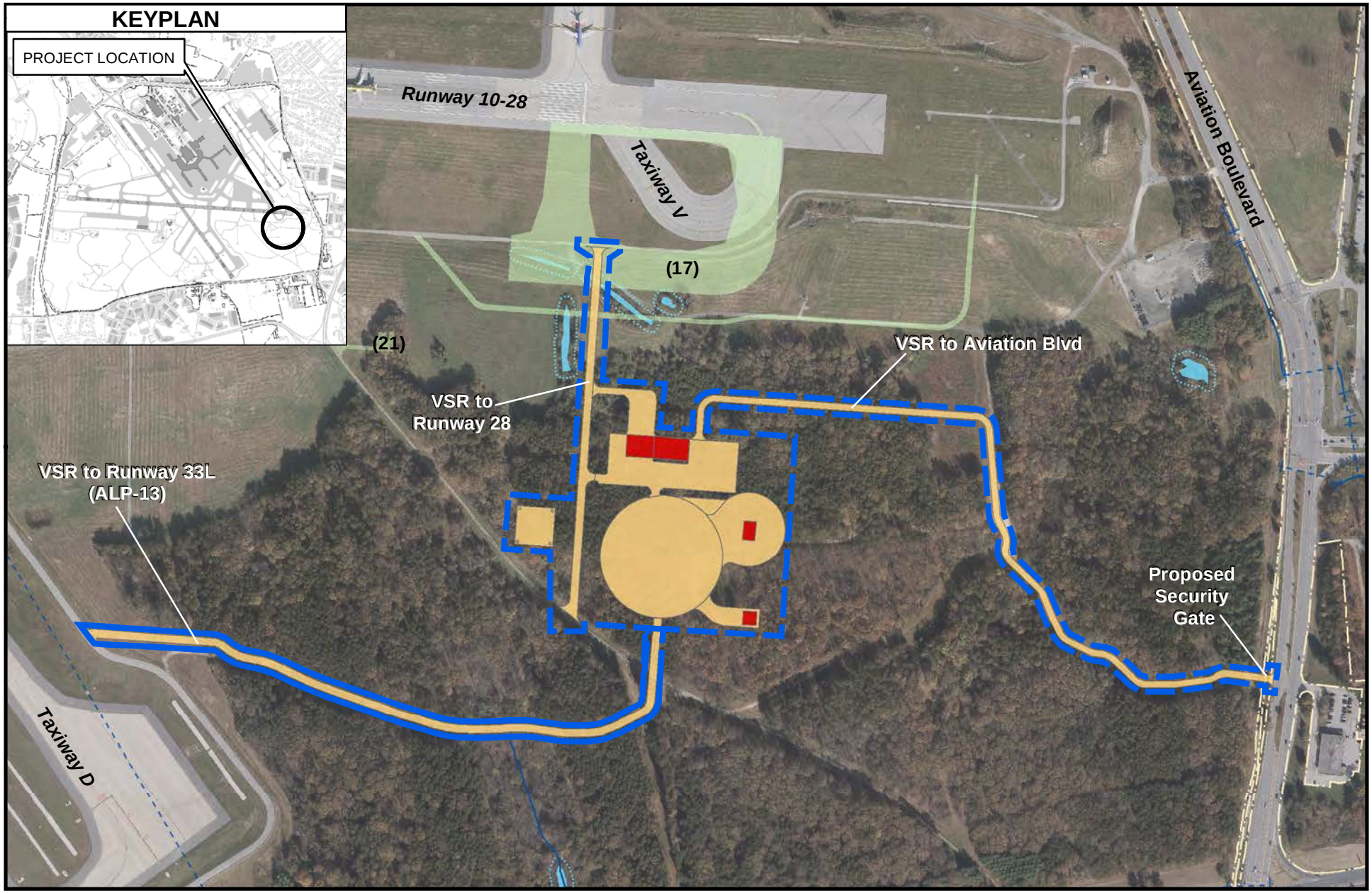
- New Impervious
- Building
- Limit of Disturbance
- Stormwater Management Pond
- Other EA Projects

(P10) Existing ARFF Expansion Bays - Alternative 1 - 2015 ALP
Figure 3.3-4

N

0 30 60 120 Feet

Source: Aerial - MDOT MAA (2018), ADCI



LEGEND

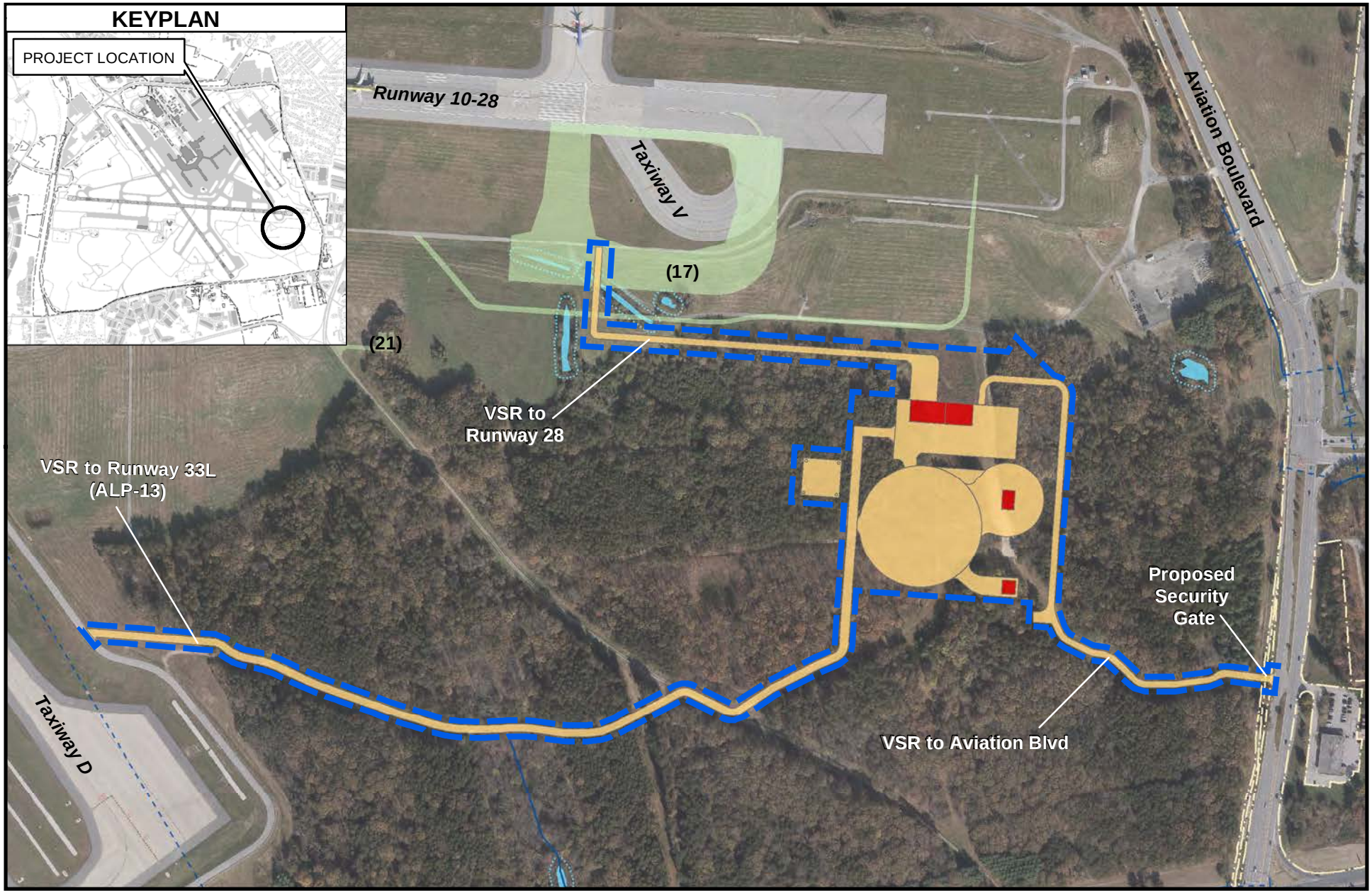
- New Impervious
- Other EA Projects
- Limit of Disturbance
- Wetlands with 25' Buffers
- Building
- Waters of the U.S.
- Culverted Waters of the U.S.
- Airport Property Boundary

(P45) Relocate Fire Training Facility - Alternative 1 - 2015 ALP
Figure 3.3-5a

N

0 125 250 500 Feet

Source: Aerial - MDOT MAA (2018), ADCI



LEGEND

- New Impervious
- Other EA Projects
- Limit of Disturbance
- Wetlands with 25' Buffers
- Building
- Waters of the U.S.
- Culverted Waters of the U.S.
- Airport Property Boundary

(P45) Relocate Fire Training Facility - Alternative 2
Figure 3.3-5b

N

0 125 250 500 Feet

Source: Aerial - MDOT MAA (2018), ADCI

as listed in Alternative 1. As with Alternative 1, VSRs would be needed to connect to the Runway 33L end, Taxiway V, and to provide access (including a public access gate) to Aviation Boulevard. Forested and wetland areas would be impacted by this alternative, but there would be fewer forest impacts under this alternative as compared with Alternative 1.

Alternative 3 - Modified 2015 ALP Alternative (shifts facility 490 feet east)

As proposed with Alternatives 1 and 2, a relocated fire training facility would be constructed. As shown on **Figure 3.3-5c**, the facility would be located between the locations proposed under Alternatives 1 and 2. Relocating the facility west of the Alternative 2 location would maximize the potential development that could occur to the west of the facility by maintaining a large contiguous open area for future development.

Alternative 4 – Advanced Planning Alternative

Following publication of the January 2018 Draft EA and Draft Section 4(f) Determination, a Program Definition Document (PDD) was completed for the Fire Training Facility in August 2018 (see *Appendix E, Attachment 7*)**.** The PDD advanced the preliminary engineering design to align with MDOT MAA's vision for the project, "to include a multi-purpose facility with more realistic fire training resources and capabilities, additional classrooms to accommodate a wider array of airport first responder and employee training needs, and to serve as the command center and control facility for managing and coordinating events in the aftermath of an airport emergency or disaster."

As shown in **Figure 3.3-5d**, Alternative 4 includes preliminary design for needed utility connections (sanitary, water, gas, electric telecom) and stormwater management facilities. Two options for sanitary sewer connection are identified in the PDD. Option 1 would tie into the Airport's sanitary system approximately 5,800 feet west of the project site near the ARFF station. Option 2 would tie into Anne Arundel County's sanitary system approximately 2,500 feet east of the project site at the intersection of Aviation Blvd and Cromwell Park Drive. While Option 2 is the preferred connection due to proximity, both options are proposed in the event that Anne Arundel County does not have capacity or does not approve the connection into their sanitary sewer system.

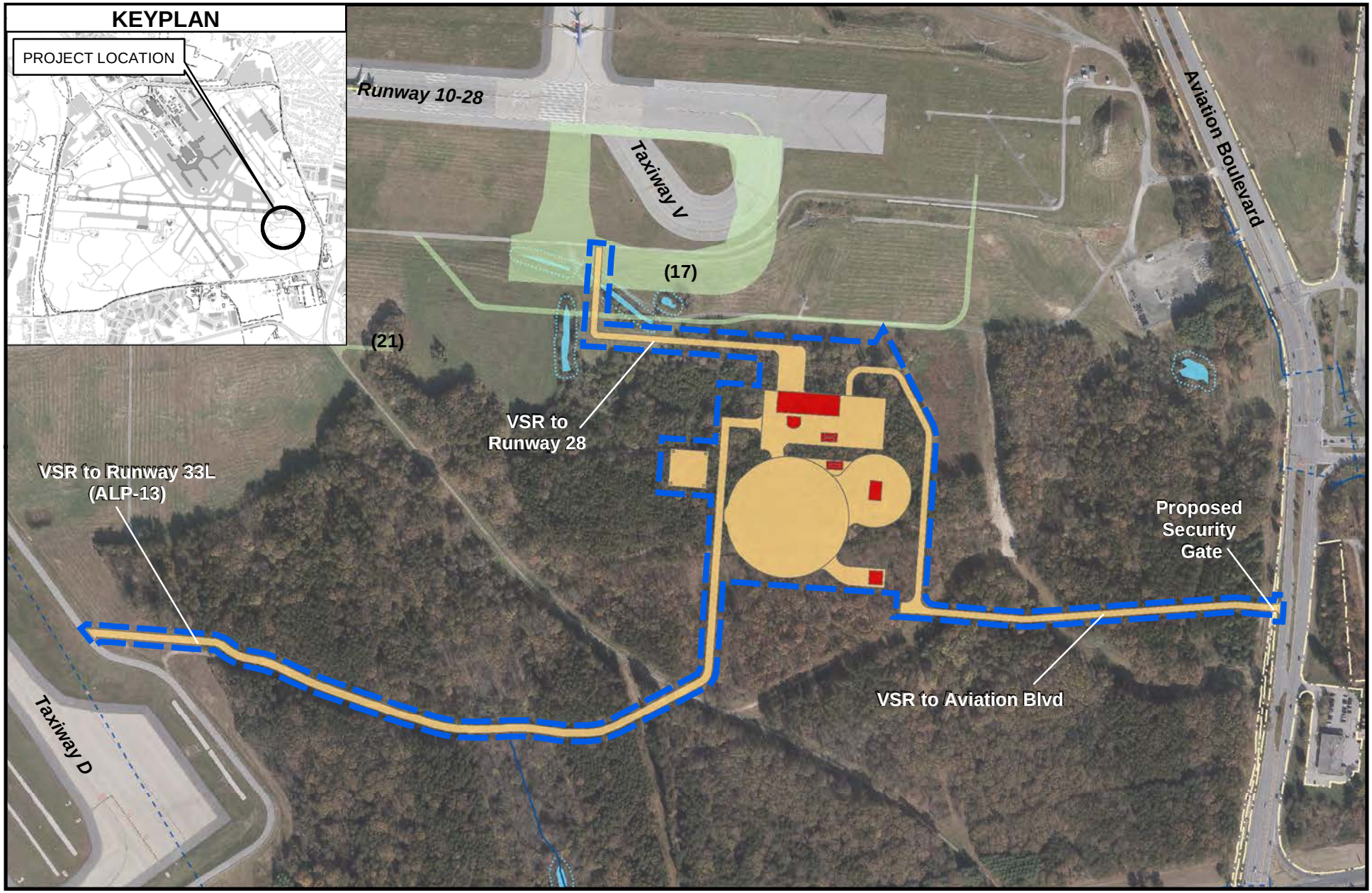
Alternative 4 also includes a proposed VSR connecting to Aviation Blvd at the existing intersection with Cromwell Park Drive.

No Action

As the existing Fire Training Facility located in the midfield area along Mathison Way does not meet current FAA design standards, the facility would remain nonstandard and any additional improvements needed to the facility would not be permitted until the facility is upgraded to meet current design standards.

3.3.6 Rehabilitate / Improve Pavement in Accordance with the Pavement Management Plan (PMP)

BWI Marshall Airport maintains a Pavement Management Program where the status and condition of all airside and landside pavements are reviewed, tested, and capital improvement schedules for rehabilitation are determined. Pavement repairs are needed because the pavement has deteriorated to unacceptable levels or is planned for routine, lifecycle



LEGEND

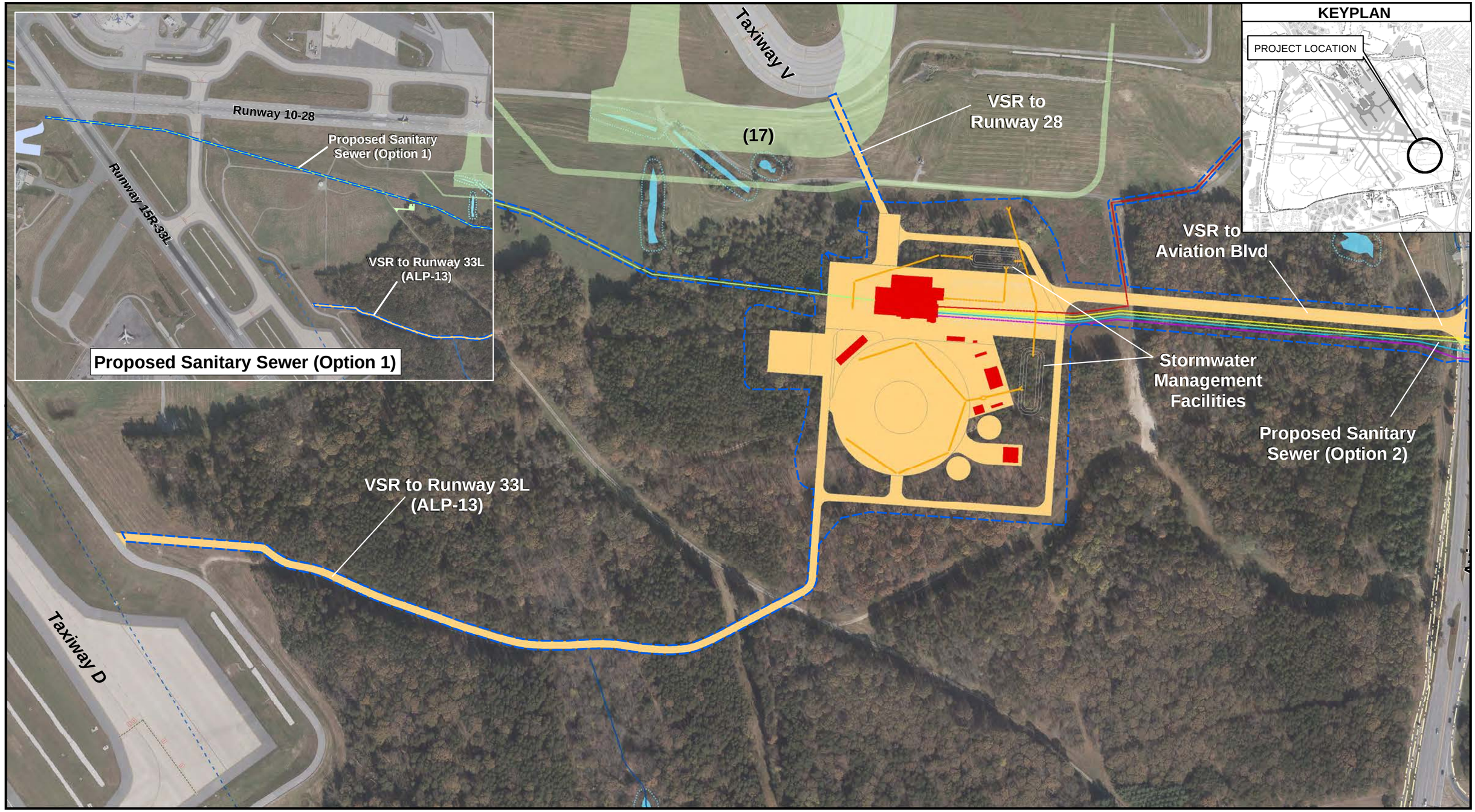
- New Impervious
- Other EA Projects
- Limit of Disturbance
- Wetlands with 25' Buffers
- Building
- Stream
- Culverted Stream
- Airport Property Boundary

(P45) Relocate Fire Training Facility - Alternative 3
Figure 3.3-5c

N

0 125 250 500 Feet

Source: Aerial - MDOT MAA (2018), ADCI



LEGEND

- New Impervious
- Other EA Projects
- Limit of Disturbance
- Wetlands with 25' Buffers
- Building
- Stream
- Culverted Stream
- Airport Property Boundary

Proposed Utilities

- Sanitary Line
- Water Line
- Gas Line
- Electric Utility Line
- Stormwater Line
- Telecom Duct

(P45) Relocate Fire Training Facility - Alternative 4
Figure 3.3-5d

N

0 150 300 600 Feet

Source: Aerial - MDOT MAA (2018), ADCI

repairs. For some projects where PMP improvements are proposed, in the event that a separate pavement relocation or improvement project is proposed, the PMP improvement project would no longer be required (i.e., Relocation of Taxiways F and R).

Alternative 1 – Pavement Management Program

Figure 3.3-6 depicts the projects included in the PMP proposed for implementation in the next five years. The proposed type of repair (i.e., mill and overlay, full reconstruction) varies per project and is detailed in ***Appendix F, Pavement Management Program (PMP) Reports***.

No Action

Under the No Action Alternative, the pavement proposed for repair would continue to deteriorate and may eventually fail and be unusable. Failing pavement in aircraft movement areas resulting in Foreign Object Debris (FOD) would create a safety concern.

3.3.7 VSR Connector (20)

The provision of a perimeter roadway system allows non-critical vehicles to avoid using the runway and taxiways for movement around the airfield inside the security perimeter of the airport. Thus, a perimeter roadway system adds an important factor of safety and efficiency for the airfield.

Within the southern portion of the airport, a roadway segment is needed to connect the existing roadway south of the ARFF to the east with the Gold Lot. The current dirt roadway is not conducive to many vehicle operations due to steep grades and inadequate rights-of-way.

Alternative 1

The proposed VSR connector would include a two-lane paved road south of the former Runway 4 end. This roadway would provide more efficient access around the southern portion of the airfield. **Figure 3.3-7** shows the proposed VSR connector. The roadway would connect with the old Fort Mead Road south of the ARFF, then continue southeast (adjacent to the former Runway 4 end), and then turn south to continue parallel to the Gold Lot, where it would connect with the Gold Lot.

No Action

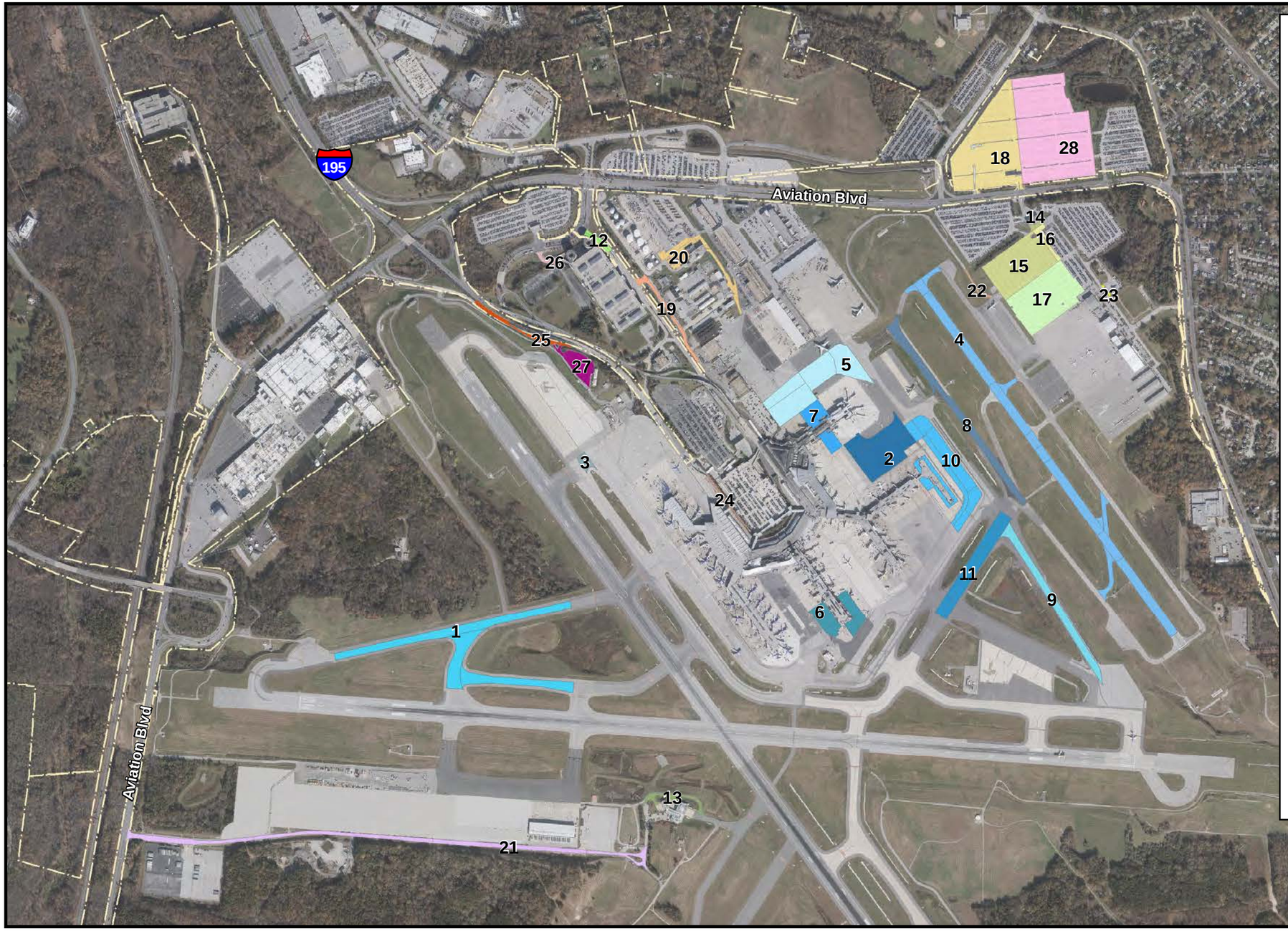
Airfield safety and efficient access by security, maintenance and other critical vehicles would be limited without the addition of this VSR connector.

3.3.8 Relocate Remote Transmitter/Receiver (RTR) Facility

Relocation of the RTR facility is necessary to improve and optimize the RTR signal, as the existing RTR site is susceptible to signal loss due to interference from surrounding buildings. Future development may further impede signal coverage if the RTR remains at the existing site. Additionally, the proposed expansion of the Runway 15R deicing pad (see Section 3.4.1) would result in the demolition of the existing RTR facility.

Alternative 1

A siting analysis for a new RTR site was conducted in early 2015 by MDOT MAA and AECOM / Spohnheimer Consulting Airspace Systems, with FAA overview and review. The analysis identified a general search area on the southeast side of the Airport and validated that a future RTR within the search area could perform well. The proposed RTR



Recommended 10-Year CIP Projects

Airside

1 Taxiways F, G and R Mill and Overlay (17-01)
2 Ramp DE & Taxilanes N & N1 Mill and Overlay (17-02)
3 Taxiway H Mill and Overlay (18-03)
4 RW 15L & Associated Taxiways Mill and Overlay (19-01)
5 Taxilane AA & Ramp E Mill and Overlay (19-02)
6 Gate C PCC Restoration & Reconstruction (20-02)
7 Gate E PCC Restoration (20-03)
8 Taxiways S and J Overlay (20-04)
9 Taxiway B Mill and Overlay (21-01)
10 Ramp DY Mill and Overlay (21-02)
11 Taxiway P Mill and Overlay (21-03)

Landside

12 Elm Road (At Terminal Road) Mill and Overlay (17-01)
13 ARFF Road Reconstruction (17-02)
14 Long-Term B Parking 02A (Booths to Main Lot) Mill and Overlay (18-01)
15 Long-Term B Parking 05 (Northwest Section) Reconstruction (18-02)
16 Long-Term B Parking 06A (Entrance Aisle to Main Lot) Reconstruction (18-03)
17 Long-Term B Parking 07 (Southeast Section) Mill and Overlay (18-04)
18 Long-Term A Parking 01 (West Section) Mill and Overlay (19-01)
19 Cargo Service Road Mill and Overlay (19-02)
20 Fuel Farm Road and Park Mill and Overlay (19-03)
21 Mathison Way Mill and Overlay (19-04)
22 Burma Road (RW 15L Hold Pad to GA Apron) Reconstruction (20-01)
23 Compressed Natural Gas (CNG) Facility Pavement Reconstruction (20-02)
24 Arrivals (Hourly Garage to Pedestrian Bridge #2) and Departures (Executive Managers Lot to Elm Road_ Roadway Mill and Overlay (20-03)
25 I-195 Inbound (Aviation Blvd On-Ramp to Taxi Lot and Adjacent to Employee Lot) Mill and Overlay (20-04)
26 Sheraton Parking Mill and Overlay (20-05)
27 Taxi Lot Pavement Mill and Overlay (20-06)
28 Long Term A Parking 02 (Center Section) Mill and Overlay (21-01)

LEGEND

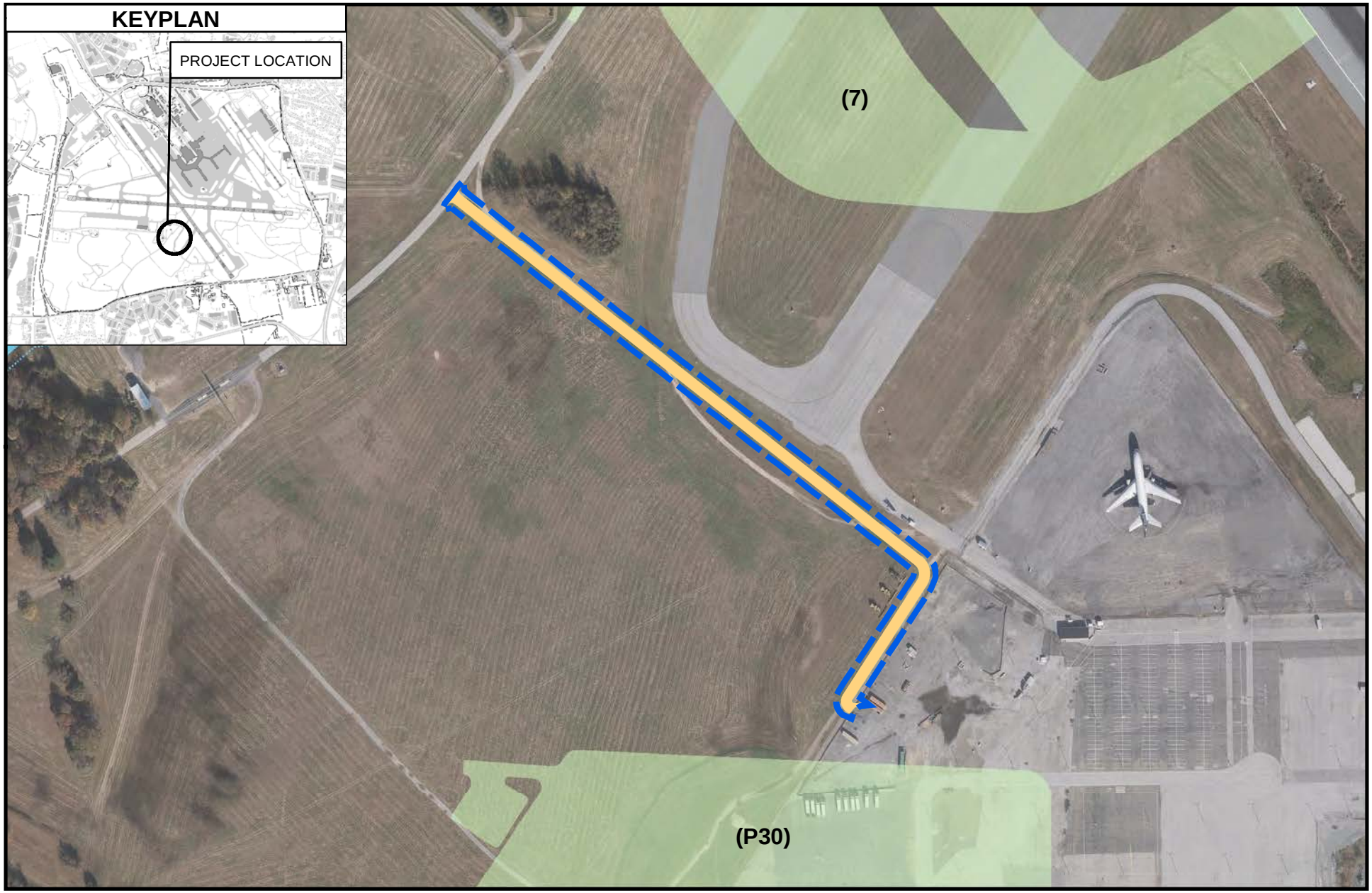
Airport Property Boundary

Rehabilitate/Improve Pavement - Pavement Management Plan (PMP)
Figure 3.3-6

N

0 600 1,200 2,400 Feet

Source: Aerial - MDOT MAA (2018)



LEGEND

- New Impervious
- Other EA Projects
- Limit of Disturbance

(20) VSR Connector - Alternative 1
Figure 3.3-7

N

0 75 150 300 Feet

Source: Aerial - MDOT MAA (2018), ADCI

facility would be located south of Runway 10-28 and east of Runway 15R-33L, as shown on **Figure 3.3-8**. The relocated RTR would include construction of a RTR tower, parking area, and access roadway; siting of a pre-engineering/prefabricated RTR equipment shelter; and relocation of utility infrastructure, including new ductbank. The RTR tower is expected to be approximately 38' high, with an additional 30' for the tallest antennae.

The project would include approximately 0.5 acres of tree removal, in an area known to be existing Part 77 surface obstructions.

No Action

Without the relocation of the RTR facility, the existing facility would continue to suffer signal loss due to interference from surrounding buildings. Signal loss can jeopardize airfield safety as it negatively affects communication capabilities between aircraft and the ATCT. Additionally, the expansion of the Runway 15R deicing pad would result in demolition of the existing RTR facility. If the RTR facility is not relocated prior to the demolition of the existing facility, the RTR system would not operate.

3.4 Accommodate Existing and Anticipated Passenger Demand

Alternatives to address existing and anticipated airfield, terminal, general aviation, and support facility demand are described in the following sub-sections. These improvements are needed to allow BWI Marshall Airport to provide a quality level of service to the airlines and the traveling public in keeping with MDOT MAA's focus on customer service.

3.4.1 Runway 15R Deicing Pad Expansion (18)

The existing Runway 15R deicing pad needs to be expanded to enhance the utility of the pad, improve operations, and support simultaneous deicing requirements, RON parking, and aircraft queuing. The need to expand the Runway 15R deicing pad is independent of the Runway 28 deicing pad expansion project. There are multiple connected actions associated with this improvement.

Alternative 1 – 2015 ALP

To more easily identify objects and areas to be demolished and the expansion of the deicing pad two figures illustrate this alternative. **Figure 3.4-1a** shows the demolition projects connected to the deicing pad expansion project. **Figure 3.4-1b** shows the proposed Runway 15R deicing pad expansion and the connected improvements.

To allow for the expansion of the deicing pads, several facilities would need to be demolished and/or relocated:

- *Glycol Storage/Truck Staging Relocation (P40) and Glycol Storage Building Demolition (D-173)*

  The Glycol Storage/Truck Staging Relocation (P40) project is designed to accommodate both a glycol storage building and deicing control building, replacing the existing buildings that would be demolished.

- *Taxicab Support Building at Former Hotel Site (P148) and Taxi/Bus Staging Area Demolition (D-148)*

  A Taxicab Support building is proposed to be relocated to the former Sheraton Hotel site northwest of the 15R deicing pad. Existing pavement, formerly used

KEYPLAN

PROJECT LOCATION

Proposed RTR Tower Location

Proposed RTR Shelter

New Access Road

Parking Area

INSET

SEE INSET

Taxiway S

Taxiway B

Taxiway E

Runway 10/28

Runway 15R/33L

(1)

(2)

(4)

(7)

(8)

(13)

(17)

(P10)

(P14)

(P30)

(P45)

ARFF

Gold Lot

Aviation Blvd

Dorsey Rd

97

LEGEND

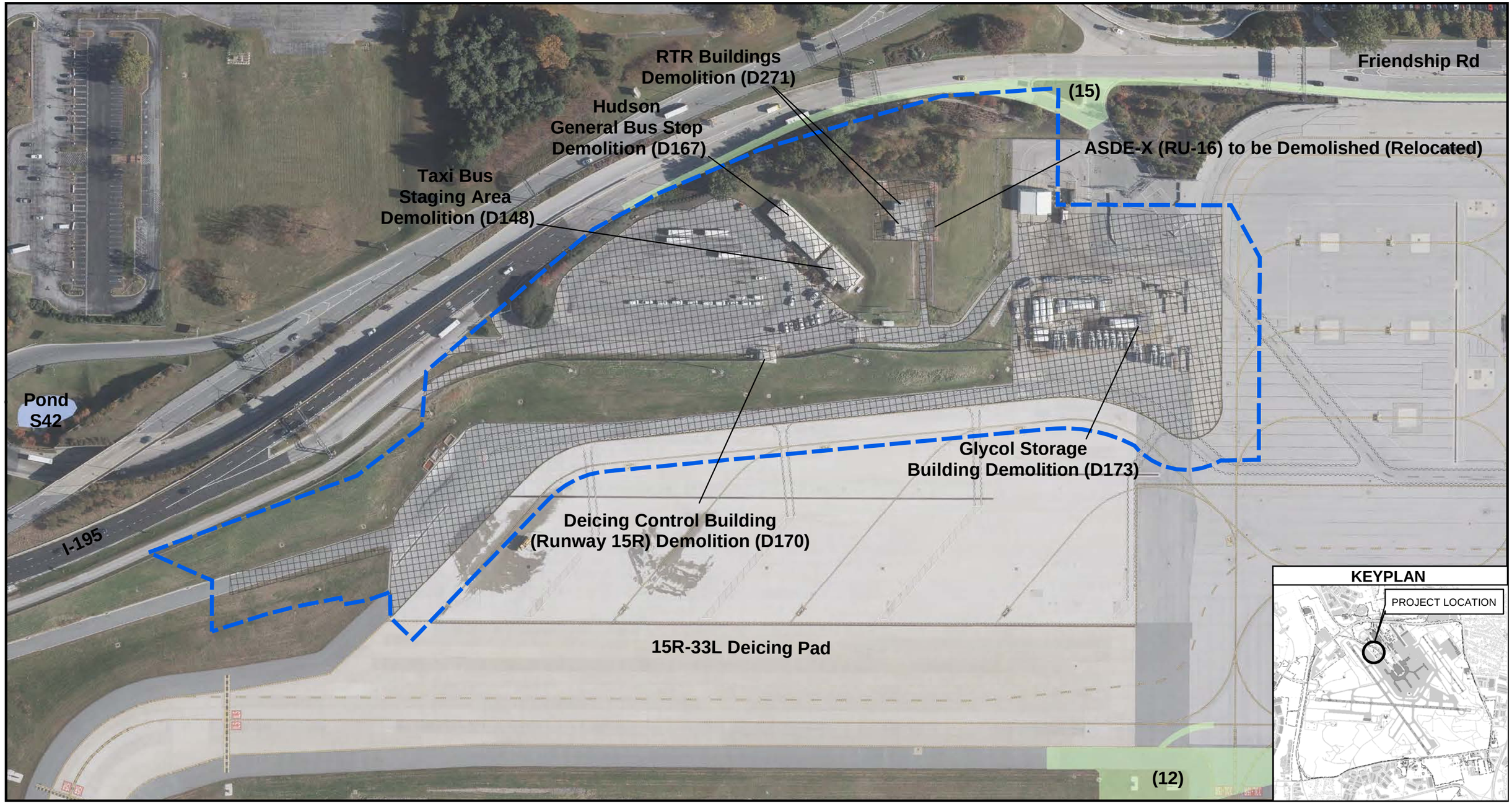
- Limit of Disturbance
- New Impervious
- Other EA Projects
- Building
- New Ductbank
- Wetlands with 25' Buffers
- Stormwater Management Pond
- USACE Jurisdictional Pond
- Stream
- Culverted Stream
- Airport Property Boundary

Alternative 1 – Relocate Remote Transmitter/Receiver (RTR) Facility
Figure 3.3-8

N

0 400 800 1,600 Feet

Source: Aerial - MAA (2018), ADCI, JMT



LEGEND

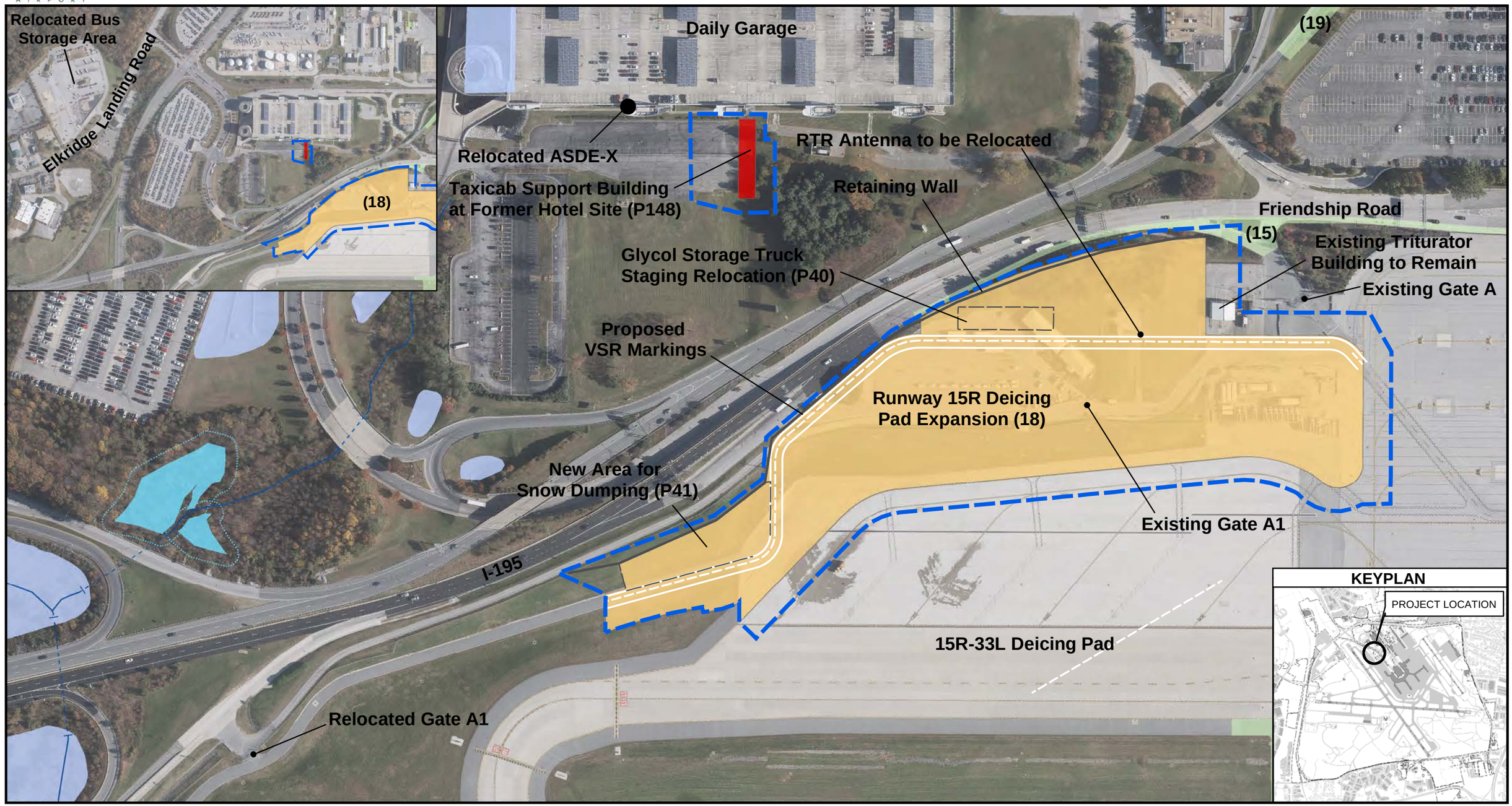
- Impervious Removal
- Other EA Projects
- Limit of Disturbance
- Stormwater Management Pond

(18) Runway 15R Deicing Pad Expansion Demolition - Alternative 1 - 2015 ALP
Figure 3.4-1a

N

0 75 150 300 Feet

Source: Aerial - MDOT MAA (2018), ADCI



LEGEND

- New Impervious
- Building
- Limit of Disturbance
- Stormwater Management Pond
- Wetlands with 25' Buffers
- Other EA Projects

(18) Runway 15R Deicing Pad Expansion - Alternative 1 - 2015 ALP
Figure 3.4-1b

N

0 100 200 400 Feet

Source: Aerial - MDOT MAA (2018), ADCI

for hotel parking, would be used for taxi staging areas. Additionally, either a new support building would be constructed, or a temporary staging trailer would be located adjacent to the parking area.

- *Hudson General Bus Storage Demolition (D-167)*

  The bus storage area would be relocated to existing open space on Elkridge Landing Road.

- *Deicing Control Building (RW 15R) Demolition (D-170)*

  The deicing control building would be relocated within the footprint of the Glycol Storage/Truck Staging Relocation (P40) project.

- *RTR Buildings Demolition (D-271)*

  The location of the relocated RTR Buildings is addressed within this environmental evaluation (see Section 3.3.8).

- *Gate A1 Demolition and Relocation*

  Gate A1 would be demolished and relocated, but there would be no limit of disturbance (LOD) associated with this project. Existing Gate 55 would be upgraded and serve the function as Relocated Gate A1 with no ground disturbance needed to perform the upgrade.

- *ASDE-X (RU16) Relocation*

  The existing ASDE-X would be relocated to the Daily Garage.

The proposed deicing pad expansion would also include a new snow dump area and a VSR. As a part of advanced planning, the layout of the proposed expansion is now better defined than was illustrated on the ALP.

No Action

Under the No Action Alternative, the Runway 15R deicing pad would not be expanded to accommodate forecast demand needs.

3.4.2 Second FBO (P7)

Additional FBO space is needed to accommodate GA activities for based and itinerant aircraft.

Alternative 1 – 2015 ALP

The proposed GA facilities would be located between the existing GA facilities and long-term parking lot northeast of Runway 15L-33R, as shown in **Figure 3.4-2**. There is currently one FBO operating at BWI Marshall Airport adjacent to the proposed second FBO. The additional FBO facilities would include a Pilot Center, GA hangar buildings, aircraft ramp, fuel storage facility, vehicle parking and other potential facilities.

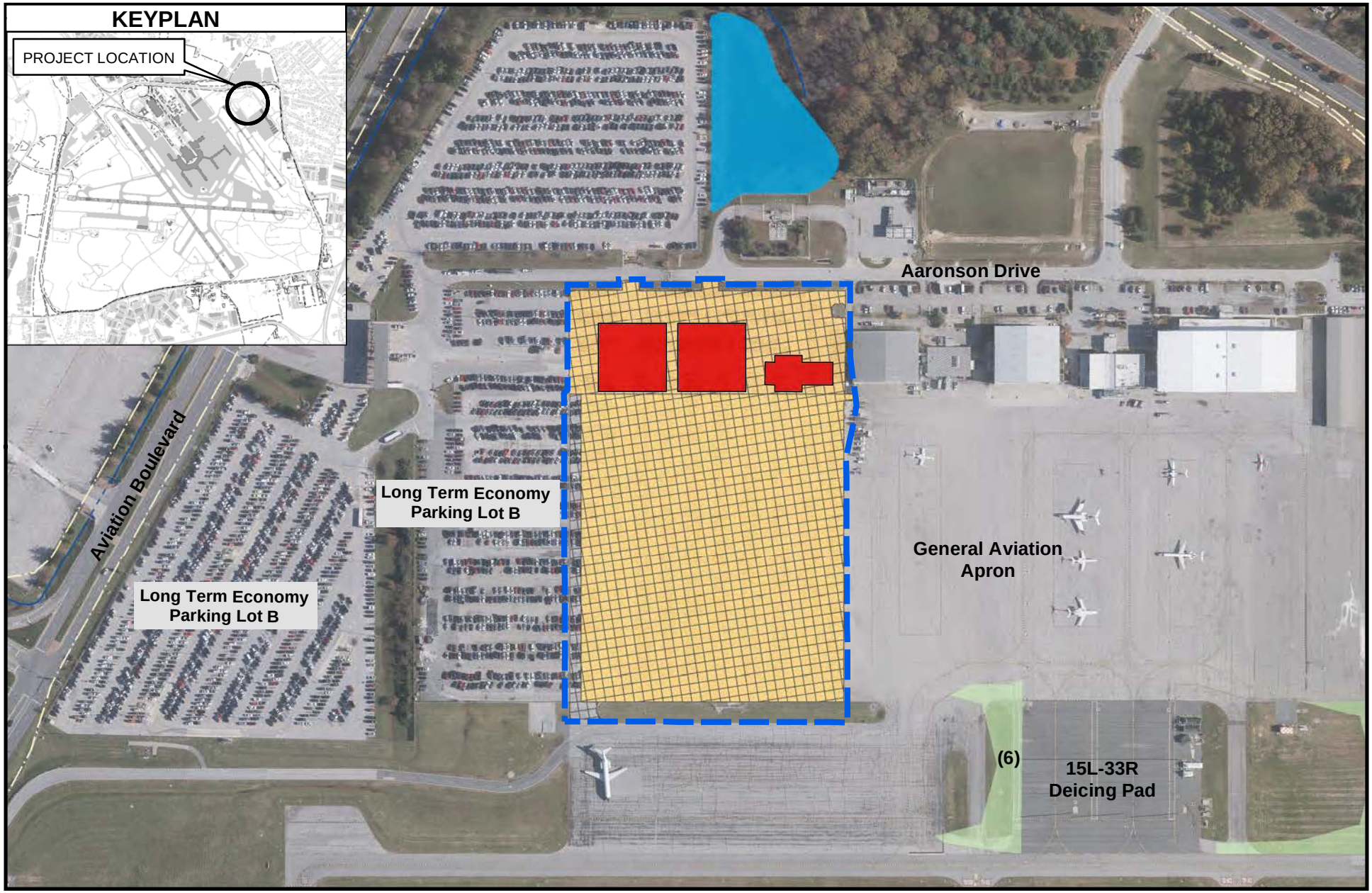
The proposed project would remove approximately 1,550 public vehicular parking spaces in Long Term Parking Lot B; however, there would be sufficient parking available in Long Term Parking Lot A to accommodate this need.

No Action

The existing facilities would continue to accommodate expected demand through 2027. However, the need for additional FBO facilities and services to improve the level of service experienced by GA users of BWI Marshall would not be met under the No Action Alternative.

3.4.3 New Airline Maintenance Facility (P11)

An airline maintenance facility is needed for Southwest Airlines (SWA) and specifically their ADG III aircraft. Beyond the need to



LEGEND

- New Impervious
- Impervious Reconstructed
- Other EA Projects
- Limit of Disturbance
- Building
- USACE Jurisdictional Pond
- Airport Property Boundary

(P7) Second FBO - Alternative 1 - 2015 ALP
Figure 3.4-2

N

0 75 150 300 Feet

Source: Aerial - MDOT MAA (2018), ADCI

make maintenance operations more efficient and safer for workers, the apron space currently used for maintenance operations is needed to accommodate irregular operations, and to allow for flexible gate assignments and additional remain overnight parking. Lastly, the proposed facility is needed to increase reliability of aircraft fleet maintenance, thereby allowing SWA to maintain flight schedules and minimize delay impacts on passengers. A perimeter roadway system would also be needed to provide access from Stoney Run Road to the proposed facility and from Stoney Run Road to the main terminal area.

After review of multiple locations on the Airport, it was determined that the northwestern most area between Runway 10-28 and Runway 15R-33L would provide the preferred location because of the minimal impacts to airfield operations and compatible land use (i.e., proximity to roadway access and industrial land uses). The FAA reviewed the line-of-sight to the ATCT and the proximity to the Airport Surveillance Radar (ASR) for the proposed facility with consideration of two maintenance facilities and their potential impacts to the function of the existing ASR. The FAA provided a determination stating that the proposed maintenance facility(ies) would be located within a "clear zone" wherein structure size and position can affect radar beacon performance, see *Appendix E, Attachment 4*. The FAA identified three potential mitigation measures that could be undertaken should the FAA allow the facility to be constructed within the ASR-9 "clear zone" (1,500'): reorient reflected transmissions; construct vertical corner reflectors; and utilize radar absorbent material.

Although two maintenance facilities were originally considered to accommodate expected demand with various sizes of aircraft, the current need can be satisfied with one of the facilities rather than both.

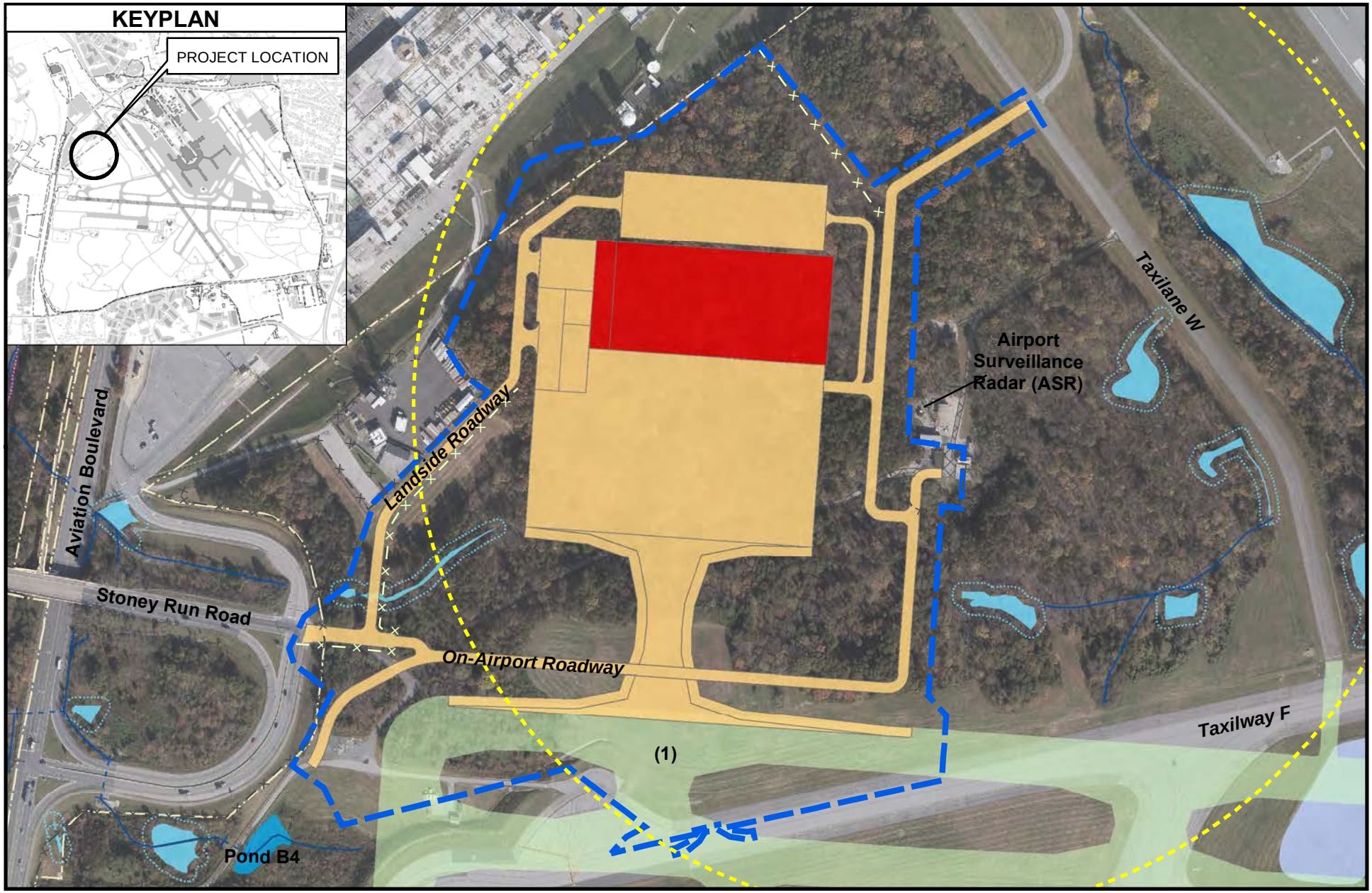
Alternative 1 – 2015 ALP West Facility (P11)

This alternative proposes an approximately 224,000 square-foot maintenance facility building, as well as an apron, parking areas, and perimeter roadways to be located north of the existing Runway 10 end, and tying into existing Taxiway F. **Figure 3.4-3a** shows the proposed Alternative 1 location.

The location of the proposed facility is heavily wooded and a large portion of the forested areas would need to be removed to provide room for the maintenance facility and associated access. As proposed, the construction of the maintenance facility would impact the function of the existing Airport Surveillance Radar (ASR). The final elevation of the maintenance facility would be within the line-of-sight of the radar beacon antenna. This could create reflectivity issues and disrupt the signals reported back to the ATCT, wherein the false reflections could be reported as aircraft that are not actually there.

Alternative 2 – 2015 ALP East Facility (P12)

This alternative proposes a similar facility to Alternative 1, but the maintenance facility building would be approximately 136,000 square feet and located east of Alternative 1, as shown in **Figure 3.4-3b**. As with Alternative 1 – 2015 ALP West Facility (P11), facility access from the taxiway system would tie in from Taxiway F, but would be adjacent to the west of Taxilane W. As with Alternative 1 – 2015 ALP West Facility (P11), the location of the proposed facility is heavily wooded and a large portion of the forested areas would need to be removed for this alternative. This alternative would also impact four wetland areas west of Taxilane W.



LEGEND

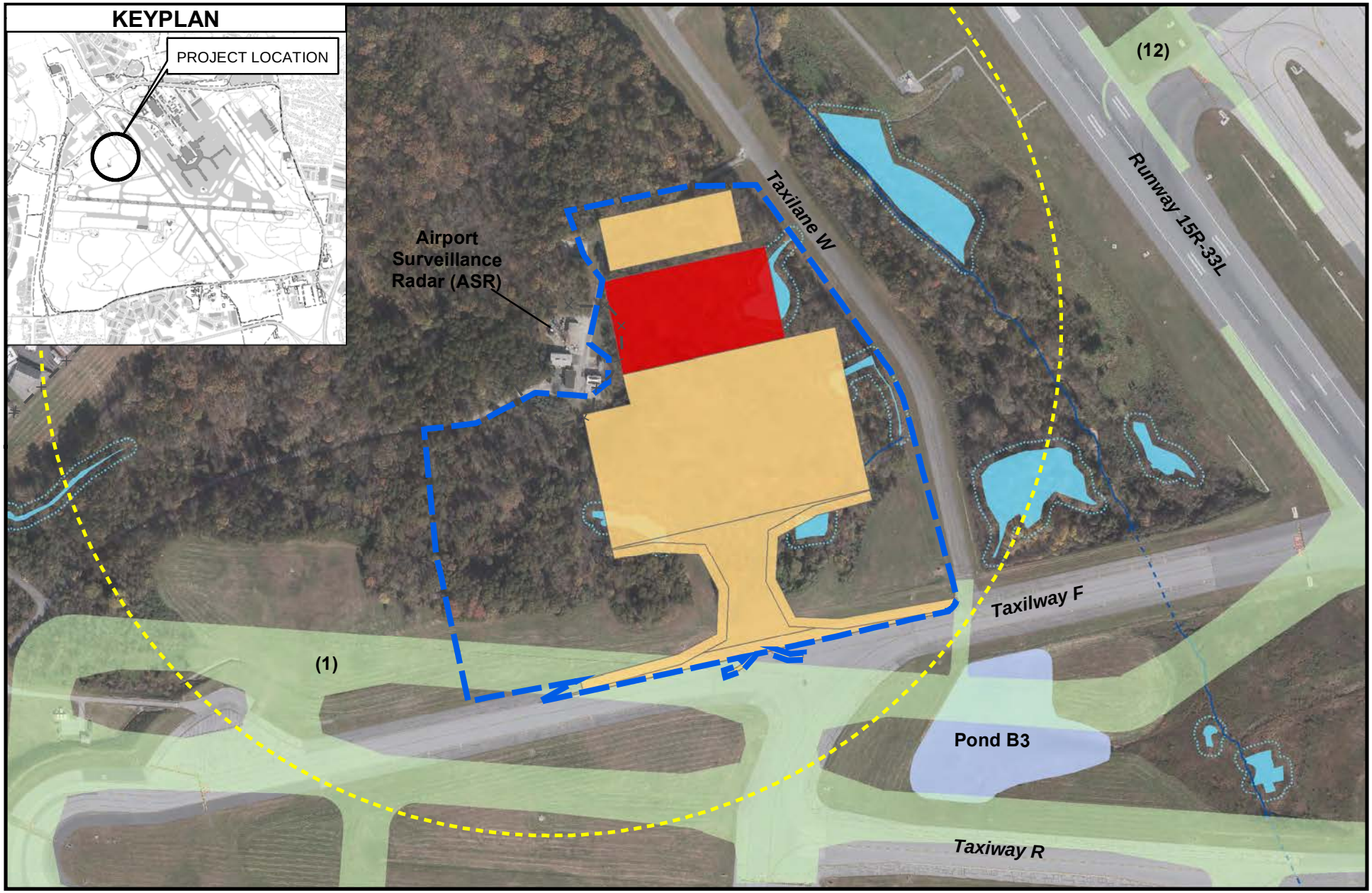
- New Impervious
- Impervious Removal
- Impervious Reconstructed
- Other EA Projects
- Limit of Disturbance
- Building
- Existing Fence
- Proposed Fence
- Wetlands with 25' Buffers
- Stormwater Management Pond
- USACE Jurisdictional Pond
- Stream
- Culverted Stream
- Airport Property Boundary
- 1,500' ASR Clear Zone

(P11) New Airline Maintenance Facility – Alternative 1 – 2015 ALP
Figure 3.4-3a

N

0 100 200 400 Feet

Source: Aerial - MDOT MAA (2018), ADCI



LEGEND

- New Impervious
- Impervious Removal
- Impervious Reconstructed
- Other EA Projects
- Limit of Disturbance
- Building
- Existing Fence
- Wetlands with 25' Buffers
- Stormwater Management Pond
- Stream
- Culverted Stream
- 1,500' ASR Clear Zone

(P12) New Airline Maintenance Facility – Alternative 2 – 2015 ALP
Figure 3.4-3b

N

0 100 200 400 Feet

Source: Aerial - MDOT MAA (2018), ADCI

Alternative 3 – Modified West Facility

During the preliminary engineering design efforts for the Airline Maintenance Facility (P11), as identified on the current ALP, FAA determined that the layout and configuration of the proposed facility would impact the operation of the ASR located east of the proposed facility, see *Appendix E, Attachment 4*. In response to the FAA comments, the design of the proposed facility was modified. The modified layout was conditionally approved by the FAA and is now included herein as Alternative 3 as shown on **Figure 3.4-3c**. The proposed maintenance facility building would be approximately 157,500 square feet and would be constructed at a lower elevation than the facility under Alternative 1 to minimize impacts to the function of the ASR.

Alternative 4 – Advanced Planning West Facility

Following publication of the January 2018 Draft EA and Draft Section 4(f) Determination, additional preliminary engineering design was completed for the Airline Maintenance Facility. The apron footprint was reduced to align with refined planning assumptions, which sets aside additional area to the east for future expansion. The design evolved to add needed utility connections, including a sewer and water line connection to the east, and a second water line connection west under Aviation Blvd, as shown on **Figure 3.4-3d**.

In order to implement this improvement with any of the alternatives, the following connected action would need to be completed:

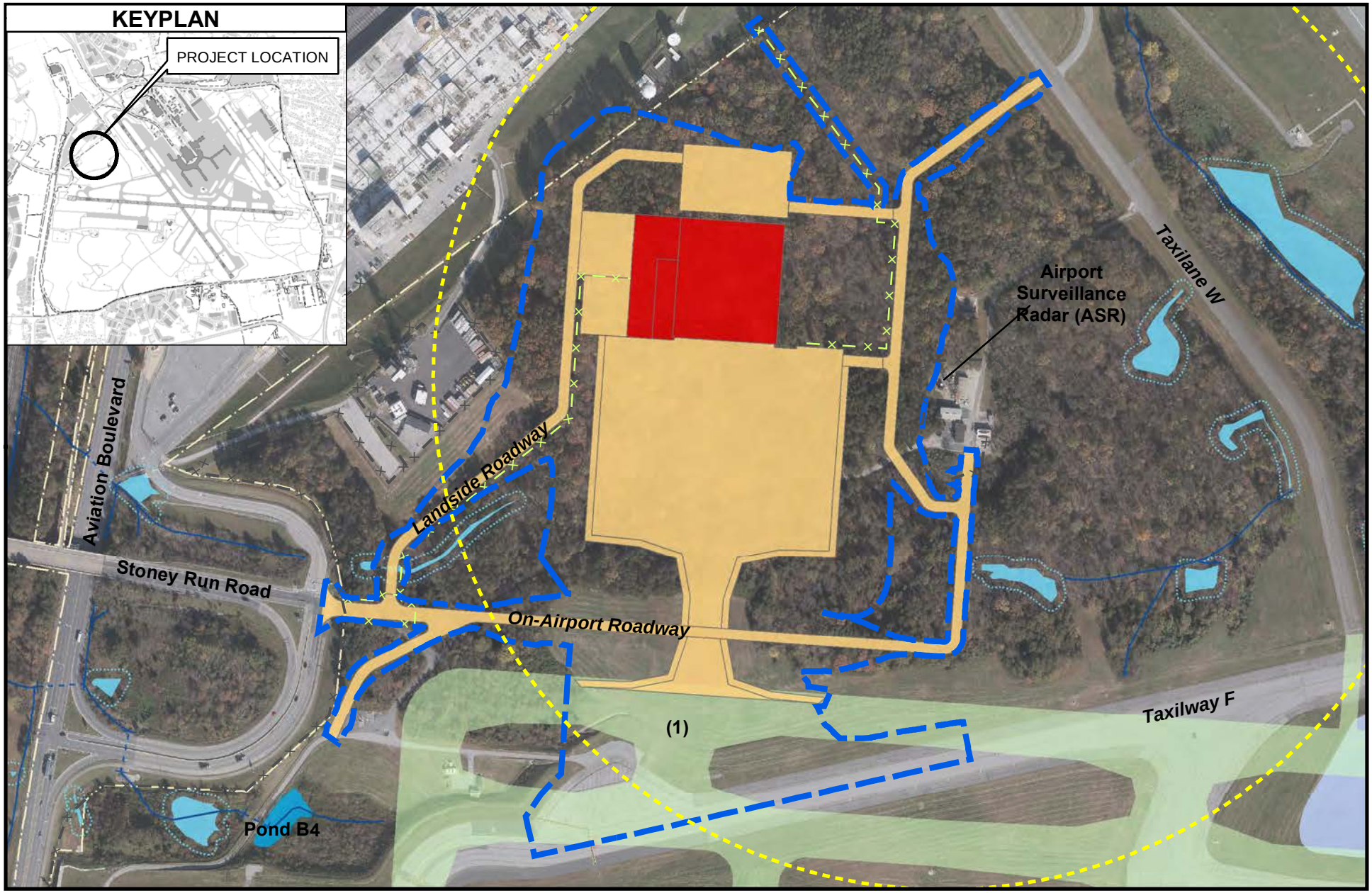
- *Perimeter Roadway System*

  The provision of a perimeter roadway system allows non-critical vehicles to avoid using the runway and taxiways for movement around the airfield inside the secure perimeter of the airport. Thus, a perimeter roadway system adds an important factor of safety and efficiency for the airfield. The proposed roadway system includes landside non-secure roadway and on-airport secure roadway, both are two lane paved roadways. The landside non-secure roadway would provide access from Stoney Run Road to the parking lots of the proposed airline maintenance facilities without entering secure areas of the airport. The on-airport secure roadway would provide access through a security gate off Stoney Run Road. This roadway would provide access to airport maintenance and security vehicles, and air cargo tug vehicles between the main terminal area and the Midfield Cargo Facility. The on-airport secure roadway would connect with the existing perimeter roadway at the Runway 10 end, then continue east (parallel to Taxiway F), and then turn north to parallel the Airline Maintenance Facility before crossing Taxilane W where it would connect with an existing service road.

  A standalone roadway project was included in the January 2018 issuance of the Draft EA and Draft Section 4(f) Determination but has since been removed due to redundancy with the proposed maintenance facility roadway and as a result of the additional wetlands it would have impacted.

No Action

The need for a SWA maintenance facility would not be met under the No Action Alternative. If the maintenance facility is not constructed, SWA maintenance operations would continue as they have in the past at



LEGEND

- New Impervious
- Impervious Removal
- Impervious Reconstructed
- Other EA Projects
- Limit of Disturbance
- Building
- Existing Fence
- Proposed Fence
- Wetlands with 25' Buffers
- Stormwater Management Pond
- USACE Jurisdictional Pond
- Stream
- Culverted Stream
- Airport Property Boundary
- 1,500' ASR Clear Zone

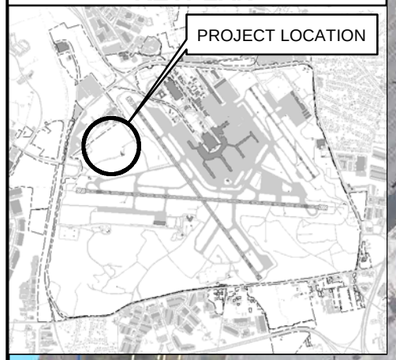
(P11) New Airline Maintenance Facility – Alternative 3
Figure 3.4-3c

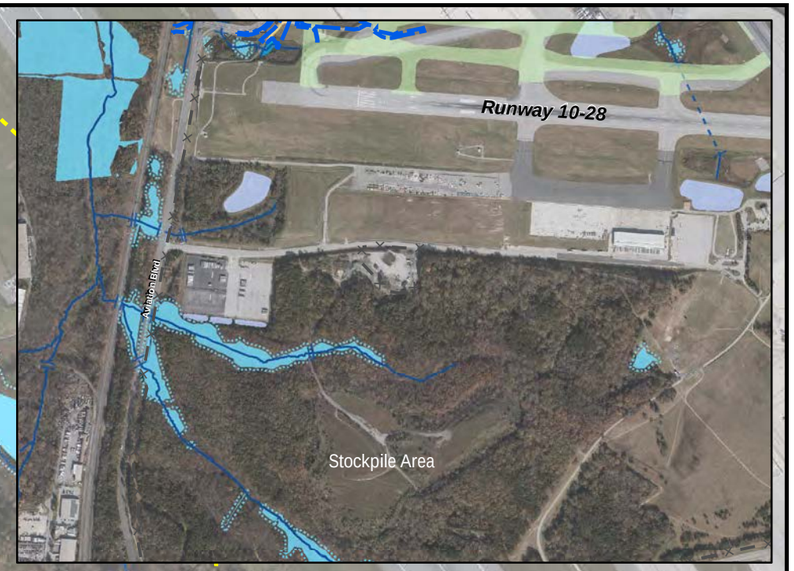
N

0 100 200 400 Feet

Source: Aerial - MDOT MAA (2018), ADCI

KEYPLAN





Aviation Boulevard
Landside Roadway
Airport Surveillance Radar (ASR)
Taxilane W
Stoney Run Road
On-Airport Roadway
(1)
Taxiway F
Pond B3
Pond B4

LEGEND

- Limit of Disturbance
- New Impervious
- Other EA Projects
- Building
- Existing Fence
- Airport Property Boundary
- Wetlands with 25' Buffers
- Stormwater Management Pond
- USACE Jurisdictional Pond
- Stream
- Culverted Stream

Proposed Utilities

- Sanitary Line
- Water Line
- Gas Line
- Electric Utility Line
- Stormwater Line
- Telecom Duct
- 1,500' ASR Clear Zone

(P11) New Airline Maintenance Facility - Alternative 4
Figure 3.4-3d

N

0 175 350 700 Feet

Source: Aerial - MDOT MAA (2018), ADCI

various locations on the Airport. However, the needs to make maintenance operations more efficient and safe for workers, to accommodate irregular operations on apron area currently used for maintenance activities, and to minimize delays on passengers would not be met. As described in *Section 5.11.2.1*, without the maintenance facility the number of maintenance run-up operations is expected to remain at approximately 10 per year and to be conducted at the Runway 10 holding block. No perimeter roadway system associated with the maintenance facility would be constructed.

3.4.4 Runway Deicing Chemical Storage and Access Road (P13)

An additional runway deicing chemical storage area is needed to accommodate current and forecast demand. An additional access road to the storage area is needed to increase circulation to the existing and proposed storage tanks. This project is unrelated to the Runway 28 and Runway 15R Deicing Pad Expansion projects. The Deicing Pad Expansion projects do not change the capacity of glycol storage.

Alternative 1 – 2015 ALP

The project includes a 20,000-gallon glycol storage tank that would be added next to the two existing tanks north of the main terminal area, and adjacent to the northeast of Building 113. Additionally, an access road would be constructed through the existing space for vehicle circulation. **Figure 3.4-4** shows the proposed location. The proposed glycol storage tank and VSR are needed for simultaneous tank loading and unloading operations during snow events and would also provide storage for the recovery of high concentration glycol for recycling.

No Action

Under the No Action Alternative, the need for additional deicing chemical storage would not be met.

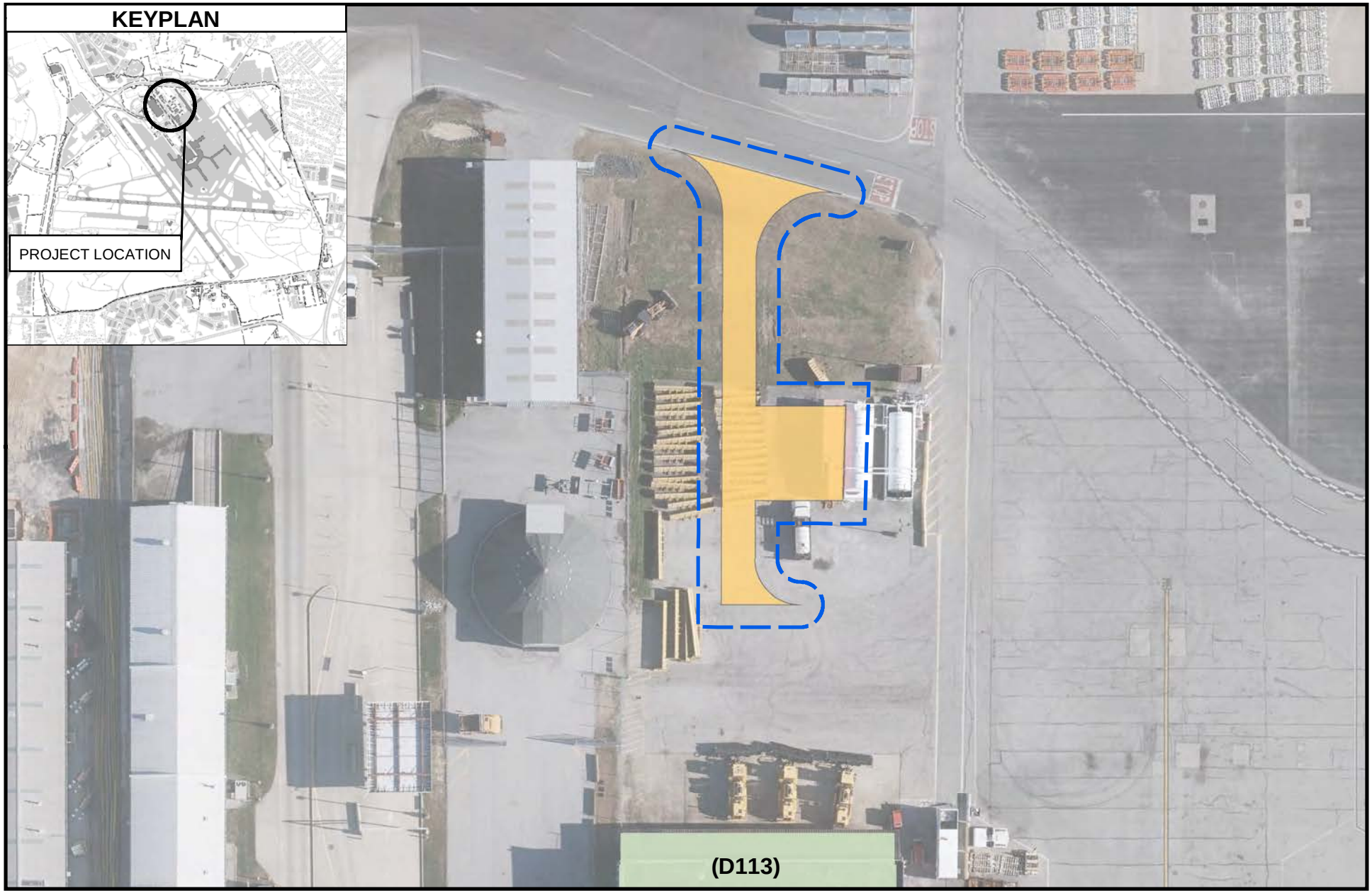
3.4.5 Airport Maintenance Complex Relocation and Consolidation (P30)

The airport maintenance complex needs to be relocated and consolidated. The driving need behind the project is to provide a new Snow Removal Equipment (SRE) building to provide appropriate storage for equipment that is currently stored outside and is exposed to the weather elements, reducing the useful life of the equipment.

The existing complex is located along Elm Road north of the passenger terminal building. The existing location could constrain development of additional space needed for airline operations and aircraft parking associated with terminal building utilization. The existing facilities accommodate outside storage of snow removal equipment, as well as administrative space for airport maintenance employee staging and operations during snow events. In addition, the existing facilities house the fueling area for airport vehicles.

The relocated complex on the south side of the airport would also provide wash bays for maintenance vehicles, and bulk storage for chemicals used to treat airfield and landside pavements and importantly covered facilities for storing equipment. The proposed Airport Maintenance Complex would provide for a more efficient operation of maintenance activities.

It is not currently known whether the entire airport maintenance complex would be relocated simultaneously, largely due to cost



LEGEND

- New Impervious
- Other EA Projects
- Limit of Disturbance

(P13) Runway Deicing Chemical Storage and Access Road - Alternative 1 - 2015 ALP
Figure 3.4-4

N

0 15 30 60 Feet

Source: Aerial - MDOT MAA (2018), ADCI

considerations. It is possible that the relocation would occur in phases, with the first priority being given to construction of an SRE building, with follow-on priorities consisting of the administrative functions and associated development. However, this EA and Section 4(f) Determination evaluates the relocation of all existing facilities in the maintenance complex.

Existing airport maintenance facilities along Elm Road would not be demolished as part of the Proposed Action. Future NEPA documentation would be required prior to the demolition of existing airport maintenance facilities. The proposed relocation and consolidation of facilities would not increase capacity of maintenance facilities as the paved area abandoned by moving equipment to an SRE building would not be used for maintenance equipment going forward. The Airport Maintenance Complex is proposed to accommodate the relocation of all Elm Road facilities. As each described individual facility is moved to the new Airport Maintenance Complex, existing facilities would be closed until such time as they can be safely demolished.

Alternative 1 – 2015 ALP

As shown in **Figure 3.4-5a**, this alternative proposes the airport maintenance complex relocation to be located at what is referred to as the "Gold Lot"; a paved parking lot on the south side of the airfield, west of the Runway 33L end. This location would to sufficient to replace the existing facilities currently located at the Elm Road complex. Under Alternative 1, the majority of the proposed facility would be located on existing impervious surface of the Gold Lot.

Alternative 2 – Shifted West

As shown in **Figure 3.4-5b**, this alternative proposes the airport maintenance complex relocation to be located at the western edge of the Gold Lot. Alternative 2 would shift the location of the airport maintenance complex west of the Alternative 1 location to include a larger footprint of new impervious surface.

No Action

Under the No Action Alternative, the airport maintenance complex would not be relocated and consolidated to provide needed equipment storage. SRE would continue to be stored outside and exposed to weather elements, reducing the useful life of the equipment.

3.4.6 Building 113 Demolition (D113)

Building 113 needs to be demolished as the existing structure does not meet current building codes and it is not cost effective to upgrade the building for MDOT MAA use.

Alternative 1 – 2015 ALP

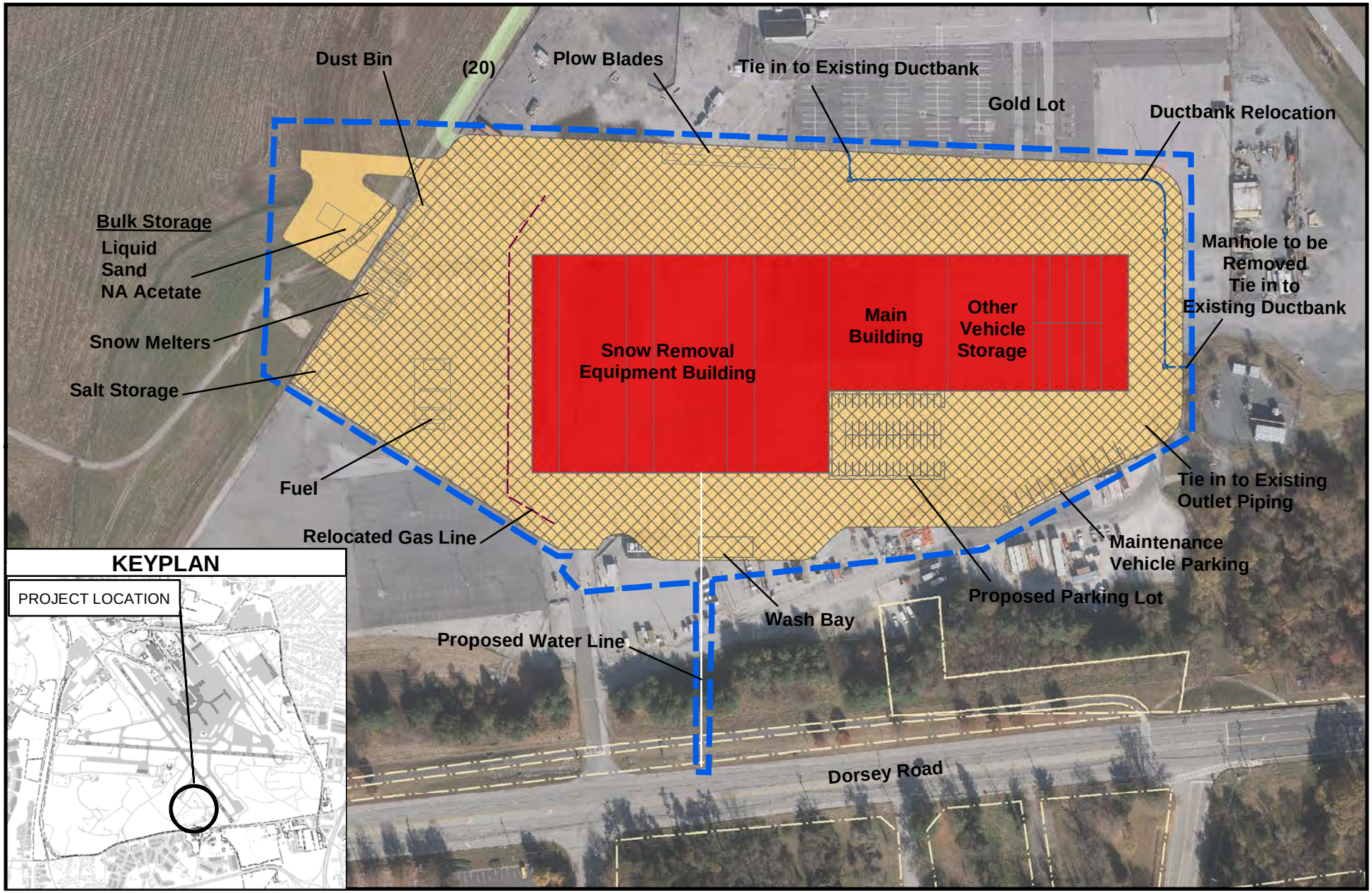
As shown in **Figure 3.4-6**, the former maintenance building (Building 113) would be demolished and the site left vacant for future purposes. It is assumed the building would be demolished to slab on grade.

No Action

Under the No Action Alternative, Building 113 would not be demolished and the area would not be available for future purposes.

3.5 Improve Customer Service

Alternatives to improve passenger and vehicular traffic movement around the terminal are described in the following sub-sections.



LEGEND

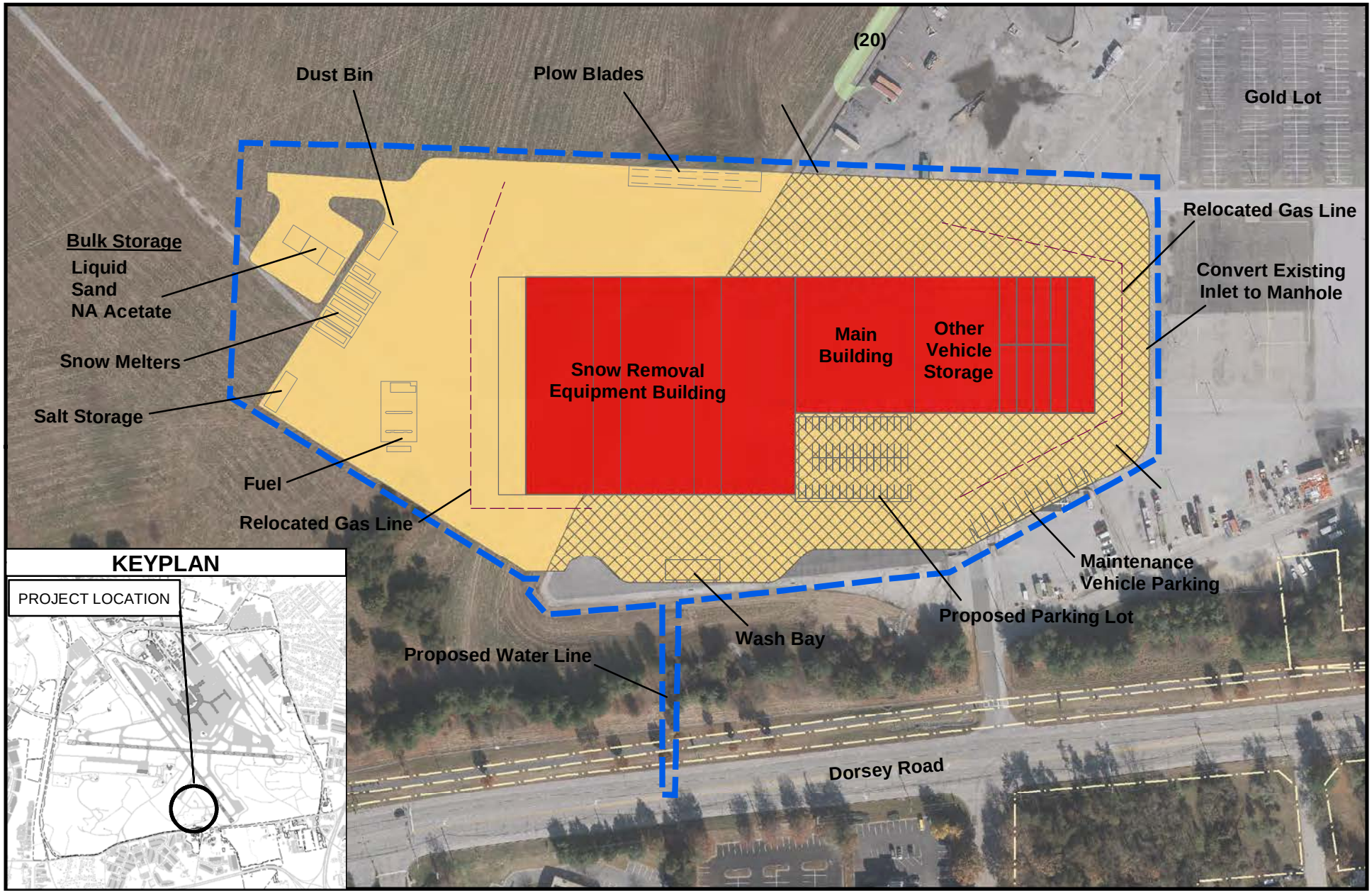
- Building
- New Impervious
- Impervious Removal
- Impervious Reconstructed
- Limit of Disturbance
- Other EA Projects

(P30) Airport Maintenance Complex Relocation and Consolidation - Alternative 1 - 2015 ALP
Figure 3.4-5a

N

0 50 100 200 Feet

Source: Aerial - MDOT MAA (2018), ADCI



LEGEND

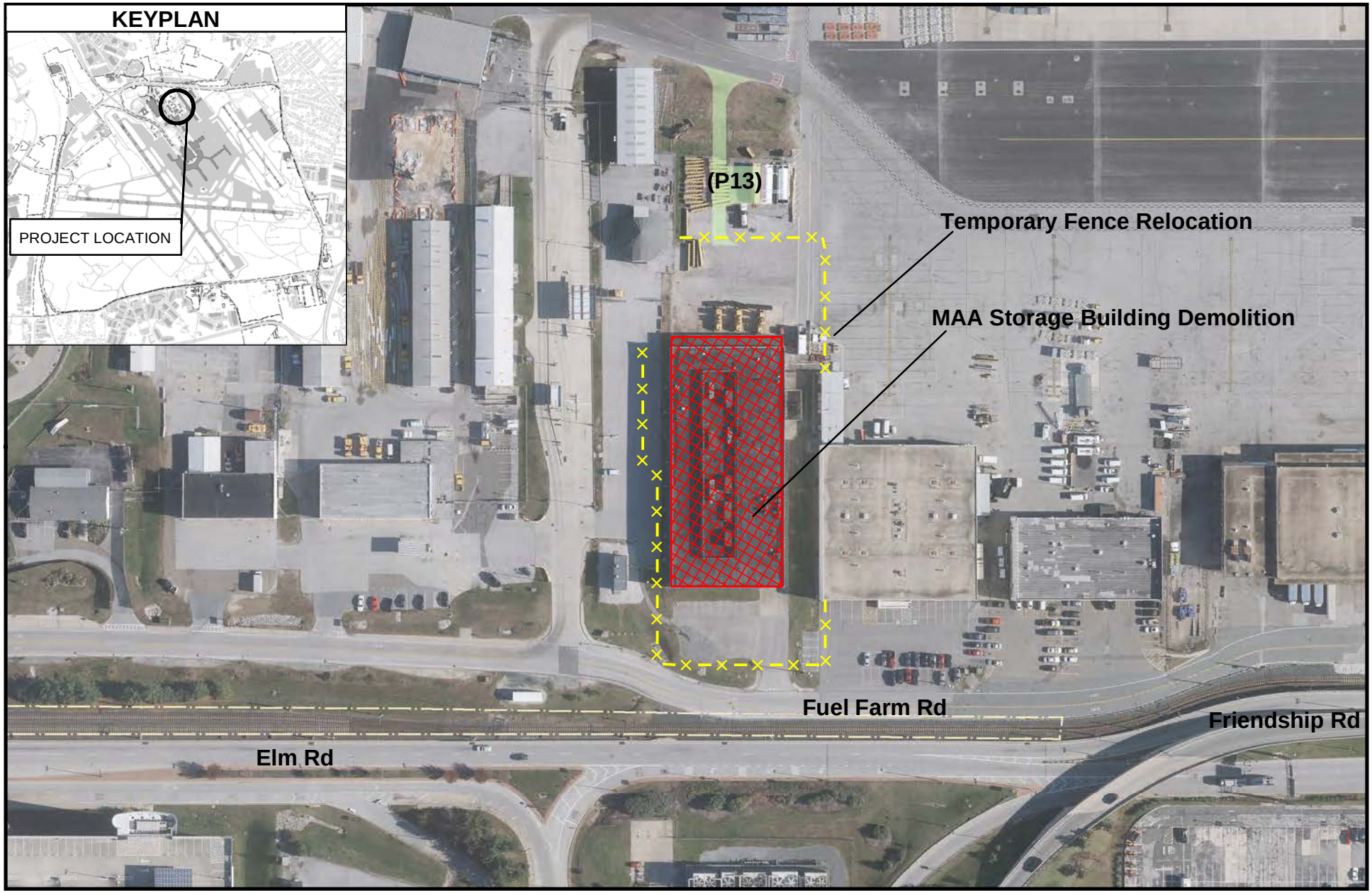
- Building
- New Impervious
- Impervious Removal
- Impervious Reconstructed
- Limit of Disturbance
- Other EA Projects

(P30) Airport Maintenance Complex Relocation and Consolidation - Alternative 2
Figure 3.4-5b

N

0 50 100 200 Feet

Source: Aerial - MDOT MAA (2018), ADCI



LEGEND

- Building Removal
- Other EA Projects
- Airport Property Boundary

(D113) Building 113 Demolition - Alternative 1 - 2015 ALP
Figure 3.4-6

N

0 37.5 75 150 Feet

Note: Buildings to be demolished to slab on grade. No limit of disturbance is anticipated.

Source: Aerial - MDOT MAA (2018), ADCI

3.5.1 New Sky Bridge C (14)

A new Sky Bridge is needed to improve accessibility from the hourly parking garage to the terminal (i.e., Concourse C).

Alternative 1 – 2015 ALP

The Sky Bridge would be constructed between Level 6 of the hourly garage and the terminal building near the Concourse C exit, as shown in **Figure 3.5-1**. The Sky Bridge would improve connectivity from the terminal. The proposed columns of the Sky Bridge would likely impact the Service Animal Relief Area and require its relocation.

No Action

Direct access to and from the parking garage to the central part of the terminal near Concourse C would not be provided under the No Action Alternative.

3.5.2 Terminal Roadway Widening and Access Improvements (15)

Widening of the terminal roadway and other access improvements are needed to alleviate existing and future traffic congestion along Interstate 195 (I-195) between Maryland Route 170 and the terminal curb on the lower and upper level roadways. The congestion and queuing back-ups tend to block both lower and upper level roadways during peak activity periods.

Alternative 1 – 2015 ALP

Figure 3.5-2 shows the location of the proposed terminal roadway widening and access improvements. The right shoulder of the inbound terminal approach roadway would be widened to provide a dedicated lane for traffic destined for the Upper Level Roadway. This improvement would provide unimpeded access from I-195 to the Upper Level Roadway. An existing landscaped island would be impacted by the improvements.

No Action

Under the No Action Alternative, congestion would not be reduced, queuing back-ups would continue to disrupt traffic and a quality level of service on the roadway would not be achieved.

3.5.3 Upper Level Roadway Widening at Concourse E (19)

Upper Level Roadway improvements are needed at Concourse E to alleviate existing and future traffic congestion and to be consistent with the existing roadway layout between Concourses A and D.

Alternative 1 – 2015 ALP

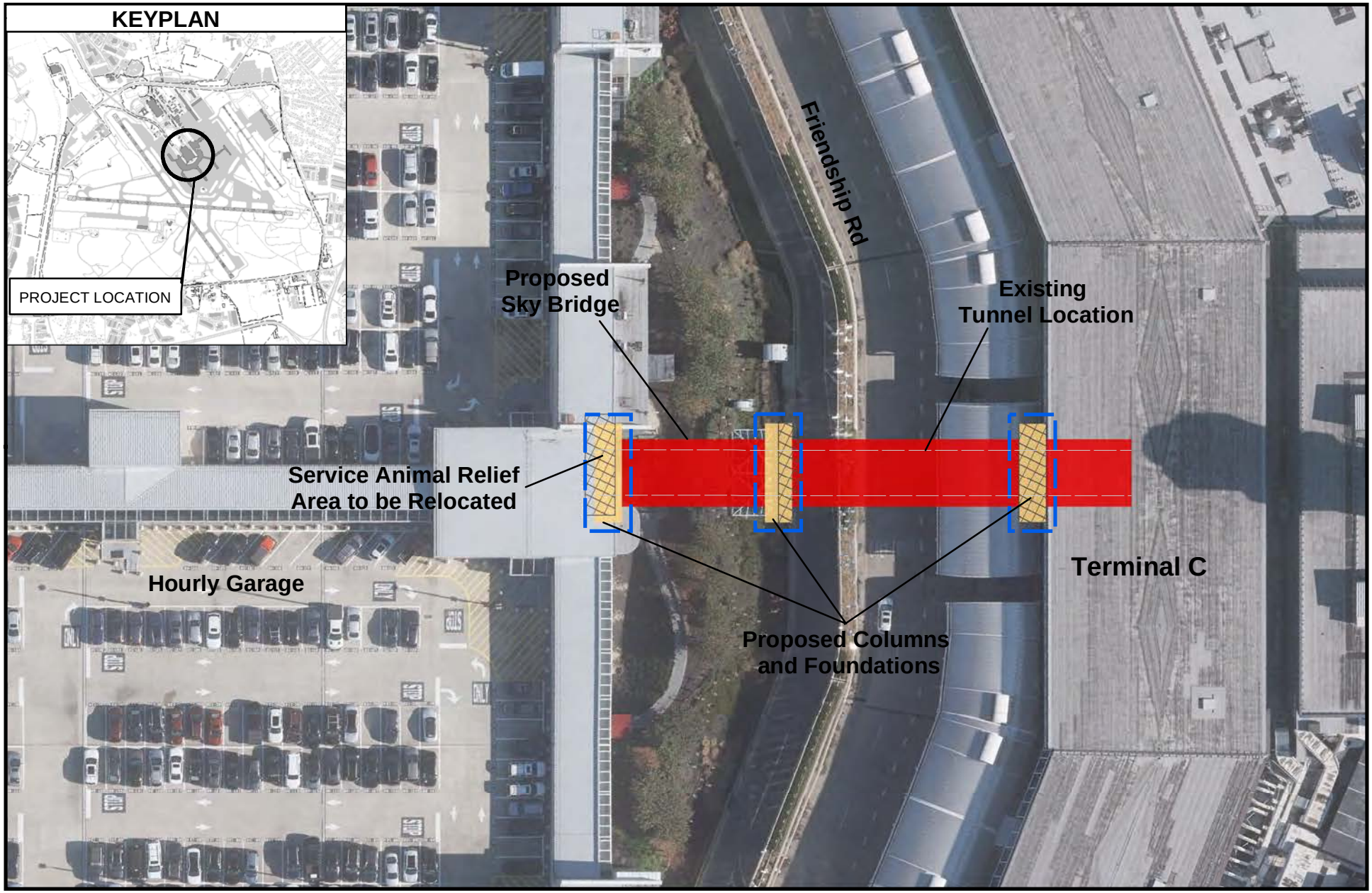
The upper level roadway would be widened by two additional outer lanes, as shown in **Figure 3.5-3**. The outer and inner lanes would be segregated to separate public and private vehicle operators. This project would include removal of existing landscaped area and pedestrian walkway from the hourly garage to Concourse E.

No Action

Under the No Action Alternative, existing and forecast vehicular traffic demand to access Concourse E would not be accommodated at a quality level of service to the traveling public.

3.6 Alternatives Recommended for Further Consideration

Various potential alternatives were identified to meet the needs at BWI Marshall Airport. These alternatives were screened and either eliminated from further consideration or carried forward for environmental evaluation.



LEGEND

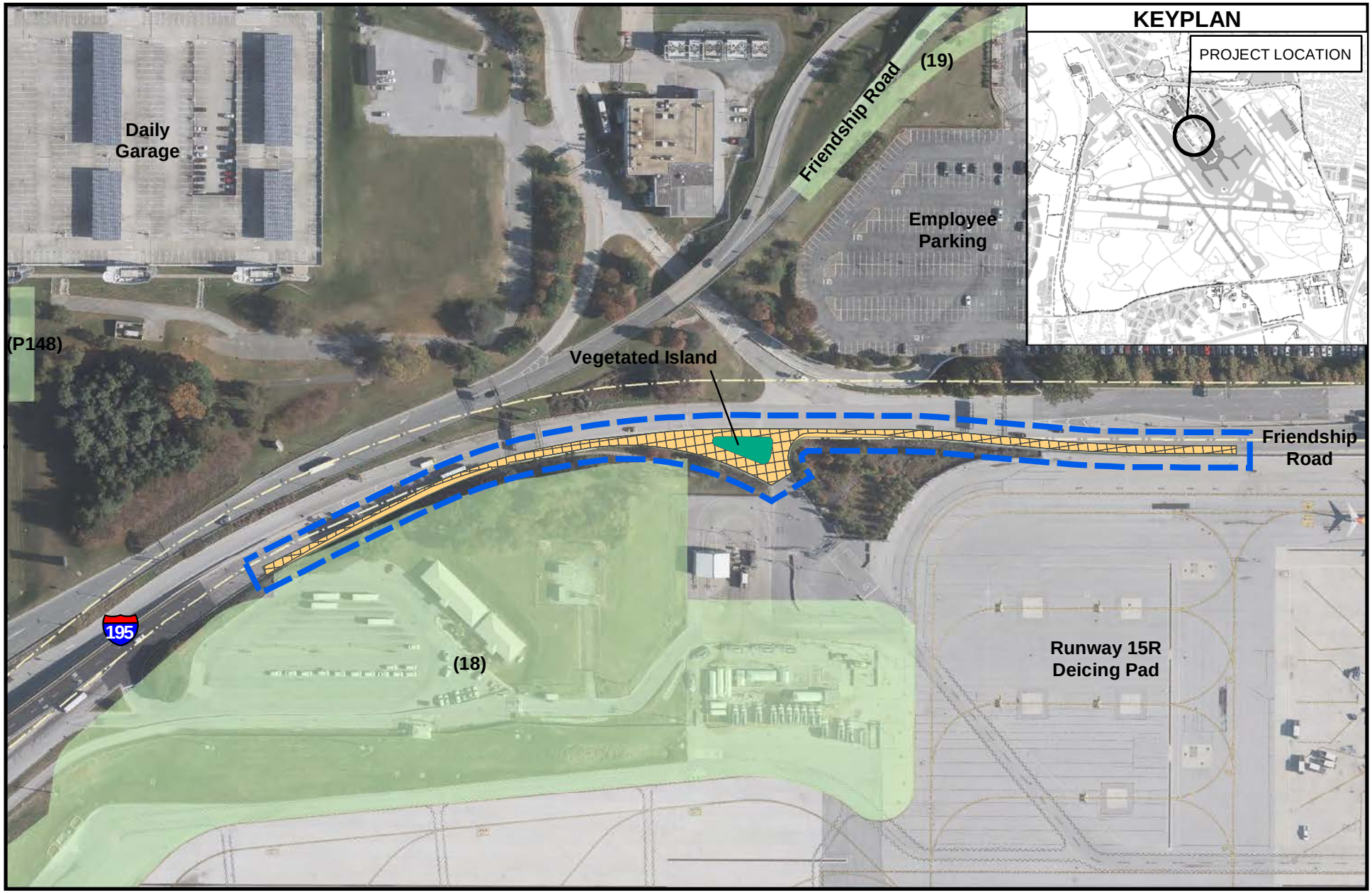
- New Impervious
- Building
- Impervious Reconstructed

(14) New Sky Bridge C - Alternative 1 - 2015 ALP
Figure 3.5-1

N

0 15 30 60 Feet

Source: Aerial - MDOT MAA (2018), ADCI



LEGEND

- New Impervious
- Impervious Removal
- Impervious Reconstructed
- Other EA Projects
- Limit of Disturbance

(15) Terminal Roadway Widening and Access Improvements - Alternative 1 - 2015 ALP

Figure 3.5-2

N

0 50 100 200 Feet

Source: Aerial - MDOT MAA (2018), ADCI

LEGEND

- New Impervious
- Impervious Removal
- Impervious Reconstructed
- Limit of Disturbance
- Airport Property Boundary

(19) Upper Level Roadway Widening at Concourse E - Alternative 1 - 2015 ALP
Figure 3.5-3

N

0 50 100 200 Feet

Source: Aerial - MDOT MAA (2018), ADCI

Retained component alternatives were combined to form three overall-airport alternatives; the 2015 ALP Alternative, the Other Action Alternative, and the No Action Alternative.

The 2015 ALP Alternative includes the actions identified as the Phase I Improvements on the BWI Marshall ALP as conditionally approved by FAA in April 2015. The 2015 ALP Phase I Improvements are those actions required to meet BWI Marshall Airport's needs through 2022 based on additional planning completed during the development of this EA.

The Other Action Alternative, which is the Sponsor's Preferred Alternative, is the 2015 ALP Alternative modified to reduce potential impact on environmental resources and/or modify the action shown on the 2015 ALP as a result of additional planning efforts and considerations during the development of this EA.

The No Action Alternative represents BWI Marshall Airport in its current state without any proposed improvements. The Airport would remain in its current configuration and none of the proposed improvements would be implemented.

The results of the evaluation of alternatives are summarized in **Table 3.6.1**. The alternatives that were identified for each 2015 ALP project are listed in the second column. The 2015 ALP number included in the table correlates to a facility number included on the conditionally approved April 2015 ALP. Columns 3-9 summarize the net impervious, LOD and potential impacts resulting from each alternative. The tenth column indicates whether or not the alternative was retained for detailed analysis. An "X" in the final two columns signifies which alternatives are those shown on the 2015 ALP and which are designated as the Sponsor's Preferred Alternative. See ***Appendix D, Alternatives Preliminary Engineering Project Quantities Table*** for details on the projects summarized in Table 3.6.1.

3.6.1 2015 ALP Alternative

The 2015 ALP Alternative, as illustrated in **Figures 3.6-1 and 3.6-2**, includes the ALP Phase I Improvements as they are shown on the conditionally approved April 2015 ALP.

3.6.2 Other Alternative - "Sponsor's Preferred Alternative"

Figures 3.6-3 and 3.6-4, illustrate the Sponsor's Preferred Alternative. This alternative includes many of the projects as they are shown on the conditionally approved April 2015 ALP, but also incorporates a number of alternatives to various components of the ALP projects. The 2015 ALP is being revised to reflect the Sponsor's Preferred Alternative and was submitted to FAA for review in Fall 2019. The components of the Sponsor's Preferred Alternative are summarized in **Table 3.6.2.** MDOT MAA identified this alternative as their preferred alternative because it addresses all the identified needs for the BWI Marshall Airport ALP Phase I Improvements and minimizes environmental impacts where allowable while still meeting the purpose and need for the Proposed Action.

3.6.3 No Action Alternative

Consideration of the No Action Alternative is required by NEPA in accordance with CEQ regulations. This alternative serves as a basis of comparison with other alternatives considered for detailed analysis. The No Action Alternative represents BWI Marshall Airport in its current state without any

proposed project action(s). The airport would remain as is and none of the improvements included in the Sponsor's Proposed Action Alternative would be implemented. The No Action Alternative would not meet the purpose and need for the Sponsor's Proposed Action. BWI Marshall Airport would remain in its current configuration, as shown in Figure 1.1-2. Regardless, the No Action Alternative was retained for detailed environmental analysis as required by CEQ regulations.

Table 3.6.1

Results of Identification and Screening of Alternatives

Project (ALP Facility Number)	Alternatives Identified *(connected actions)*	Net Impervious (acres)	LOD (acres)	Impacts[1]				Meets Purpose and Need	Retained for Detailed Analysis	2015 ALP Alternative	Other (Sponsor's Preferred) Alternative
				Wetlands/ Jurisdictional SWM Ponds *(acres)*	Stormwater Facilities[2]	Stream Channel *(linear feet)*	Forest Clearing *(acres)*				
Meet FAA Standards											
Relocate Taxiways F and R (1)	1 – 2015 ALP	17.4	111.0	0.2		825	5.1	Yes	Yes	X	X
	2 – Modified Taxiways F and R Relocation (entirely avoid stormwater management Pond B3)	9.9	59.0	X			X	No	No		
	3 – Modified Taxiway F Relocation with ALP Taxiway R Relocation	16.1	79.0	X		X	X	No	No		
	No Action							No	Yes		
International Terminal Area Taxiway Fillets/Shoulders (3)	1 – 2015 ALP	3.5	14.6					Yes	Yes	X	X
	No Action							No	Yes		
New Infill Pavement Near Taxiways T, P and 'Future P' (4)	1 – 2015 ALP	2.2	11.6		X			Yes	Yes	X	X
	Relocate Airfield Lighting Vault (P14)										
	Airfield Lighting Vault Demolition (D-101)										
	Glycol Pump Control Building Demolition (D-101A)										
	No Action							No	Yes		
Relocate Taxiways K and L (6)	1 – 2015 ALP	1.8	7.9					Yes	Yes	X	X
	No Action							No	Yes		
Runway 28 Deicing Pad Expansion (8)	1 – 2015 ALP	1.1	14.1					Yes	Yes	X	
	2 – 2015 ALP with snow dump area	1.7	16.6					Yes	Yes		X
	No Action							No	Yes		
Part 77 Obstruction Removal (10)	1 – 2015 ALP	0	[3]	4.9		X	180.3	Yes	Yes	X	
	2 – Minimize Vegetative Obstruction Removal	0	[3]	35 trees		X	48.2	Yes	Yes		X
	3 – Reduce Runway Length to Avoid Off-Airport Vegetative Obstruction Removal	0	[3]	X		X	X	No	No		
	No Action							No	Yes		
Taxiway V Relocation (17)	1 – 2015 ALP	3.7	35.0	0.2			0.02	Yes	Yes	X	X
	No Action							No	Yes		
VORTAC Critical Area Clearing	1 – Alternative 1	0	[3]				6.3	Yes	Yes	X	X
	No Action							No	Yes		

Table 3.6.1

Results of Identification and Screening of Alternatives

Project (ALP Facility Number)	Alternatives Identified *(connected actions)*	Net Impervious (acres)	LOD (acres)	Impacts[1]				Meets Purpose and Need	Retained for Detailed Analysis	2015 ALP Alternative	Other (Sponsor's Preferred) Alternative
				Wetlands/ Jurisdictional SWM Ponds *(acres)*	Stormwater Facilities[2]	Stream Channel *(linear feet)*	Forest Clearing *(acres)*				
Enhance Airfield Safety and Efficiency											
Taxiway U3 (2)	1 – 2015 ALP	1.6	5.1					Yes	Yes	X	X
	2 – High Speed Exit	2.9	10.8					Yes	Yes		
	No Action							No	Yes		
Isolation/RON Apron (7)	1 – 2015 ALP	8.2	36.0					Yes	Yes	X	
	2 – Impact Minimization Alternative (ALP apron layout, revised roadway segment)	8.3	37.0					Yes	Yes		X
	No Action							No	Yes		
Taxiway H Relocation (12)	1 – 2015 ALP	0.08	8.8		X			Yes	Yes	X	
	2 – Relocate Taxiway H 150 Feet North	-0.19	7.1		X			Yes	Yes		X
	3 – Relocate Taxiway H 500 Feet North	-0.17	8.8		X			Yes	No		
	No Action							No	Yes		
Existing ARFF Expansion Bays (P10)	1 – 2015 ALP	0.39	0.71					Yes	Yes	X	X
	No Action							No	Yes		
Relocate Fire Training Facility (P45)	1 – 2015 ALP	11.1	24.0	0.03			17.1	Yes	Yes	X	
	2 – Impact Minimization Alternative (relocate facility 970 feet east of ALP alternative location)	13.0	26.0	X			X	Yes	No		
	3 – Avoid Potential Future Development Alternative (relocated facility 490 feet east of ALP alternative location)	11.8	25.0	X			X	Yes	No		
	4 – Advanced Planning Alternative	14.8	30.5				22.5	Yes	Yes		X
	VSR Section from Runway 33L to Future Fire Training Facility (13)										
	No Action							No	Yes		
Pavement Rehabilitation and Improvement	1 – Pavement Management Program							Yes	Yes	X	X
	No Action							No	Yes		
VSR Connector	1 – Alternative 1	0.93	1.9					Yes	Yes	X	X
	No Action							No	Yes		
Relocate RTR Facility	1 – Alternative 1	0.16	1.3				0.5	Yes	Yes	X	X
	No Action							No	Yes		

Table 3.6.1

Results of Identification and Screening of Alternatives

Project (ALP Facility Number)	Alternatives Identified *(connected actions)*	Net Impervious (acres)	LOD (acres)	Impacts[1]				Meets Purpose and Need	Retained for Detailed Analysis	2015 ALP Alternative	Other (Sponsor's Preferred) Alternative
				Wetlands/ Jurisdictional SWM Ponds *(acres)*	Stormwater Facilities[2]	Stream Channel *(linear feet)*	Forest Clearing *(acres)*				
Accommodate Existing and Anticipated Passenger Demand											
Runway 15R Deicing Pad Expansion (18)	1 – 2015 ALP	5.4	15.5					Yes	Yes	X	X
	Glycol Storage/Truck Staging Relocation (P40)										
	Glycol Storage Building Demolition (D-173)										
	New Area for Snow Dumping (P41)										
	Taxicab Support Building at Former Hotel Site (P148)										
	Taxi/Bus Staging Area Demolition (D-148)										
	Hudson General Bus Storage Demolition (D-167)										
	Deicing Control Building (RW 15R) Demolition (D-170)										
	RTR Buildings Demolition (D-271)										
	No Action							No	Yes		
Second FBO (P7)	1 – 2015 ALP	-0.41	13.9					Yes	Yes	X	X
	No Action							No	Yes		
New Airline Maintenance Facility (P11)	1 – 2015 ALP West Facility	26.4	72.0	0.1		13	52.6	Yes	Yes	X	
	2 – 2015 ALP East Facility (P12)	16.9	36.0	X		X	X	Yes	No		
	3 – Modified West Facility	26.3	54.0	X		X	X	Yes	No		
	4 – Advanced Planning West Facility	24.2	79.3	0.1		178	48.6	Yes	Yes		X
	No Action							No	Yes		
Runway Deicing Chemical Storage and Access Road (P13)	1 – 2015 ALP	0.12	0.27					Yes	Yes	X	X
	No Action							No	Yes		
Airport Maintenance Complex (P30)	1 – 2015 ALP	0.41	17.7					Yes	Yes	X	
	2 – 2015 ALP shifted west	6.8	17.7					Yes	Yes		X
	No Action							No	Yes		
Building 113 Demolition (D113)	1 – 2015 ALP	0	0					Yes	Yes	X	X
	No Action							No	Yes		

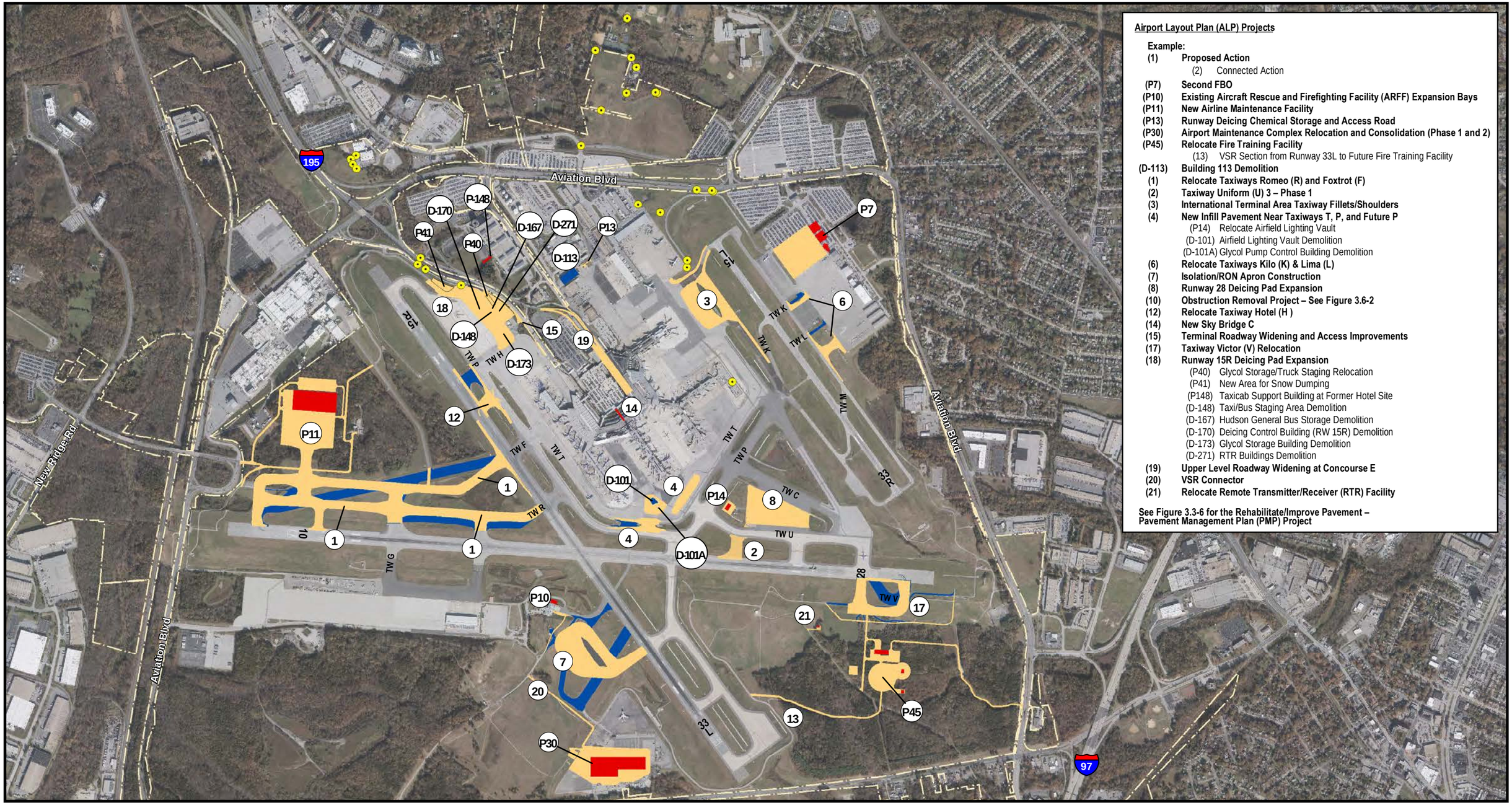
Table 3.6.1

Results of Identification and Screening of Alternatives

Project (ALP Facility Number)	Alternatives Identified *(connected actions)*	Net Impervious (acres)	LOD (acres)	Impacts[1]				Meets Purpose and Need	Retained for Detailed Analysis	2015 ALP Alternative	Other (Sponsor's Preferred) Alternative
				Wetlands/ Jurisdictional SWM Ponds *(acres)*	Stormwater Facilities[2]	Stream Channel *(linear feet)*	Forest Clearing *(acres)*				
Improve Customer Service											
New Sky Bridge C (14)	1 – 2015 ALP	0.12	0.07					Yes	Yes	X	X
	No Action							No	Yes		
Terminal Roadway Widening and Access Improvements (15)	1 – 2015 ALP	0.12	2.0					Yes	Yes	X	X
	No Action							No	Yes		
Upper Level Roadway Widening at Concourse E (19)	1 – 2015 ALP	1.8	8.1					Yes	Yes	X	X
	No Action							No	Yes		

Notes:
[1] Quantitative impacts are provided for wetland, stream and forest clearing for the Alternatives carried forward for impact analysis. An 'X' indicates the Alternative includes impacts to the resource but that quantitative impacts were not determined since the alternative was not carried forward for impact analysis. Details on the quantitative impacts are provided in *Chapter 5*.
[2] Stormwater facilities include non-jurisdictional stormwater ponds and infiltration trenches. An "X" indicates one or more existing stormwater facilities would be impacted by the alternative. Details on which existing facilities are impacted are provided in Chapter 5.
[3] Details on the limits of disturbance for vegetation obstruction removal is provided in *Chapter 5, Section 5.2 – Biological Resources*.

Sources: BWI Marshall Airport Layout Plan, conditionally approved April 2015, *Appendix D, Alternatives Preliminary Engineering Project Quantities*, and HNTB analysis, 2019.



Airport Layout Plan (ALP) Projects

Example:
(1) Proposed Action
(2) Connected Action

(P7) Second FBO
(P10) Existing Aircraft Rescue and Firefighting Facility (ARFF) Expansion Bays
(P11) New Airline Maintenance Facility
(P13) Runway Deicing Chemical Storage and Access Road
(P30) Airport Maintenance Complex Relocation and Consolidation (Phase 1 and 2)
(P45) Relocate Fire Training Facility
(13) VSR Section from Runway 33L to Future Fire Training Facility
(D-113) Building 113 Demolition
(1) Relocate Taxiways Romeo (R) and Foxtrot (F)
(2) Taxiway Uniform (U) 3 – Phase 1
(3) International Terminal Area Taxiway Fillets/Shoulders
(4) New Infill Pavement Near Taxiways T, P, and Future P
(P14) Relocate Airfield Lighting Vault
(D-101) Airfield Lighting Vault Demolition
(D-101A) Glycol Pump Control Building Demolition
(6) Relocate Taxiways Kilo (K) & Lima (L)
(7) Isolation/RON Apron Construction
(8) Runway 28 Deicing Pad Expansion
(10) Obstruction Removal Project – See Figure 3.6-2
(12) Relocate Taxiway Hotel (H)
(14) New Sky Bridge C
(15) Terminal Roadway Widening and Access Improvements
(17) Taxiway Victor (V) Relocation
(18) Runway 15R Deicing Pad Expansion
(P40) Glycol Storage/Truck Staging Relocation
(P41) New Area for Snow Dumping
(P148) Taxicab Support Building at Former Hotel Site
(D-148) Taxi/Bus Staging Area Demolition
(D-167) Hudson General Bus Storage Demolition
(D-170) Deicing Control Building (RW 15R) Demolition
(D-173) Glycol Storage Building Demolition
(D-271) RTR Buildings Demolition
(19) Upper Level Roadway Widening at Concourse E
(20) VSR Connector
(21) Relocate Remote Transmitter/Receiver (RTR) Facility

See Figure 3.3-6 for the Rehabilitate/Improve Pavement – Pavement Management Plan (PMP) Project

LEGEND

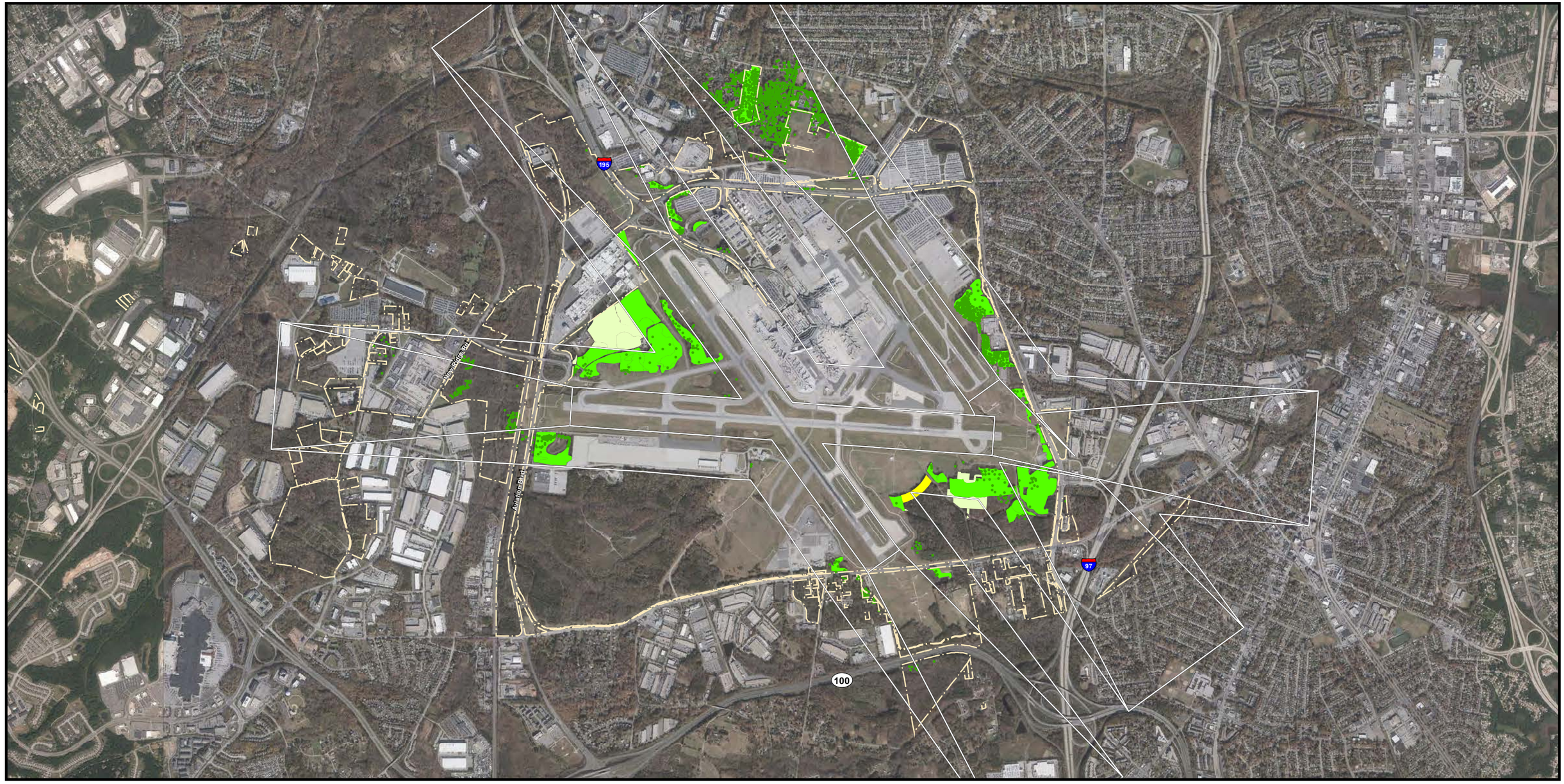
- Airport Property Boundary
- Pavement Improvements
- Proposed Structures
- Demolition
- Pole/Sign/Obstruction Light (To Be Relocated or Removed)

2015 ALP Alternative
Figure 3.6-1

N

0 750 1,500 3,000 Feet

Source: Aerial - MDOT MAA (2018)



LEGEND

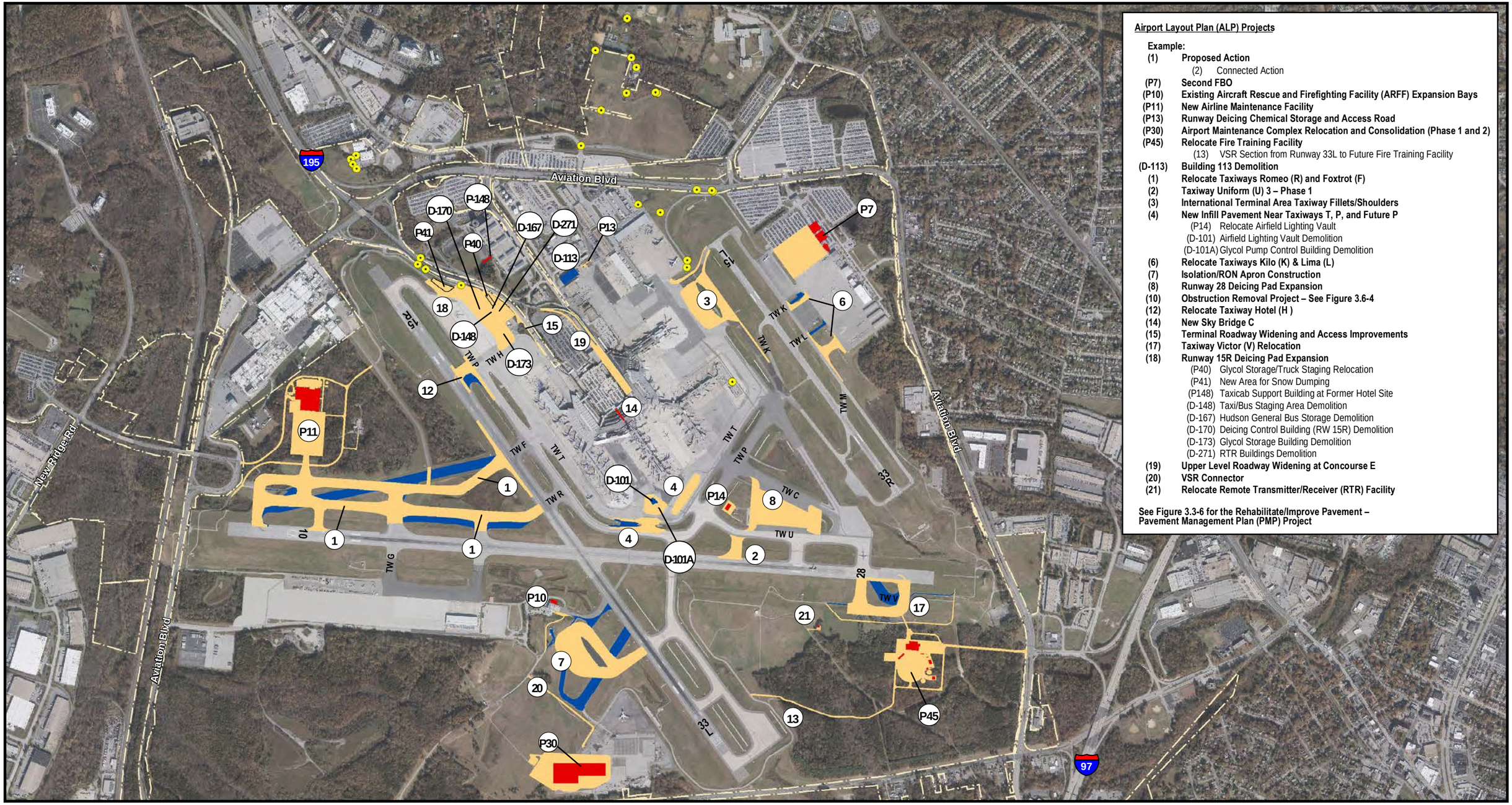
- Airport Property Boundary
- Part 77 (Primary, Approach and Transitional Surface Limits)
- Tree Obstruction Removal (2014 FMP Part 77 Conflict Areas)
- Obstruction Removal (2015 ALP Obstruction Points)
- Tree Removal for Phase I Improvements
- Tree Removal for VORTAC Critical Area

2015 ALP Alternative – Vegetation
Figure 3.6-2

N

0 1,250 2,500 5,000 Feet

Source: Aerial - MDOT MAA (2018)



Airport Layout Plan (ALP) Projects

Example:
- **(1) Proposed Action**
  - (2) Connected Action
- **(P7) Second FBO**
- **(P10) Existing Aircraft Rescue and Firefighting Facility (ARFF) Expansion Bays**
- **(P11) New Airline Maintenance Facility**
- **(P13) Runway Deicing Chemical Storage and Access Road**
- **(P30) Airport Maintenance Complex Relocation and Consolidation (Phase 1 and 2)**
- **(P45) Relocate Fire Training Facility**
  - (13) VSR Section from Runway 33L to Future Fire Training Facility
- **(D-113) Building 113 Demolition**
- **(1) Relocate Taxiways Romeo (R) and Foxtrot (F)**
- **(2) Taxiway Uniform (U) 3 – Phase 1**
- **(3) International Terminal Area Taxiway Fillets/Shoulders**
- **(4) New Infill Pavement Near Taxiways T, P, and Future P**
  - (P14) Relocate Airfield Lighting Vault
  - (D-101) Airfield Lighting Vault Demolition
  - (D-101A) Glycol Pump Control Building Demolition
- **(6) Relocate Taxiways Kilo (K) & Lima (L)**
- **(7) Isolation/RON Apron Construction**
- **(8) Runway 28 Deicing Pad Expansion**
- **(10) Obstruction Removal Project – See Figure 3.6-4**
- **(12) Relocate Taxiway Hotel (H)**
- **(14) New Sky Bridge C**
- **(15) Terminal Roadway Widening and Access Improvements**
- **(17) Taxiway Victor (V) Relocation**
- **(18) Runway 15R Deicing Pad Expansion**
  - (P40) Glycol Storage/Truck Staging Relocation
  - (P41) New Area for Snow Dumping
  - (P148) Taxicab Support Building at Former Hotel Site
  - (D-148) Taxi/Bus Staging Area Demolition
  - (D-167) Hudson General Bus Storage Demolition
  - (D-170) Deicing Control Building (RW 15R) Demolition
  - (D-173) Glycol Storage Building Demolition
  - (D-271) RTR Buildings Demolition
- **(19) Upper Level Roadway Widening at Concourse E**
- **(20) VSR Connector**
- **(21) Relocate Remote Transmitter/Receiver (RTR) Facility**

See Figure 3.3-6 for the Rehabilitate/Improve Pavement – Pavement Management Plan (PMP) Project

LEGEND

- Airport Property Boundary
- Pavement Improvements
- Proposed Structures
- Demolition
- Pole/Sign/Obstruction Light (To Be Relocated or Removed)

Sponsor's Preferred Alternative
Figure 3.6-3

N

0 750 1,500 3,000 Feet

Source: Aerial - MDOT MAA (2018)

LEGEND

- Airport Property Boundary
- Part 77 (Primary, Approach and Transitional Surface Limits)
- Tree Obstruction Removal (2014 FMP Part 77 Conflict Areas)*
- Obstruction Removal (2015 ALP Obstruction Points)
- Tree Removal for Phase I Improvements
- Tree Removal for VORTAC Critical Area
- Trees to Remain Under Sponsor's Preferred Alternative (No longer considered to be obstructions per 2016 tree survey)

Note: * Sponsor's Preferred Alternative Tree Obstruction Removal Areas include Part 77 Conflict Areas where they overlap with project LODs.

Sponsor's Preferred Alternative - Vegetation
Figure 3.6-4

N

0 1,250 2,500 5,000 Feet

Source: Aerial - MDOT MAA (2018)

Table 3.6.2

Sponsor's Preferred Alternative

Project (Project Number)	Component Alternative Selected	Selection Determination
Meet FAA Design Standards		
Relocate Taxiways R and F (1)	Alt 1 – 2015 ALP	Meets FAA taxiway standards and runway to taxiway separation standards.
International Terminal Area Taxiway Fillets/Shoulders (3)	Alt 1 – 2015 ALP	Meets FAA standards for taxiway geometry and fillets.
New Infill Pavement Near Taxiways T, P and Future P (4)	Alt 1 – 2015 ALP	Meets FAA standards for taxiway separation and accommodates a new VSR.
Relocate Taxiways K and L (6)	Alt 1 – 2015 ALP	Meets FAA standards to prevent direct access from the GA complex to Runway 15L-33R.
Runway 28 Deicing Pad Expansion (8)	Alt 2 – 2015 ALP with Snow Dump Area	Meets FAA standards for deicing facilities while maintaining the current capacity. This alternative also provides the needed snow dump area that is lost in reconfiguring the deicing pad to meet standards. Pavement and Glycol infrastructure is replaced
Part 77 Obstruction Removal (10)	Alt 2- Minimize Vegetative Obstruction Removal	Meets Part 77 by removing obstructions at 50:1 on-airport and 34:1 off-airport. Minimizes vegetation obstruction removal by saving 46 off-airport trees that through field visits have been determined to not to be penetrations to Part 77 surfaces.
Taxiway V Relocation (17)	Alt 1 – 2015 ALP	Meets FAA standards for runway to taxiway separation, while also providing more space for queuing of departures.
VORTAC Critical Area Clearing	Alt 1	Eliminates the out-of-tolerance conditions and allows the VORTAC to operate appropriately.
Enhance Airfield Safety and Efficiency		
Taxiway U3 (2)	Alt 1 – 2015 ALP	Reduces arrival runway occupancy times related to arrivals on Runway 10 and thus improves runway system efficiency.

Table 3.6.2

Sponsor's Preferred Alternative

Project (Project Number)	Component Alternative Selected	Selection Determination
Isolation/RON Apron (7)	Alt 2 – Move ARFF Access Road	Accommodates the need for an apron to isolate aircraft for inspection as well as RON spots for parking aircraft overnight. This alternative relocates the existing ARFF access road west to avoid the need to relocate the RTR and ASDE-X.
Taxiway H Relocation (12)	Alt 2 – 150 Feet North	Reduces runway occupancy times for arrivals to Runway 33L.
Existing ARFF Expansion Bays (P10)	Alt 1 – 2015 ALP	Provides for additional office space and indoor parking areas to meet existing needs.
Relocate Fire Training Facility (P45)	Alt 4 – Advanced Planning	Meets FAA design standards for ARFF training facilities and provides a public access gate for regional training capabilities. Alternative 4 results in no impacts to existing wetlands and includes utility connections for the training facility.
Pavement Rehabilitation and Improvement	Alt 1 – PMP	Provides pavement repairs where pavement has deteriorated to unacceptable levels.
VSR Connector	Alt 1	Provides needed connection between the existing roadway south of the ARFF to the east with the Gold Lot.
Relocate RTR Facility	Alt 1	Improves and optimizes the RTR signal, as the existing RTR site is susceptible to signal loss due to interference from surrounding buildings.
Accommodate Existing and Anticipated Passenger Demand		
Runway 15R Deicing Pad Expansion (18)	Alt 1 – 2015 ALP	Enhances the utility of the deicing pad, improves operations, and supports simultaneous deicing requirements, RON parking and aircraft queuing.
Second FBO (P7)	Alt 1 – 2015 ALP	Accommodates GA operations by providing additional facilities and services to enhance the level of service for GA users.

Table 3.6.2

Sponsor's Preferred Alternative

Project (Project Number)	Component Alternative Selected	Selection Determination
New Airline Maintenance Facility (P11)	Alt 4 – Advanced Planning West Facility	Accommodates SWA needs for maintenance of aircraft scheduled to use BWI Marshall and in a location with minimal related airfield operational impacts, including minimizing impacts to the function of the ASR. Alternative 4 sets aside additional area to the east for future expansion and includes necessary utility connections for the facility.
Runway Deicing Chemical Storage and Access Road (P13)	Alt 1 – 2015 ALP	Accommodates current and forecast demand for deicing storage.
Airport Maintenance Complex (P30)	Alt 2	Provides appropriate storage for SRE.
Building 113 Demolition (D113)	Alt 1 – 2015 ALP	Eliminates building that does not meet existing building codes.
Improve Customer Service		
New Sky Bridge C (14)	Alt 1 – 2015 ALP	Improves accessibility from the hourly parking garage to Concourse C.
Terminal Roadway Widening and Access Improvements (15)	Alt 1 – 2015 ALP	Alleviates existing and future traffic congestion and queuing backups that block the upper level roadways and provides a quality level of service.
Upper Level Roadway Widening at Concourse E (19)	Alt 1 – 2015 ALP	Alleviates existing and future traffic congestion and to be consistent with the existing roadway layout between Concourses A and D.

Source: HNTB analysis, 2019.

Chapter 4: AFFECTED ENVIRONMENT

This chapter provides a description of the existing conditions within the Study Area as described in *Section 4.1, Study Areas*. The environmental resource categories are organized as identified in FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures* and FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions*. The potential environmental impacts of the No Action and Proposed Action alternatives are presented in *Chapter 5, Environmental Consequences*, of this EA and Section 4(f) Determination.

4.1 Study Areas

The study area is the geographic area where the potential impacts of the alternatives retained for further study are analyzed. The extent of the study area depends upon the environmental resource being evaluated and whether the direct or indirect impacts are being considered. Therefore, for the purposes of this EA and Section 4(f) Determination, two general study areas were identified: the Noise Impact Study Area and the Physical Development Study Area.

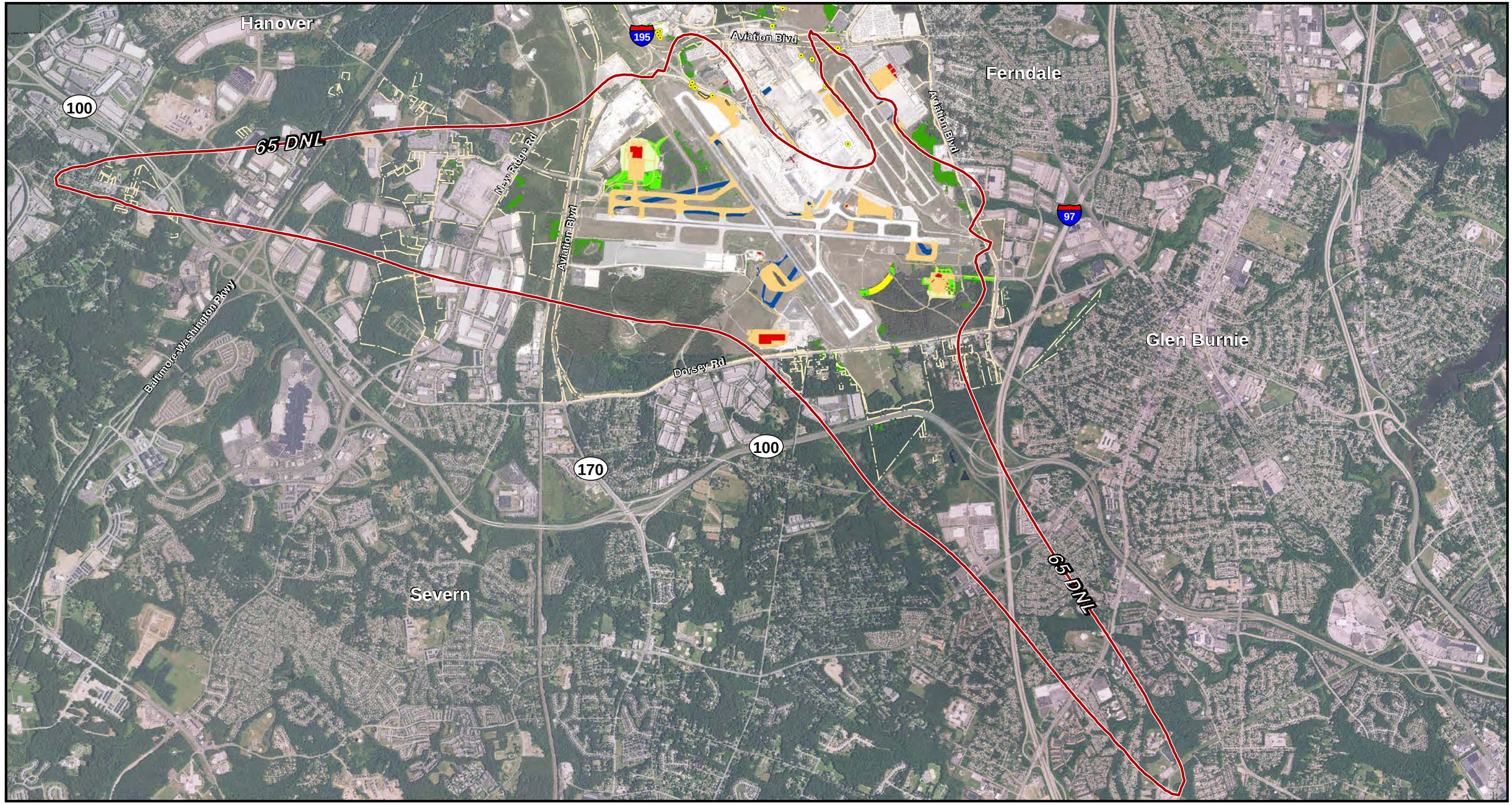
As illustrated in **Figure 4.1-1**, the Noise Impact Study Area is defined as the area where the noise level is 65 decibels (dB) Day-Night Average Sound Level (DNL) or greater. The Noise Impact Study Area boundary is represented by the Future 2027 Proposed Action DNL 65 dB contour for BWI Marshall Airport completed as part of this EA and Section 4(f) Determination.

As illustrated in **Figure 4.1-2**, the Physical Development Study Area (Study Area) is defined by all areas that could experience physical disturbance as a result of implementation of proposed improvements. In some cases, these general Study Areas were not used because of specific resource requirements. Where these two Study Areas were not applicable, the specific study area used is described in the section addressing the associated resource.

Analysis years were established for the existing conditions and forecast years to be used for environmental analysis. The existing conditions (base year) for this EA and Section 4(f) Determination is 2018. The forecast years are the year of implementation of the proposed improvements (2022) and five years thereafter (2027).

4.2 Air Quality

This section includes information on existing air quality conditions in Maryland (including the area surrounding BWI Marshall Airport and the Study Area), including (i.) the regulatory framework involved in the management of air quality, (ii.) sources of emissions and existing emissions inventory, (iii.) ambient air quality monitoring and (iv.) air quality conformity requirements. The air quality impacts associated with the operational and construction activities of the proposed improvements at BWI Marshall Airport are further discussed in **Chapter 5**.



LEGEND

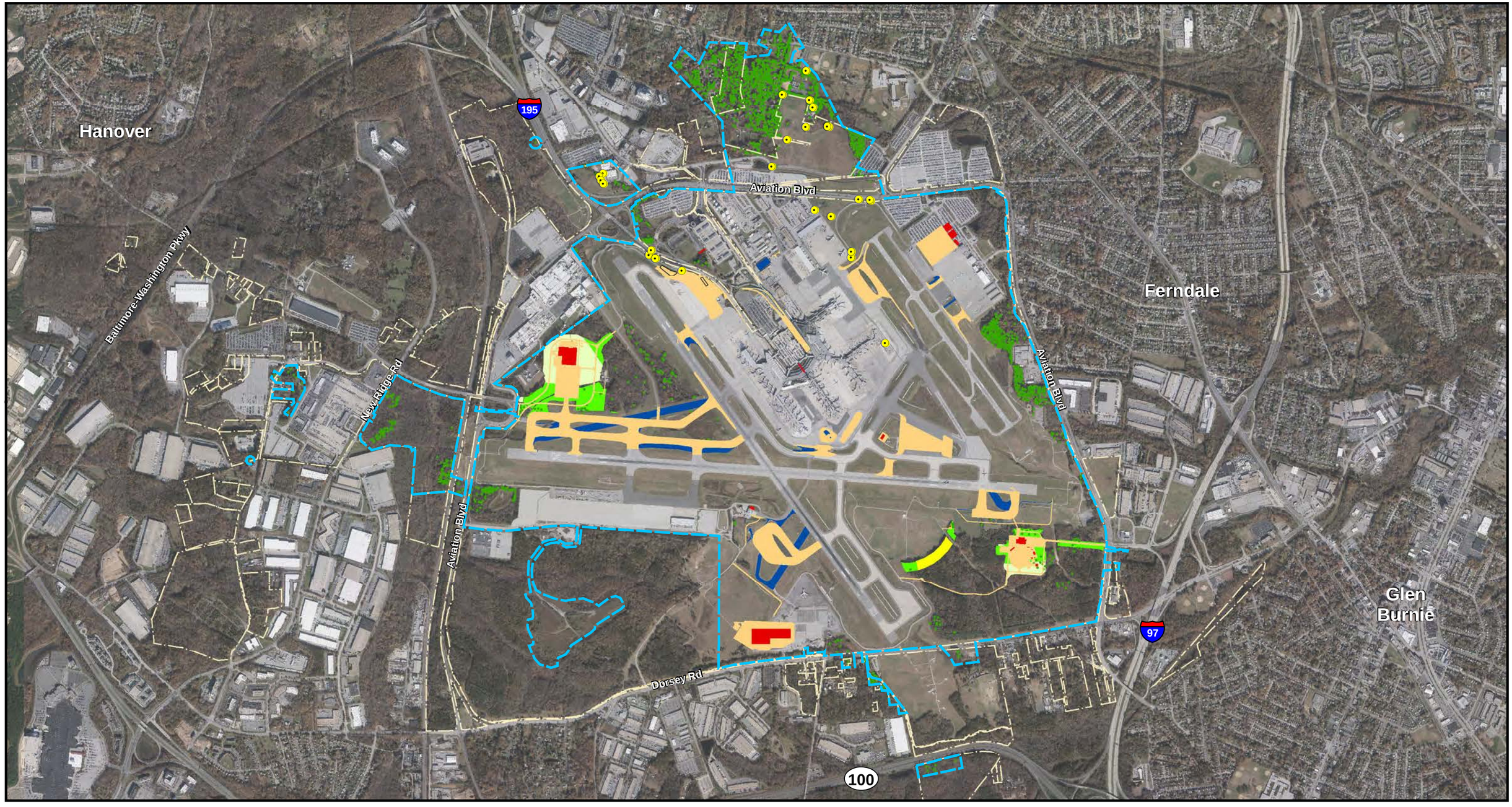
- Noise Impact Study Area
- Airport Property Boundary
- Pavement Improvements
- Proposed Structures
- Demolition
- Pole/Sign/Obstruction Light (To Be Relocated or Removed)
- Tree Obstruction Removal (2014 FMP Part 77 Conflict Areas)
- Tree Removal for Phase I Improvements
- Obstruction Removal (2015 ALP Obstruction Points)
- Tree Removal for VORTAC Critical Area
- Property Acquisition for NEPA Review

Noise Impact Study Area
Figure 4.1-1

N

0 1,500 3,000 6,000 Feet

Source: Aerial - MDOT MAA (2016)



LEGEND

- Physical Development Study Area
- Airport Property Boundary
- Pavement Improvements
- Proposed Structures
- Demolition
- Pole/Sign/Obstruction Light (To Be Relocated or Removed)
- Tree Obstruction Removal (2014 FMP Part 77 Conflict Areas)
- Tree Removal for Phase I Improvements
- Obstruction Removal (2015 ALP Obstruction Points)
- Tree Removal for VORTAC Critical Area
- Property Acquisition for NEPA Review

Physical Development Study Area
Figure 4.1-2

N

0 1,000 2,000 4,000 Feet

Source: Aerial - MDOT MAA (2018)

4.2.1 Regulatory Information

4.2.1.1 Air Quality Standards

The United States Environmental Protection Agency (EPA) promulgates national clean air regulations and sets National Ambient Air Quality Standards (NAAQS)[1] under the authority of the Clean Air Act (CAA).

The NAAQS are set to safeguard public health and environmental welfare against the harmful effects of outdoor air pollution. Primary NAAQS are health-based standards geared toward protecting sensitive or at-risk portions of the population such as asthmatics, children, and the elderly. Secondary NAAQS are welfare oriented and are designed to prevent decreased visibility and damage to animals, vegetation, and physical structures. The NAAQS set threshold levels for ambient (i.e., outdoor) air quality for six common air pollutants, referred to as "criteria" air pollutants. These air pollutants are carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), sulfur dioxide (SO_2) and particulate matter (PM) which includes particulate matter with a diameter of 10 microns or less (PM_{10}) and a diameter of 2.5 microns or less ($PM_{2.5}$). Each state has the option to impose stronger air quality standards than those promulgated by the EPA, however Maryland has opted to retain the NAAQS. **Table 4.2.1** presents a general description of EPA's "criteria" air pollutants, and **Table 4.2.2** presents the NAAQS.

Table 4.2.1
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.
Ozone (O_3)	O_3 is formed when nitrogen oxides and volatile organic compounds (VOC) react in the presence of sunlight. O_3 is subject to long-range transport and is considered a "regional" pollutant. VOCs 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.
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 two to three times that of "background" levels.
Sulfur Dioxide (SO_2)	Sulfur is a contaminant of fossil fuels. Emitted as a gas (SO_2) or a solid (sulfates, SO_4), Sulfur oxides (SO_x) is an exhaust product of internal combustion engines. SO_x are measured in ambient air as SO_2; a "criteria" air pollutant. Coal-fired power plants are typically the largest sources of sulfur dioxide.

Table 4.2.1
EPA Criteria Air Pollutants

Pollutant	Characteristic
Particulate Matter (PM)	PM is comprised of 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).
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.

Source: KB Environmental Sciences, Inc., 2017.

Table 4.2.2
National Ambient Air Quality Standards

Pollutant	Primary/ Secondary	Averaging Period	Standard	Form
Carbon monoxide (CO)	Primary	1-hour	35 ppm	Not to be exceeded more than once per year
		8-hour	9 ppm	
Ozone (O_3)	Primary and Secondary	8-hour	0.070 ppm	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Nitrogen dioxide (NO_2)	Primary	1-hour	100 ppb	98th percentile of 1-hour daily maximum concentration, averaged over 3 years
	Primary and Secondary	Annual	53 ppb	Annual Mean
Sulfur dioxide (SO_2)	Primary	1-hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	Secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year
Particulate matter (PM_{10})	Primary and Secondary	24-hour	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Particulate matter ($PM_{2.5}$)	Primary and Secondary	24-hour	35 µg/m^3	98th percentile, averaged over 3 years
	Primary	Annual	12 µg/m^3	Annual mean, averaged over 3 years
	Secondary	Annual	15 µg/m^3	Annual mean, averaged over 3 years
Lead (P_b)	Primary and Secondary	3-month	0.15 µg/m^3	Not to be exceeded

Notes: ppb = parts per billion; ppm = parts per million; and µg/m^3 = micrograms per cubic meter.
Source: EPA, https://www.epa.gov/criteria-air-pollutants/naaqs-table, January 2017.

4.2.1.2 Air Quality Management Agencies

The management of air quality conditions in the state of Maryland is the responsibility of federal, regional, state, and local governmental air quality regulatory agencies. Under the CAA, the EPA's primary responsibility is to promulgate the NAAQS, as well as approving State Implementation Plans (SIPs). It is the responsibility of the Maryland Department of Environment (MDE) to enforce these regulations and ensure that these standards are met. MDE is responsible for preparing a SIP by which air quality goals and standards can be met.

Regionally, Maryland is part of the Ozone Transport Commission (OTC)[2]. This organization comprises 13-states working together in order to advise the EPA on transport issues and for developing and implementing regional solutions to the ground-level ozone problem in the Northeast and Mid-Atlantic regions.[3]

On a local level, the Baltimore Metropolitan Council (BMC) assists MDE with SIP development and compliance with Transportation Conformity regulations as they pertain to air quality.

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

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 4.2.3 summarizes the federal, regional, state, and local governments and their roles and responsibilities with regard to air quality management in Anne Arundel County and as it potentially applies to the assessment of BWI Marshall Airport.

4.2.1.3 Attainment/Non-attainment Status

The EPA designates areas of the United States as either meeting or not meeting the NAAQS. An area that is meeting the NAAQS is designated an "attainment" area, while an area that is not meeting the NAAQS is designated as a "non-attainment" area. Areas that were once designated as "non-attainment," but are currently meeting the NAAQS are classified as a "maintenance" area. "Non-attainment" areas are pollutant specific (i.e., an area could have multiple "non-attainment" designations, one for each criteria pollutant not meeting the NAAQS).

BWI Marshall Airport is located in Anne Arundel County, which is currently designated "non-attainment" for the EPA criteria pollutants O_3 (2008[4] and 2015 standards) and SO_2 (2010 standard). This signifies that exceedances of the NAAQS have occurred within recent years. Anne Arundel County was within a $PM_{2.5}$ maintenance area for the 1997 standard, however the 1997 standard was revoked on October 24, 2016.

Table 4.2.4 summarizes the NAAQS "attainment" and "non-attainment" designations for the area encompassing BWI Marshall Airport.

Table 4.2.3

Agencies Involved with Air Quality Management in Anne Arundel County

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 FHWA and BMC to coordinate the Baltimore regional components of the TIP and RTP into the STIP. Headquartered in Hanover, MD.
Ozone Transport Commission (OTC)	*Regional* – Created under the CAA, the OTC advises the EPA on transport issues and for developing and implementing regional solutions to the ground-level ozone problem in the Northeast and Mid-Atlantic areas. Provides air pollution assessment, technical support and a forum through which states can work together on strategies to reduce air pollution.
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.

Notes: 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, and TIP = Transportation Improvement Plan.

Source: KB Environmental Sciences, Inc., January 2017.

Table 4.2.4
Current Attainment / Non-attainment Designations

Pollutant	NAAQS	Designation
Carbon Monoxide (CO)	1971 Standard	Attainment
Ozone (O_3)	1979 (1-Hour) Standard	Revoked on June 15, 2005
	1997 (8-Hour) Standard	Revoked on April 6, 2015
	2008 (8-Hour) Standard	Non-attainment (Moderate)
	2015 (8-Hour) Standard	Non-attainment (Marginal)
Nitrogen Dioxide (NO_2)	1971 Standard	Attainment
Sulfur Dioxide (SO_2)	1971 Standard	Attainment
	2010 Standard	Non-attainment
Particulate Matter (PM_{10})	1987 Standard	Attainment
Particulate Matter ($PM_{2.5}$)	1997 Standard	Revoked on October 24, 2016
	2006 Standard	Attainment
	2012 Standard	Attainment
Lead (Pb)	1978 Standard	Attainment
	2008 Standard	Attainment

Source: EPA, Green Book at https://www.epa.gov/green-book, December 2019.

4.2.1.4 State Implementation Plans

The CAA requires individual states to develop, update and maintain SIPs that will demonstrate compliance with the NAAQS. Common features of a SIP include attainment timeframes or milestones, area-wide emissions inventories and budgets and control/mitigation strategies that are to be employed to achieve attainment. SIPs may be revised by the state with EPA approval. The federally enforceable SIP for the State of Maryland is compiled under 40 CFR Part 52 Subpart V. Section 110(a) of the CAA requires that within three years of the promulgation of a NAAQS, a state must adopt and submit such a plan to the EPA.

Maryland's Air Quality Planning Program (AQPP) is responsible for writing SIPs and regulations to reduce emissions of "criteria" air pollutants in order to achieve the NAAQS. It is also the responsibility of the AQPP to implement federal, regional, local, and state greenhouse gas (GHG) emissions reduction programs, which include the implementation of Maryland's GHG Reduction Act of 2009 and 2016, as well as the involvement in the Regional Greenhouse Gas Initiative (RGGI).

In September 2019, MDE submitted an 8-hour O_3 Transport SIP to EPA detailing the implementation, maintenance and enforcement of the 0.70 ppm 8-hour O_3 NAAQS.[5,6] 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.[7]

Since the designation of the $PM_{2.5}$ NAAQS in 2005, the air quality has improved due to permanent and enforceable emissions reductions. In May 2013, MDE submitted a request to EPA to re-designate the Baltimore 1997 $PM_{2.5}$ "non-attainment" area to "attainment" per the provisions under § 107 of the CAA. MDE also requested that the EPA concurrently approve, as a revision to the SIP, the related §175A maintenance plan.[8] On December 16, 2014, EPA approved Maryland's request to re-designate the Baltimore "non-attainment" area to "maintenance" for the 1997 $PM_{2.5}$ NAAQS.[9]

In June 2013, MDE issued a SIP[10] which outlines a plan to improve air quality in the Baltimore region to meet the 0.08 ppm NAAQS for the 8-hour 1997 ozone standard. The SIP included demonstrations of improving air quality during the periods of 2002-2008 and 2008-2011, as well as an attainment demonstration for 2012. The SIP also included commitments by the state to meet the requirements for serious "non-attainment" areas, as well as commitments to meet EPA requirements for the Baltimore region, including contingency plans for 2008 and 2012 rates of progress, and an analysis of reasonably available control measures (RACM).

4.2.2 Airport Air Emissions

4.2.2.1 Sources of Emissions

Airport-related air emissions associated with BWI Marshall Airport can be classified into six typical source categories. **Table 4.2.5** summarizes these airport-related emissions sources, their general characteristics, and pollutants emitted. For the project improvements reviewed in this EA and Section 4(f) Determination the primary pollutant sources are aircraft operations and their associated Ground Support Equipment (GSE) and Auxiliary Power Units (APUs) as well as construction emissions. With the exception of the potential for maintenance runup operations, aircraft operations would be the same between the Proposed Action and the No Action Alternatives. It should be noted that delay and queueing times are limited at BWI Marshall except during unusual events (e.g. severe weather). While the Action Alternatives would provide benefit especially during unusual events, the average times used for modeling purposes for both queueing and delay would not be affected. The Action Alternatives do not include fuel storage or transfer facilities. Because aircraft operations into and out of BWI Marshall Airport will be the same between the No Action, 2015 ALP, and Sponsor's Preferred Alternatives, the volume of vehicular traffic would be the same. The roadway improvements included in the Action Alternatives would serve to reduce congestion within the terminal area and therefore has the potential to reduce vehicular pollutant emissions. However, any reduction would be insignificant from a regional perspective and therefore vehicular emissions were not considered in the emissions analysis. Additionally, the loss of parking spaces as a result of the Second FBO project would be fully accommodated for with existing available capacity in the Hourly Garage and Daily Garage.

Table 4.2.5
Typical Airport-Related Sources of Air Pollutant Emissions

Source	Pollutant	Characteristic
Aircraft	CO, VOC, NOx, 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, NOx, 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, NOx, 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 Airport, SWA-operated (and other airlines) 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 Sources	CO, VOC, NOx, 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, NOx, 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.

Note: SWA = Southwest Airlines.

Source: KB Environmental Sciences, Inc., January 2017.

4.2.2.2 Emissions Inventory

Emission inventories quantify the amount of pollutants and/or pollutant precursors associated with airport-related sources. For disclosure purposes, an existing condition (2018) emissions inventory of pollutants/precursors was prepared for the primary BWI Marshall Airport sources that would be affected by the proposed improvements—aircraft, GSE, and APUs. The inventory is presented in **Table 4.2.6**. The results are presented in units of tons per year (tpy) and pollutant/precursor (i.e., CO, VOCs, NO_x, SO_x, PM_{10}, and $PM_{2.5}$). ***Appendix G, Air Quality and Climate, Attachment 1***, includes details on emissions inventory assumptions and methodology for criteria air pollutants.

Table 4.2.6
Emissions Inventory for BWI Marshall Airport 2018 Conditions

Emissions Source	Pollutant (tpy)					
	CO	VOC	NO_x	SO_x	PM_{10}	$PM_{2.5}$
Aircraft	1,084	191	1,010	97	9	9
GSE	307	11	35	2	2	2
APUs	36	3	44	6	5	5
Total	*1,427*	*206*	*1,089*	*105*	*16*	*16*

Note: Although lead (Pb) is a criteria pollutant, it was not evaluated because the proposed project would have no impacts on lead emissions.

Source: AEDT and HNTB analysis, 2019.

4.2.3 Ambient Air Quality Monitoring

MDE maintains and operates 24 air quality monitoring stations throughout Maryland as part of its permanent, state-wide air monitoring program. These monitoring stations are used to measure concentrations of air pollutants in the ambient (i.e., outdoor) air to determine compliance with the NAAQS. **Table 4.2.7** shows the most recent three years (2016 – 2018) of ambient air quality monitoring data for the monitors closest to BWI Marshall Airport. For ease of reference, the applicable NAAQS for each monitored pollutant is included.

Although BWI Marshall Airport is within "non-attainment" areas for O_3 and SO_2, based on these ambient air quality data, the NAAQS for all criteria pollutants are being met.

4.2.4 Existing and New Permits

Air emissions from BWI Marshall Airport are regulated under their current Title V Air Permit, which is administered by the EPA. This permit is valid through January 31, 2024. Any additional air emission sources that are operated as a result of the proposed projects at BWI Marshall Airport would operate under this permit.

Table 4.2.7

Air Monitoring Data in the BWI Marshall Airport Area (2016-2018)

Site Name, Address, and ID (Distance)	Pollutant	Averaging Period	NAAQS	Year		
				2016	2017	2018
Essex 600 Dorsey Avenue Baltimore County, MD 024-005-3001 (13 miles NE)	SO_2	3-hour[1]	0.5 ppm	0.01	0.01	0.02
		1-hour[2]	75 ppb	19	13	11
	CO	8-hour[3]	9 ppm	2	1	1
		1-hour[3]	35 ppm	2	2	2
	$PM_{2.5}$	Annual[6]	12 µg/m^3	9	9	8
		24-hour[7]	35 µg/m^3	23	23	19
Oldtown Fire Station, 1100 Hillen Street Baltimore City, MD 24-510-0040 (8 miles NE)	NO_2	Annual	53 ppb	15	14	13
		1-hour[4]	100 ppb	54	53	51
Furley E.S. Rec. Cntr., 4633 Furley Ave. Baltimore City, MD 24-510-0054 (12 miles NE)	O_3	8-hour[5]	0.07 ppm	0.07	0.07	0.07
Anne Arundel County Public Works Building 7409 Baltimore Annapolis Blvd. Glen Burnie, MD 24-003-1003 (1 mile E)	$PM_{2.5}$	Annual[6]	12 µg/m^3	9	n/a	n/a
		24-hour[7]	35 µg/m^3	22	n/a	n/a
	PM_{10}	24-hour[8]	150 µg/m^3	32	31	28
Howard University's Beltsville Laboratory, 12003 Old Baltimore Pike, Beltsville, MD 24-033-0030 *EPA monitor* (14 miles SW)	Pb	3-month[9]	0.15 µg/m^3	0.01	0.01	n/a

Notes: ppm = parts per million, µg/m^3 = micrograms per cubic meter, and NAAQS = National Ambient Air Quality Standards. n/a = not applicable (monitoring station did not record pollutant level in given year)

(1) The SO_2 3-hour standard is a "secondary" standard not to be exceeded more than once per year. Data obtained from EPA's Annual Summary Data at https://aqsdr1.epa.gov/aqsweb/aqstmp/airdata/download_files.html.

(2) Standard based on the 99th percentile of 1-hour daily maximum concentrations, averaged over three years.

(3) Not to be exceeded more than once per year.

(4) Standard based on the 98th percentile of 1-hour daily maximum concentrations, averaged over three years.

(5) Standard based on the annual fourth-highest daily maximum 8-hour concentration, averaged over three years.

(6) Standard based on annual mean, averaged over three years.

(7) Standard based on the daily 98th percentile, averaged over three years.

(8) Not to be exceeded more than once per year on average over three years.

(9) Not to be exceeded.

Sources: EPA AirData – Monitor Value Reports, July 2019 http://www.epa.gov/airdata/ and MDE http://www.mde.state.md.us/programs/Air/AirQualityMonitoring/Pages/HistoricalData.aspx.

4.2.5 Conformity Requirements

4.2.5.1 General Conformity Requirements

The General Conformity Rule of the federal CAA prohibits federal agencies (including the FAA) from permitting or funding projects that do not conform to an applicable SIP. The General Conformity Rule applies only to areas that are designated "non-attainment" or "maintenance."

As a means of demonstrating conformity with the SIP, project-related emissions of the applicable "non-attainment/maintenance" pollutants are compared to *de minimis* level thresholds. If the emissions exceed the thresholds, a formal Conformity Determination is required to demonstrate that the action conforms to the applicable SIP. Conversely, if project-related emissions are below the *de minimis* levels the project is automatically assumed to conform to the SIP. As previously mentioned in Section 4.2.3, BWI Marshall Airport currently resides within the "non-attainment" areas for O_3 (2015 standard) and SO_2, and therefore are subject to the applicable *de minimis* levels listed in **Table 4.2.8.** As shown, these thresholds apply to SO_2 as well as NO_x and VOCs – the two primary precursors to ozone formation.

In addition to the General Conformity Rule requirements, the NEPA also requires environmental review of federally-funded projects that have the potential to affect the environment. Therefore, for disclosure purposes under the NEPA an operational and construction emissions inventory of the proposed improvements at BWI Marshall Airport is presented in **Chapter 5** of this report.

Table 4.2.8
General Conformity *de minimis* Levels

Pollutant	Tons per year
O_3	100 for NO_x and 50 for VOCs
SO_2	100

Source: EPA, *De Minimis* Emission Levels, https://www.epa.gov/general-conformity/de-minimis-emission-levels, January 2017.

4.2.5.2 Transportation Conformity Requirements

The CAA also contains a Transportation Conformity Rule that functions similarly to the General Conformity Rule. The Transportation Conformity Rule restricts federal funding to highway or transportation projects that do not conform to an applicable SIP. The responsibility of transportation conformity determination is vested in the FHWA and state Department of Transportation (DOT). The proposed improvements to BWI Marshall Airport are not subject to the Transportation Conformity Rule because the projects are not regionally significant, they are not funded under U.S.C. Title 23 or the Federal Transit Act and they do not require approval by FHWA or Federal Transit Administration (FTA).

4.3 Biological Resources

Fish, wildlife, and plants within and adjacent to the Study Area are described in the following sections.

4.3.1 Fish

The BWI Marshall Airport Campus and Study Area occurs within two subwatersheds, Patapsco Lower North Branch (MDE No. 02130906) and Baltimore Harbor (MDE No. 02130903). Numerous perennial and intermittent headwater tributaries associated with these subwatersheds occur within the Study Area. These systems are designated

by MDE for use as water contact recreation and protection of nontidal warmwater aquatic life. *Section 4.15, Water Resources*, provides greater detail on the water resources within the Study Area.

A variety of freshwater fish species inhabit the perennial streams within the BWI Marshall Campus and surrounding environs. American eel (*Anguilla rostrata*), creek chub (*Semotilus atromaculatus*), and various minnow (Cyprinidae spp.) and sunfish (Centrarchidae spp.) species are known to occur within these streams.[11]

Apart from the American eel, all fish species are true freshwater species in that all life stages occur in freshwater streams. The American eel is a catadromous species, which means that it lives in freshwater systems but migrates to salt water to breed. Anadromous species are fish such as herring and shad that spend most of their life in the sea but are born in freshwater and return there to spawn. The degree to which anadromous species utilize the streams within the study area is unknown and is influenced by the presence of culverts and other impediments to fish passage.

4.3.2 Wildlife

The BWI Marshall Airport airfield is managed in a way to be the least attractive to wildlife species that can be hazardous to airport operations. Therefore, the airfield is maintained as turfgrass with little to no trees or shrubs, weedy areas, or tall grass. Suitable wildlife habitat near the Study Area occurs within the forested areas on the BWI Marshall Airport Campus and within contiguous forested areas in the neighborhoods surrounding BWI Marshall Airport.

Common mammals found on or near BWI Marshall Airport include white-tailed deer (*Odocoileus virginianus*), red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*), raccoon (*Procyon lotor*), opossum (*Didelphis virginiana*), striped skunk (*Mephitis mephitis*), groundhog (*Marmota monax*), beaver (*Castor canadensis*), eastern gray squirrel (*Sciurus carolinensis*), eastern chipmunk (*Tamias striatus*), eastern cottontail (*Sylvilagus floridanus*), and several bat and small rodent species.[12]

Numerous bird species occur on or near BWI Marshall Airport. European starlings (*Sturnus vulgaris*), rock pigeons (*Columba livia*), and house sparrows (*Passer domesticus*) are invasive, non-migratory species that use developed areas on BWI Marshall Airport. Migratory songbirds and birds of prey use the forest, wetlands, and edge habitats on and off the Airport.[13]

Many reptile and amphibian species are expected to occur in the lesser-developed areas on or near BWI Marshall Airport. Common species expected within forested and wetland habitats include eastern box turtle (*Terrapene carolina carolina*), eastern rat snake (*Pantherophis alleghaniensis*), eastern garter snake (*Thamnophis sirtalis*), green frog (*Lithobates clamitans melanota*), southern leopard frog (*Lithobates sphenocephalus utricularius*), wood frog (*Lithobates sylvaticus*), and American toad (*Anaxyrus americanus americanus*).[14]

Several palustrine forested (PFO) wetland systems on BWI Marshall Airport contain the potential for viable vernal pool habitat. Most vernal pools are small, isolated systems under forest cover. Vernal pool ecosystems are unique in that they are critical for the entire life cycle of many amphibian and invertebrate

species. Fallen detritus such as leaves, branches, and any growing vegetation in and around the edges of vernal pools provide sufficient organic material to provide food and cover during the various life stages of amphibians and invertebrates. Many reptiles, small mammals, and birds also use vernal pools for a source of food or refuge.

4.3.3 Plants

Much of the BWI Marshall Airport Campus is maintained as turf grass. Grass is maintained at a height of 6 to 12 inches, except around runway and taxiway marker lights, where it is cut to 3 inches for purposes of visibility. Shrub lands and transitional or edge habitats are prevented from establishing on BWI Marshall Airport. Forest resources within and surrounding the Study Area primarily consist of mixed deciduous forests, which are dominated by oaks (Quercus spp.), maples (Acer spp.), hickories (Carya spp.) and other hardwood species, interspersed with stands of pines (Pinus spp.).[15] **Figure 4.3-1** shows the forest resources as they relate to the Physical Disturbance Study Area.

The wetlands present within the Study Area contain additional plant community types. Wetlands occurring within the Study Area are discussed in Section 4.15.4, *Wetlands*.

4.3.4 Federal Regulations

Federally-protected species include endangered, threatened, proposed, and candidate species protected by the Endangered Species Act of 1973 (16 United States Code [U.S.C.] 1531 et seq.). Critical habitat, also protected under the Endangered Species Act, is defined as a specific geographic area that contains features essential for the conservation of a threatened or endangered species and that may require special management and protection. Other federally-protected species/habitat include migratory birds protected by the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703–712) and the Bald and Golden Eagle Protection Act (BGEPA) (16U.S.C 668-668d), and Essential Fish Habitat (EFH) protected by the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (Public Law 94-265).

4.3.4.1 Federally-listed Threatened and Endangered Species

Under Section 7(a) of the Endangered Species Act, federal agencies are required to consult with the U.S. Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service (as appropriate) regarding federally-listed threatened or endangered species or their habitats in the proposed project area. The USFWS was consulted via its Information for Planning and Consultation system (IPaC). Through the IPaC, the USFWS provides a list of threatened, endangered, and proposed species, designated critical habitat, and candidate species that may occur within the boundaries of the Study Area. *Appendix H, Attachment 1*, includes the USFWS provided list of species. One plant species and one mammal species were listed for the project area: swamp pink (*Helonias bullata*) and the northern long-eared bat/ NLEB (*Myotis septentrionalis).*

Swamp pink, federally-listed as threatened, has been documented to occur within the Study Area west of the BWI Marshall Airport campus in the floodplain of 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. Maryland Department of Natural Resources (MDNR) Wildlife and Heritage Service (WHS)

LEGEND

- Physical Development Study Area
- Forest Stand
- Airport Property Boundary

Forest Stand Delination (On-Airport)
Figure 4.3-1

N

0 1,000 2,000 4,000 Feet

Source: Aerial - MDOT MAA (2018)

monitors populations of swamp pink within the floodplain of Stony Run on MDOT MAA-owned property.

As there is no federally designated critical habit for swamp pink, a survey for individuals and populations will be required. Correspondence with MDNR WHS, dated July 26, 2019, indicated that MDNR WHS planned to complete an updated swamp pink survey in the Stony Run floodplain area in late August or early September 2019. MDNR WHS completed the updated survey in November 2019. FAA consultation with the USFWS Chesapeake Bay Field Office (CBFO) was completed. A Biological Assessment was prepared in January 2020 (See *Appendix H, Attachment 8*). The USFWS CBFO rendered a Not Likely to Adversely Affect determination for the swamp pink in February 2020 (See *Appendix H, Attachment 9*).

Correspondence with MDNR WHS, dated April 11, 2019, indicated that there are no known hibernacula or maternity roost trees for the NLEB within the vicinity of BWI Marshall Airport (See *Appendix H, Attachment 7*). While the USFWS does not designate critical habitat for the NLEB, additional consultation with USFWS is required when projects with a federal nexus will clear 15 acres or more of trees. Since the project meets these criteria, FAA will consult with USFWS through the NLEB 4(d) Rule Streamlined Consultation process.

4.3.4.2 Migratory Birds

The MBTA prohibits anyone from taking, possessing, importing, exporting, transporting, selling, purchasing, or bartering any migratory bird or the parts, nests, or eggs of such a bird except under the terms of a valid Federal permit. The BGEPA prohibits the taking, possessing, selling, purchasing, or bartering of any bald or golden eagle alive or dead including any part, nest or egg without a valid permit. BWI Marshall Airport has a current Federal depredation permit to take migratory birds except eagles and threatened or endangered species. MDNR allows the take of these species under the Federal permit without obtaining an additional state permit.

Migratory bird species protected by the MBTA are listed in 50 CFR 10.13. The vast majority of birds occurring within Anne Arundel County, with a few exceptions, are listed in 50 CFR 10.13 and thus are protected by the Act. Birds occurring in Anne Arundel County that are not protected by the Act include house sparrows, European starlings, rock pigeons, resident game birds that are regulated by state game laws (e.g., northern bobwhite [*Colinus virginianus*], wild turkey [*Meleagris gallopavo*], and crows [*Corvus* spp.]), domestic ducks and geese, and other exotic birds.

In North America, general migratory pathways, or flyways, between winter feeding grounds and summer breeding grounds occur along coastlines, major rivers, and mountain ranges. BWI Marshall Airport lies within the Atlantic Flyway. In the United States, the Atlantic Flyway generally spans from the Atlantic coast to the Appalachian Mountains, and it is the most densely populated of the four flyways in North America. Many habitats in the Atlantic Flyway are threatened by development and urban sprawl.

The CBFO lists 16 migratory bird species that could occur within the project area. These species include the following: bald eagle (*Haliaeetus leucocephalus),* black-billed cuckoo (*Coccyzus erythropthalmus*), bobolink (*Dolichonyx oryzivorus*), cerulean warbler (*Dendroica cerulea*), Canada

warbler (*Cardellina canadensis*), Kentucky warbler (*Oporornis formosus*), least tern (*Sterna antillarum*), lesser yellowlegs (*Tringa flavipes*), long-eared owl (*Asio otus*), prairie warbler (*Dendroica discolor*), prothonotary warbler (*Protonotaria citrea*), red-headed woodpecker (*Melanerpes erythrocephalus*), red-throated loon (*Gavia stellata*), rusty blackbird (*Euphagus carolinus*), snowy owl (*Bubo scandiacus*), and wood thrush (*Hylocichla mustelina*). Of the species identified, the wood thrush is near threatened. The cerulean warbler, rusty blackbird and snowy owl are vulnerable with decreasing populations. The remainder of listed species are in the category of least threatened.[16]

4.3.5 State Regulations

The state of Maryland protects state-listed rare, threatened, and endangered species as well as their supporting habitats. Forest resources are also protected in Maryland with an emphasis on protection of habitats that support life stages of migratory songbirds and other Forest Interior Dwelling Bird Species (FIDS).

4.3.5.1 State-Listed Rare, Threatened, and Endangered Species

State-listed rare, threatened, and endangered species are protected by the Maryland Nongame and Endangered Species Conservation Act (Annotated Code of Maryland 10-2A). The MDNR Wildlife and Heritage Service (WHS) was contacted during the EA and Section 4(f) Determination scoping effort in July 2016 requesting state records for rare, threatened, or endangered species within the boundaries of the Study Area. MDNR WHS responded in an email on April 6, 2017 (see *Appendix H, Attachment 2*) and indicated that no state-listed species are known to occur within the Study Area. MDNR WHS also responded in an email dated April 11, 2019 (see *Appendix H, Attachment 7)* that there are no known hibernacula or maternity roosts for the NLEB within the vicinity of BWI Marshall Airport. The project area lies within the zone of white-nose syndrome for the species, where Federally funded projects that clear more than 15 acres of forest are subject to additional coordination with USFWS for the NLEB.

Wetlands known to support (or have the potential to support) individuals or populations of federally or state designated species are classified by MDE as Wetlands of Special State Concern (WSSC). Wetlands associated with the Stony Run floodplain are WSSC.

Habitats known to support (or have the potential to support) individuals or populations of state and/or federally listed species are designated by MDNR as Sensitive Species Project Review Areas (SSPRAs).

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;
- Switch Cane *(Arundinaria tecta)*: 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.

4.3.5.2 Forest Resources

The Maryland Forest Conservation Act (FCA), enacted in 1991, requires identification of existing forest stands[17], protection of the highest priority forest stands, and establishment of areas where new forests can be planted. Prior to the approval of any public or private construction, grading, or sediment control activity exceeding 40,000 square feet, applicants must submit a Forest Stand Delineation (FSD) and a Forest Conservation Plan for approval by the MDNR Forest Service.

Special protections are afforded to specimen trees which are trees with a diameter at breast height (DBH) that is equal to or greater than:

- 30 inches, or
- 75 percent of the DBH of the State of Maryland champion tree of that species.

Forest stands are assigned retention priority ratings per the Maryland Forest Conservation Manual. The priority ratings are based on forest structure and the presence of sensitive features such as wetlands, 100-year floodplains, streams, stream buffers, large contiguous areas of forest, specimen trees, and steep slopes. Retention priority ratings range from 1 to 4 as follows: 1 (high); 2 (moderate); 3 (low); and 4 (disturbed).

Forest stands on State-owned property within the Study Area were identified using MDOT MAA's FMP Update (MDOT MAA, 2014). The current FMP Update serves as the FSD for MDOT MAA-owned properties and is recognized as such by the MDNR Forest Service. *Appendix H* includes the FMP Update (*Attachment 3*) and MDNR FMP approval letter (*Attachment 4*).

Eighty-six forest stands were identified as being either partially or entirely within the Study Area on State-owned property. Most of the forest stands are mixed deciduous forests with areas of pine plantations in the mid- to late-successional stage. The boundaries of the forest stands are shown in Figure 4.3-1 and **Table 4.3.1** lists their dominant canopy species, size and retention priority. Refer to the 2014 FMP Update, Appendix E figures (included in *Appendix H, Attachment 3*) for identification of forest stands included in Table 4.3.1.

Table 4.3.1

Forest Stand Characteristics in the Study Area (MDOT MAA-Owned)

Forest Stand	Canopy Species	Priority Ranking	Size (acres)[1]
FS-3	Red Oak – White Oak	Priority 1	23.03
FS-4	Virginia Pine	Priority 2	1.52
FS-7	Virginia Pine – Chestnut Oak	Priority 2	10.09
FS-8	Virginia Pine – Red Maple	Priority 2	2.09
FS-9	Tulip Poplar – Chestnut Oak	Priority 1	3.16
FS-10	Black Locust	Priority 1	1.38
FS-11	Black Locust	Priority 1	0.89
FS-12	Red Maple	Priority 1	2.62

Table 4.3.1

Forest Stand Characteristics in the Study Area (MDOT MAA-Owned)

Forest Stand	Canopy Species	Priority Ranking	Size (acres)[1]
FS-13	Virginia Pine	Priority 1	2.02
FS-14	Virginia Pine	Priority 2	0.52
FS-15	Virginia Pine – Red Maple	Priority 1	1.65
FS-16	Virginia Pine	Priority 1	4.74
FS-17	Black Cherry – Red Maple	Priority 2	34.46
FS-18	Virginia Pine	Priority 2	5.16
FS-19	Black Locust	Priority 2	2.65
FS-20	Virginia Pine	Priority 2	2.77
FS-21	Red Maple	Priority 2	4.21
FS-22	Virginia Pine	Priority 2	3.34
FS-23	Red Maple	Priority 1	20.22
FS-24	Red Maple	Priority 1	10.21
FS-25	White Oak – Red Maple	Priority 2	5.03
FS-27	Southern Red Oak	Priority 2	6.47
FS-28	Black Cherry – Red Oak – Black Oak	Priority 2	0.88
FS-29	Virginia Pine – Oak – Red Maple	Priority 1	9.53
FS-30	Virginia Pine – Oak	Priority 2	3.42
FS-31	Oak – Hickory – Tulip Poplar	Priority 2	0.70
FS-32	Oak – Hickory – Virginia Pine	Priority 2	0.35
FS-33	White Oak – Southern Red Oak	Priority 2	1.79
FS-34	Tulip Poplar	Priority 1	5.49
FS-35	Loblolly Pine	Priority 1	59.07
FS-35A	Tulip Poplar	Priority 1	13.44
FS-35B	Virginia Pine	Priority 1	3.19
FS-36	Red Maple	Priority 1	3.01
FS-38	Red Oak – Virginia Pine – Sweetgum	Priority 1	1.00
FS-39	Virginia Pine – Tulip Poplar – Red Maple	Priority 1	11.61
FS-79	Black Locust	Priority 2	0.63
FS-80	Red Maple	Priority 1	3.06
FS-81	Virginia Pine – Red Maple	Priority 1	1.74
FS-83	Red Maple – Tulip Poplar – Willow Oak	Priority 1	4.51
FS-84	Red Maple	Priority 1	5.78
FS-85	Virginia Pine	Priority 2	16.88
FS-86	Virginia Pine	Priority 2	3.95

Table 4.3.1

Forest Stand Characteristics in the Study Area (MDOT MAA-Owned)

Forest Stand	Canopy Species	Priority Ranking	Size (acres)[1]
FS-87	Virginia Pine	Priority 2	1.09
FS-88	Southern Red Oak	Priority 2	10.02
FS-89	Virginia Pine	Priority 2	2.03
FS-90	Virginia Pine	Priority 2	15.06
FS-91	Persimmon – Red Maple – Black Cherry	Priority 2	1.35
FS-92	Virginia Pine – Southern Red Oak – Northern Red Oak	Priority 2	1.06
FS-93	Oak – Red Maple – Black Cherry	Priority 2	0.52
FS-94	Virginia Pine – Southern Red Oak – Red Maple	Priority 2	0.69
FS-95	Virginia Pine – Northern Red Oak – Southern Red Oak	Priority 2	2.29
FS-96	Virginia Pine – Southern Red Oak	Priority 2	1.87
FS-97	Virginia Pine – Southern Red Oak	Priority 2	1.26
FS-98	Virginia Pine	Priority 2	1.15
FS-99	Oak – Hickory	Priority 2	12.55
FS-100	Virginia Pine	Priority 2	1.51
FS-101	Virginia Pine – Southern Red Oak	Priority 2	16.00
FS-102	Virginia Pine	Priority 2	0.95
FS-103	Southern Red Oak	Priority 2	3.73
FS-104	Virginia Pine	Priority 2	4.63
FS-105	Oak – Pine – Red Maple	Priority 2	15.21
FS-106	Virginia Pine – Southern Red Oak	Priority 2	4.28
FS-107	Black Oak – Southern Red Oak – Virginia Pine	Priority 2	4.52
FS-108	Oak – Virginia Pine	Priority 2	3.01
FS-109	Virginia Pine – Black Oak	Priority 2	6.01
FS-110	Virginia Pine – Red Oak – Black Oak	Priority 2	1.27
FS-111	Southern Red Oak – Virginia Pine	Priority 2	2.23
FS-112	Virginia Pine	Priority 2	0.51
FS-113	Virginia Pine	Priority 2	2.57
FS-114	White Pine – Oak – Red Maple	Priority 2	2.87
FS-115	Virginia Pine – Oak – Tulip Poplar – Red Maple	Priority 1	1.76
OS-8A ST 1	Mixed	Priority 4	0.38
OS-8A ST 2	Virginia Pine	Priority 4	0.56

Table 4.3.1

Forest Stand Characteristics in the Study Area (MDOT MAA-Owned)

Forest Stand	Canopy Species	Priority Ranking	Size (acres)[1]
OS-8A ST 3	Silver Maple – Red Maple	Priority 4	2.43
OS-8A ST 4	Loblolly Pine	Priority 4	1.63
OS-8A ST 5	Loblolly Pine – White Pine – Black Cherry – Black Locust	Priority 4	1.27
OS-9B ST 1	Loblolly Pine	Priority 2	1.05
OS-9B ST 2	White Oak – Red Maple – Red Oak	Priority 2	0.83
OS-15 ST 1	Virginia Pine – Southern Red Oak	Priority 2	0.99
OS-15 ST 2	Big Tooth Aspen – Black Cherry – Southern Red Oak – Virginia Pine – Sycamore	Priority 2	3.11
OS-15 ST 3	Virginia Pine – Red Maple	Priority 2	1.12
OS-15 ST 4	Virginia Pine – Red Oak – Big Tooth Aspen – Tulip Poplar	Priority 2	5.02
OS-15 ST 5	Virginia Pine	Priority 2	3.62
OS-17B ST1	Virginia Pine	Priority 2	0.91
OS19A/B	Tulip Poplar – Red Maple – Virginia Pine – Southern Red Oak – White Pine – White Oak	Priority 1	39.72
OS 20E	Mixed	Priority 4	0.52

Note: [1] Forest stand size is based on acreages provided in the 2014 FMP Update report. Any variation between sizes provided in the FMP report and this table are due to tree clearing in those stands, or miscalculation of cumulative forest stand sizes provided in the FMP.

Source: HNTB Forest Maintenance Plan Update 2014.

4.3.5.3 Forest Interior Dwelling Bird Species Habitat

FIDS are birds that require forest interior habitat conditions to successfully breed and survive. Many FIDS are migratory songbirds that are federally protected under the MBTA. Populations of FIDS are declining in Maryland and throughout the eastern United States. Designated FIDS habitat is afforded special protection under the Critical Area Law in Maryland. MDNR strongly encourages the conservation of FIDS habitat throughout the state and recommends potential guidelines to incorporate into site design in order to minimize a project's impact on FIDS and other native forest plants and wildlife.

MDNR classifies forested areas as either Potential FIDS Habitat (Class 3), High Quality Potential FIDS Habitat (Class 2), or Potential FIDS Core Areas (Class 1). This classification is based on several factors including extent, species composition (which can vary by physiographic province), and presence of streams. To be considered Potential FIDS Habitat (Class 3) an area of contiguous forest must be at least 50 acres in size and either have 10 acres of forest interior habitat or a forested stream corridor at least 450 feet long averaging 300 feet in

width. High Quality Potential FIDS Habitat (Class 2) on the Coastal Plain can either be about 100 acres in size with at least 25 percent forest interior and 50 percent deciduous or mixed forest containing riparian forest at least 200 meters by 300 meters in size or an approximate 500-acre or larger area with at least 25 percent forest interior regardless of composition or presence of a stream. Potential FIDS Core Areas (Class 1) are tracts of contiguous forest with a minimum of 500 acres of forest interior habitat; on the Coastal Plain, species composition must be at least 50% deciduous or mixed forest. As shown on **Figure 4.3-2**, FIDS habitat within the Study Area is designated as either FIDS Class 2 or 3.

4.3.6 Other Regulations

4.3.6.1 Anne Arundel County

Forest resources and specimen trees within the Study Area that are not on State-owned property are subject to Anne Arundel County's Forest Conservation Ordinance. As only individual tree obstructions are proposed for removal, a full FSD and FCP was not conducted to inventory the forest resources within the Study Area. A simplified FSD was conducted during October and November 2016 within a residential area north of the Airport in which numerous trees have been designated by FAA as penetrations to FAR Part 77 surfaces. In addition to delineation of forest stands, individual trees identified as obstructions were field located, identified to species level, measured for DBH and estimated height, and assessed for general health. Of the 55 privately-owned parcels, only 32 property owners granted access to assess trees and forest resources. One additional owner granted access while the fieldwork was being conducted (Parcel 47).

Five forest stands were identified within the Study Area on private properties that granted permission to enter. Most of the forest stands are mixed deciduous forests in the mid-successional stage. The boundaries of the forest stands are shown in **Figure 4.3-3**, and **Table 4.3.2** lists their general characteristics. Figure 4.3-3 also shows the parcels for which MDOT MAA has existing tree topping easements. These forests stands are remnants of a larger forest stand that was fragmented due to residential development.

Fifty-one specimen trees were identified on privately-owned residential parcels within the Study Area. **Figure 4.3-4** shows their locations, and **Table 4.3.3** provides the species, diameter, and health condition of each specimen tree. Most of these specimen trees are located on private residential properties in the approach to Runway 15L-33R. The most prevalent species of specimen trees include southern red oak (*Quercus falcata*), red maple (*Acer rubrum*), and white oak (*Quercus alba*).

LEGEND

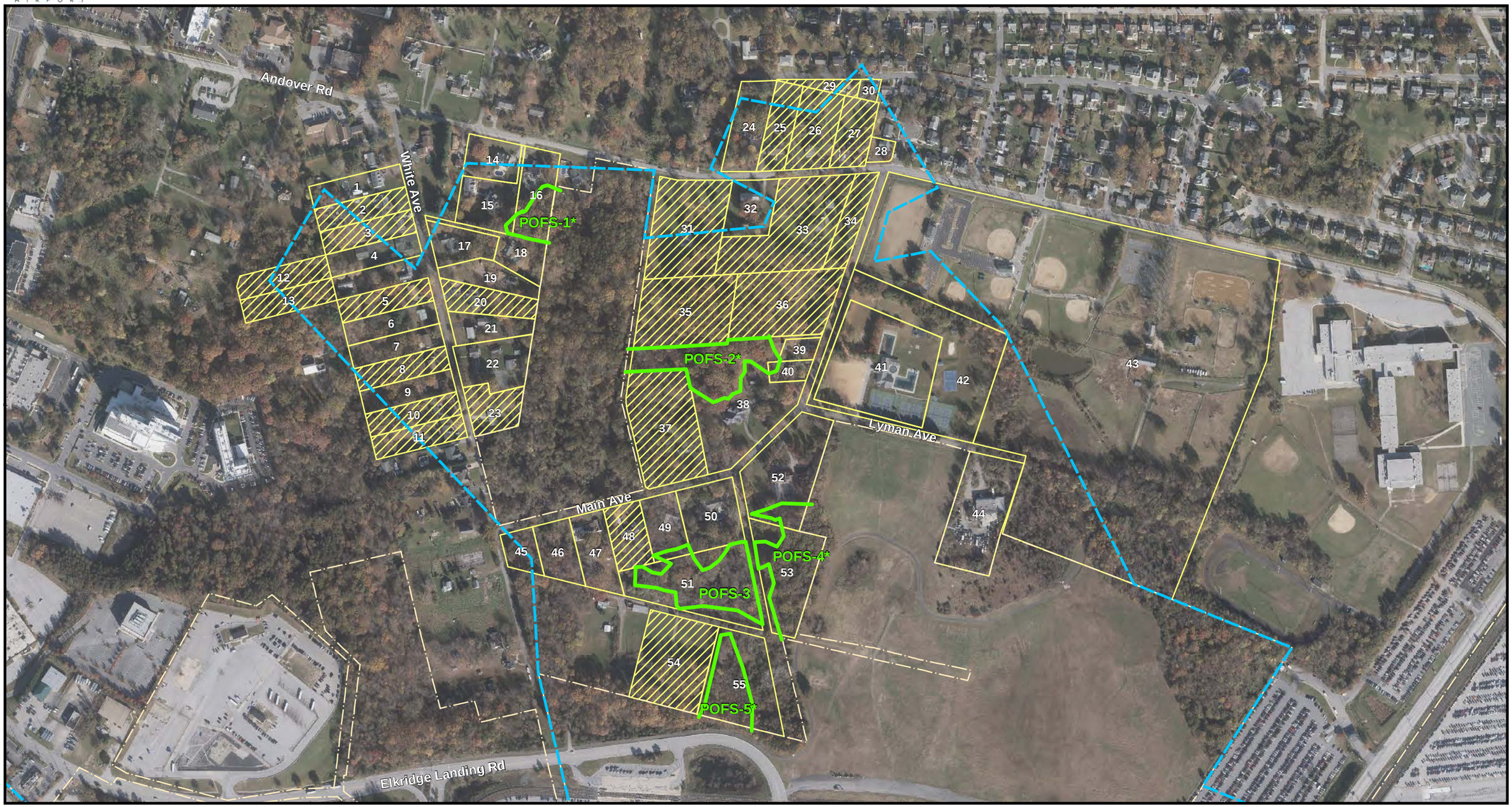
- Physical Development Study Area
- Airport Property Boundary
- FIDS Habitat Class 2
- FIDS Habitat Class 3

Forest Interior Dwelling Species Habitat
Figure 4.3-2

N

0 1,000 2,000 4,000 Feet

Source: Aerial - MDOT MAA (2018), Maryland DNR Geospatial Data



LEGEND

- Physical Development Study Area
- Forest Stand
- Parcel Boundary
- No Access to Parcel
- Airport Property Boundary

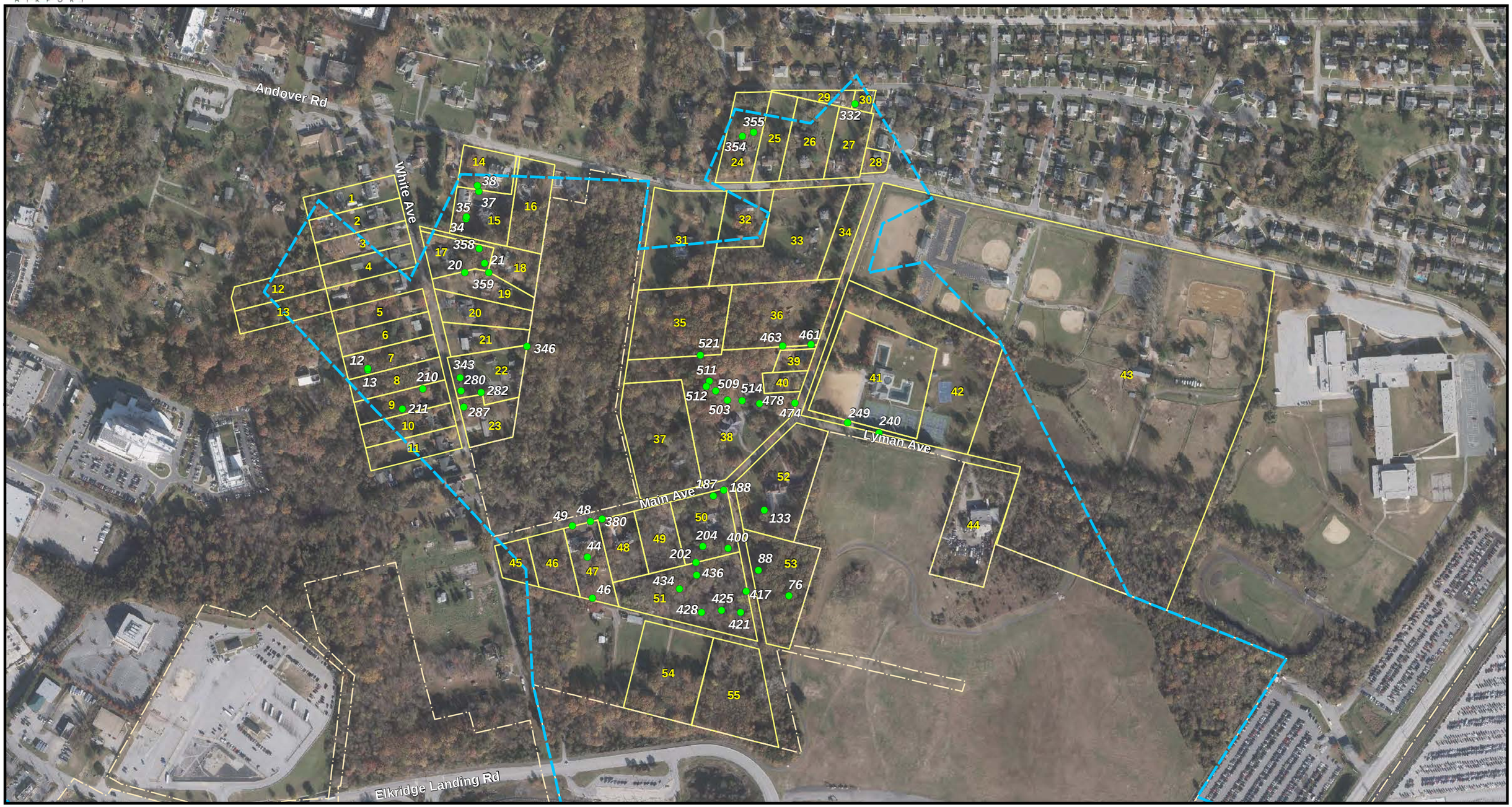
Note: * Open forest stand boundaries indicate the stand is part of a larger stand that continues off-site.

Forest Stand Delination (Off-Airport)
Figure 4.3-3

N

0 200 400 800 Feet

Source: Aerial - MDOT MAA (2018)



LEGEND

- Physical Development Study Area
- 27 Specimen Tree
- 12 Parcel Boundary
- Airport Property Boundary

Specimen Trees (Off-Airport Property)
Figure 4.3-4

N

0 200 400 800 Feet

Source: Aerial - MDOT MAA (2018)

Table 4.3.2

Forest Stand Characteristics in the Study Area (Privately Owned)

Forest Stand	Canopy Species	Priority Ranking	Size[1] (acres)
POFS-1	Tulip Poplar – Northern Red Oak – Southern Red Oak – Chestnut Oak	Priority 2	0.65
POFS-2	Tulip Poplar – White Oak – Northern Red Oak – Southern Red Oak – Red Maple	Priority 1	2.14
POFS-3	Northern Red Oak – Southern Red Oak – Red Maple	Priority 1	2.22
POFS-4	White Oak – Northern Red Oak – Southern Red Oak	Priority 1	2.11
POFS-5	Chestnut Oak – Red Maple – Virginia Pine	Priority 2	1.22

Note: [1] Surveyed forest stands may continue off the private properties where access was granted. The size of the forest stand is based on acreage within the parcel boundaries.

Source: JMT, *Forest Stand Characterization Report*, December 2016.

Table 4.3.3
Specimen Trees

Tree ID	Parcel No.	Species	DBH[(1)] (inches)	Health
12	7	Black Cherry	30.0	Fair
13	7	Black Cherry	30.0	Fair
20	19	Southern Red Oak	36.4	Good
21	17	Southern Red Oak	36.2	Good
34	15	Tulip Poplar	34.0	Good
35	15	Tulip Poplar	33.5	Good
37	15	Southern Red Oak	31.0	Good
38	14	Southern Red Oak	33.2	Good
44	47	Black Oak	40.3	Good
46	47	White Oak	39.7	Fair
48	47	Red Maple	46.8	Good
49	47	Southern Red Oak	30.0	Good
76	53	Southern Red Oak	30.7	Fair
88	53	White Oak	35.0	Poor
133	52	Silver Maple	31.9	Excellent
187	50	Willow Oak	30.3	Excellent
188	50	Silver Maple	37.7	Good
202	51	Northern Red Oak	34.6	Good
204	50	Southern Red Oak	30.2	Good
210	9	Willow Oak	30.6	Excellent
211	9	Southern Red Oak	43.3	Good
240	42	Southern Red Oak	38.7	Good
249	42	Silver Maple	33.5	Good
280	22	Southern Red Oak	38.7	Good
282	22	Southern Red Oak	40.2	Good

Table 4.3.3
Specimen Trees

Tree ID	Parcel No.	Species	DBH[1] (inches)	Health
287	23	Chestnut Oak	32.0	Good
332	30	Silver Maple	31.9	Good
343	22	Northern Red Oak	34.8	Good
346	22	American Sycamore	30.5	Good
354	24	Tulip Poplar	33.3	Good
355	24	Willow Oak	46.0	Good
358	17	Northern Red Oak	38.4	Fair
359	19	Southern Red Oak	30.1	Good
380	48	Southern Red Oak	35.2	Good
400	50	Northern Red Oak	34.0	Fair
417	51	Red Maple	43.0	Fair
421	51	Red Maple	36.7	Good
425	51	Red Maple	42.0	Good
428	51	Red Maple	45.1	Good
434	51	Southern Red Oak	34.9	Good
436	51	Southern Red Oak	35.1	Good
461	36	White Oak	30.1	Good
463	36	Southern Red Oak	37.2	Good
474	38	White Oak	30.3	Good
478	38	Silver Maple	36.3	Good
503	38	White Oak	36.0	Good
509	38	White Oak	30.7	Good
511	38	Southern Red Oak	31.5	Good
512	38	Southern Red Oak	31.8	Good
514	38	Silver Maple	42.9	Good
521	35	Southern Red Oak	31.5	Good

Note: [1] DBH = diameter at breast height; the diameter measured at 4.5 feet from the ground

Source: JMT, *Forest Stand Characterization Report*, December 2016.

4.4 Climate

This section includes information on existing climate regulations at BWI Marshall Airport (and the Study Area). Because activities at BWI Marshall Airport contribute to climate change, BWI Marshall Airport is subject to any federal, state or local GHG regulations.

Research has shown that the increase in atmospheric GHG emissions is significantly affecting the Earth's climate. These conclusions are based upon a scientific record that includes substantial contributions from the United States Global Change Research Program (USGCRP)—a program mandated by Congress in the Global Change Research Act to "assist the Nation and the world to understand, assess, predict, and respond to human-induced and natural processes of global change.[18] In 2009, based primarily on the scientific assessments of the USGCRP, as well as the National Research Council (NRC) and the Intergovernmental Panel on Climate Change (IPCC), the EPA issued a finding that it was reasonable to assume that changes in our climate caused by elevated concentrations of GHG in the atmosphere endanger the public health and public welfare of current and future generations.[19] In 2015, EPA acknowledged more recent scientific assessments that "highlight the urgency of addressing the rising concentration of carbon dioxide (CO_2) in the atmosphere."[20]

Although there are currently no federal standards for ambient concentrations of GHGs, in August of 2016 the EPA formally announced that GHG emissions from certain classes of aircraft engines contribute to climate change. EPA's final findings are in preparation for a future domestic rulemaking process to adopt future GHG standards.

On April 4th, 2016, Maryland's Greenhouse Gas Emissions Reduction Act of 2016 was signed into law. The bill (i.e., SB 323/HB 610) renews the 2009 Maryland law that set goals to reduce GHG emissions statewide by 25 percent by 2020. The bill also extends the GHG reduction goal to reduce GHG emissions by 40 percent by 2030.

The IPCC estimates that aviation accounted for 4.1 percent of world-wide transportation GHG emissions during the year 2013. The EPA data indicates that commercial aviation contributed 6.4 percent of total CO_2 emissions in 2014, compared with other sources, including electric generation (30 percent), the remainder of the transportation sector (19.6 percent), industry (21 percent), commercial (7 percent), residential (6 percent), agricultural (9 percent) and U.S. territories (<1 percent).[21]

The EPA and the FAA traditionally work within the standard-setting process of the International Civil Aviation Organization's (ICAO) Committee on Aviation Environmental Protection (CAEP) to establish international emission standards and related requirements, which individual nations later adopt into domestic law. In February 2016, ICAO/CAEP agreed on a preliminary international standard to regulate CO_2 emissions from aircraft, and formally adopted at the ICAO Assembly in October 2016. The new CO_2 standard mandates that new aircraft continue to achieve the 15-20 percent fuel efficiency gains seen in recent generations of aircraft engines and will be applied in the following three stages:

- Beginning in 2020, all new aircraft designs must comply to the new standard;
- From 2023 to 2028, all aircraft models currently being produced will

have to meet a less stringent "in-production" standard if they undergo modification requiring re-certification; and

- Beginning in 2028, all new aircraft will have to meet the full standards.[22]

4.4.1 GHG Emissions Inventory

An airport-related GHG emissions inventory was prepared based on 2018 aircraft operations (see **Table 4.4.1**). The GHGs included in this inventory were carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). The results were then converted to CO_2 equivalent (CO_{2e}) values using appropriate Global Warming Potential (GWP) values and reported in metric tons (MT). *Appendix G, Attachment 2* includes details on GHG emissions inventory assumptions and methodology.

Table 4.4.1
2018 GHG Operational Emissions Inventory for BWI Marshall Airport

Emissions Source	CO_{2e} (MT)
Aircraft	261,504

Source: AEDT and HNTB analysis, 2019.

4.5 Coastal Resources

Pursuant to the Coastal Zone Management Act (CZMA) of 1972, the National Oceanic and Atmospheric Administration (NOAA) approved the Maryland Coastal Zone Management Program (CZMP) in 1978. Any federal activities that have the potential to affect any land or water use, or natural resources in Maryland's designated coastal zone must be conducted according to the enforceable policies of the CZMP. Maryland's CZMP is administered by the MDE.

Coastal resources include all natural resources occurring within coastal waters and their adjacent shorelands.[23] Maryland's designated coastal zone includes the counties that border the Chesapeake Bay. Thus, Anne Arundel County, BWI Marshall Airport, and the Study Area are within Maryland's coastal zone. As such, MDOT MAA is required to comply with the regulations set forth and administered by MDE and MDNR.

A federal consistency review by MDE is required to determine whether the Proposed Action is consistent with Maryland's CZMP. The MDE reviewed the Draft EA and Draft Section 4(f) Determination and provided their coastal zone consistency determination for inclusion in the Final EA and Final Section 4(f) Determination, as discussed in *Chapter 5, Section 5.4, Coastal Resources*.

The Chesapeake Bay Critical Area Protection Act (Critical Area Act) of 1984 created the Critical Area Commission to regulate activities within the Critical Area to meet the following goals: minimize adverse impacts to water quality; conserve fish, wildlife, and plant habitat; and establish land use policies for development in the Critical Area to accommodate growth while minimizing adverse environmental impact. The Chesapeake Bay Critical Area is defined as all land within 1,000 feet landward from the tidal waters and wetlands of the Chesapeake Bay and its tributaries. BWI Marshall Airport is not located within a Critical Area, and no further analysis is required.

The Coastal Barriers Resources Act of 1982 prohibits federal financing for development within the Coastal Barrier Resources System (CBRS), which consists of undeveloped coastal barriers along the Atlantic and Gulf coasts. BWI Marshall Airport is not in or near a CBRS; no further analysis is required.

4.6 Department of Transportation Act, Section 4(f) Resources

Section 303(c), Title 49 USC, commonly referred to as Section 4(f) of the Department of Transportation Act of 1966, states that the "…Secretary of Transportation will not approve a 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 a 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 [unless] the project includes all possible planning to minimize harm resulting from the use."

"Use" in the context of Section 4(f) encompasses both physical use as well as constructive use. Physical use involves a physical taking of the Section 4(f) property. This could include purchase of land or a permanent easement, physical occupation, or alteration of structures or facilities on the property.[24] As stated in the FAA Order 1050.1F Desk Reference, "The concept of constructive use is that a project that does not physically use land in a park, for example, may still, by means of noise, air pollution, water pollution, or other impacts, dissipate its aesthetic value, harm its wildlife, restrict its access, and take it in every practical sense."[25]

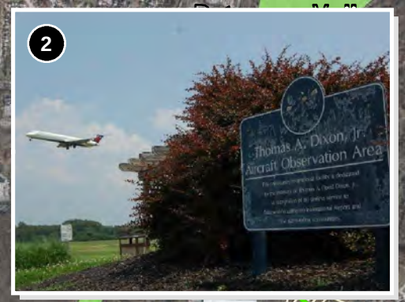
Section 4(f) resources were identified within and adjacent to the Study Area. The potential for various types of "use" was considered when defining the study area for 4(f) and 6(f)[26] resources, however, no constructive uses are expected due to the proposed improvements. Constructive use due to noise or vibration is not anticipated because aircraft operations would not increase as a result of the Proposed Action. However, Section 4(f) resources within the Noise Impact Study Area were identified and are provided in ***Appendix I, Section 4(f) Resources,*** *Attachment 1*. Due to proposed tree removal, views from and to areas of proposed construction and vegetation removal were assessed from Section 4(f) resources within the Study Area, discussed in *Chapter 5, Environmental Consequences*.

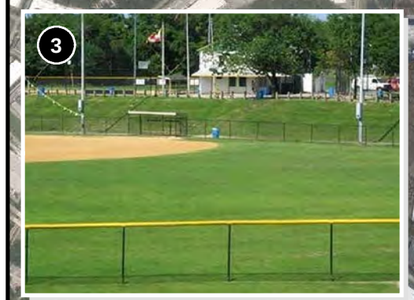
Two parks, Friendship Park – Thomas A. Dixon Observation Area and Andover Park; two recreation areas, the BWI Trail and Lindale Middle School; and one historic site, the Benson-Hammond House, are within or adjacent to the Study Area. Refer to **Figure 4.6-1** for the locations and photographs of these Section 4(f) resources. *Appendix I, Attachment 2*, includes additional detail on the Section 4(f) resource evaluation.

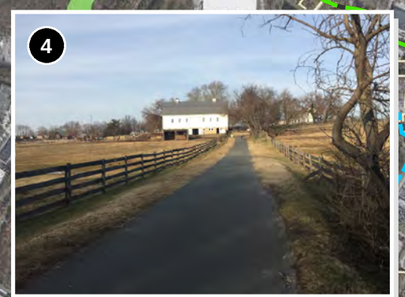
Parks

Friendship Park – Thomas A. Dixon Observation Area is located on airport property off Dorsey Road, south of the Runway 33L end. The park provides an area for the public to watch aircraft arrivals and departures, and includes a playground and parking for access to the BWI Trail. Friendship Park is outside of the Study Area.

Andover Park is located north of the airport at the corner of Andover Road and Main Avenue. The 41-acre park is owned by the Anne Arundel County Department of Recreation and Parks and includes various sports fields, picnic areas and an equestrian center. Mane Event equestrian center operates out of Andover Park. The equestrian center is situated between the sports fields of Andover Park to the west and Lindale Middle School to the east. Mane Event is a non-profit equestrian education and recreation program that operates out of







Andover Park 3
Andover Equestrian Center 4
Lindale Middle School 6
195
BWI Trail 5
Benson-Hammond House 7
Ferndale
New Ridge Rd
Aviation Blvd
97
Aviation Blvd
Dorsey Rd
Thomas A. Dixon, Jr
Aircraft Observation Area 2
Friendship Park 1

LEGEND

- Physical Development Study Area
- Section 4(f) Property
- BWI Trail
- Airport Property Boundary

Section 4(f) Resources
Figure 4.6-1

N

0 1,000 2,000 4,000 Feet

Source: Aerial - MDOT MAA (2018)

part of Andover Park. The center has a focus on special needs and physical therapy, allowing riders of all abilities the opportunity for equestrian recreation. Andover Park lies within the Part 77 surfaces for the Runway 15L end.

Recreation Areas

The BWI Trail is a 12.5-mile recreational trail that encompasses the main airport campus, running parallel to much of Aviation Blvd and Dorsey Road.[27] The trail has an asphalt surface, with the exception of wooden boardwalks which are utilized in environmentally sensitive areas. The majority of the trail is on MDOT MAA property; however, it was built and is maintained through a Memorandum of Understanding (MOU) between MDOT MAA, Anne Arundel County Department of Recreation and Parks, and the Maryland Department of Transportation's State Highway Administration. There are sections of the BWI Trail within the Study Area.

Lindale Middle School is located north of the airport off Andover Road and is adjacent to the Study Area. The school is located on 38 acres of land owned by Anne Arundel County Public Schools (AACPS) and includes various sports fields. This analysis considers the sports fields as public recreation areas.

Historic Site

The Benson-Hammond House is located in the northeast corner of the airport within the Study Area. The house is listed on the National Register of Historic Places (NRHP). *Section 4.9, Historical, Architectural, Archaeological, and Culture Resources* provides further details on the Benson-Hammond House. The existing views from the historic site include airport runways, terminal and other airport structures.

Lastly, Section 6(f) resources are those properties that were acquired or developed with assistance from the Land and Water Conservation Fund Program. Based on the US Department of the Interior National Park Service listing of Land & Water Conservation Fund grants for Anne Arundel County, there are no Section 6(f) resources with the Section 4(f)/6(f) study area.[28]

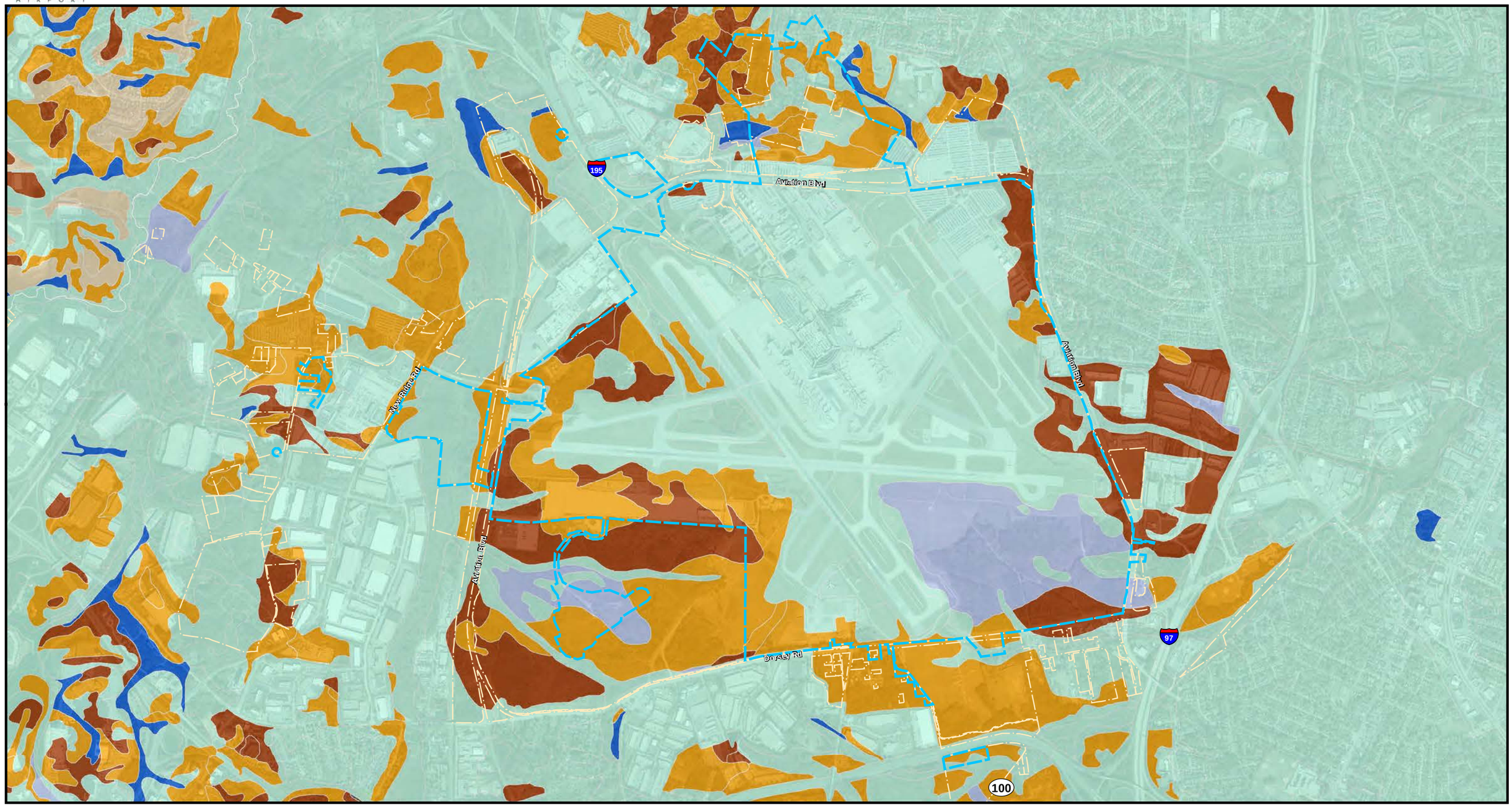
4.7 Farmlands

The Farmland Protection Policy Acts (FPPA) of 1980 and 1995 regulates the conversion of important farmland to non-agricultural uses. The purpose of the FPPA is "to minimize the extent to which Federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses…"[29] The term "farmland," as defined by the US Department of Agriculture (USDA) in the FPPA "does not include land already in or committed to urban development or water storage (i.e., airport developed areas), regardless of its importance as defined by NRCS [Natural Resource Conservation Service]."[30]

The USDA NRCS Web Soil Survey shows that approximately 18% of the Study Area is considered to be "areas of prime farmland," and approximately 15% is considered to be "farmland of statewide importance." (See **Figure 4.7-1**).

4.8 Hazardous Materials, Solid Waste and Pollution Prevention

Information presented in this section presents the regulations pertaining to, and presence of environmental contaminants and hazardous materials in the areas surrounding the proposed improvements at BWI Marshall Airport (and within two miles of the Study Area) as illustrated in **Figure 4.8-1**.



LEGEND

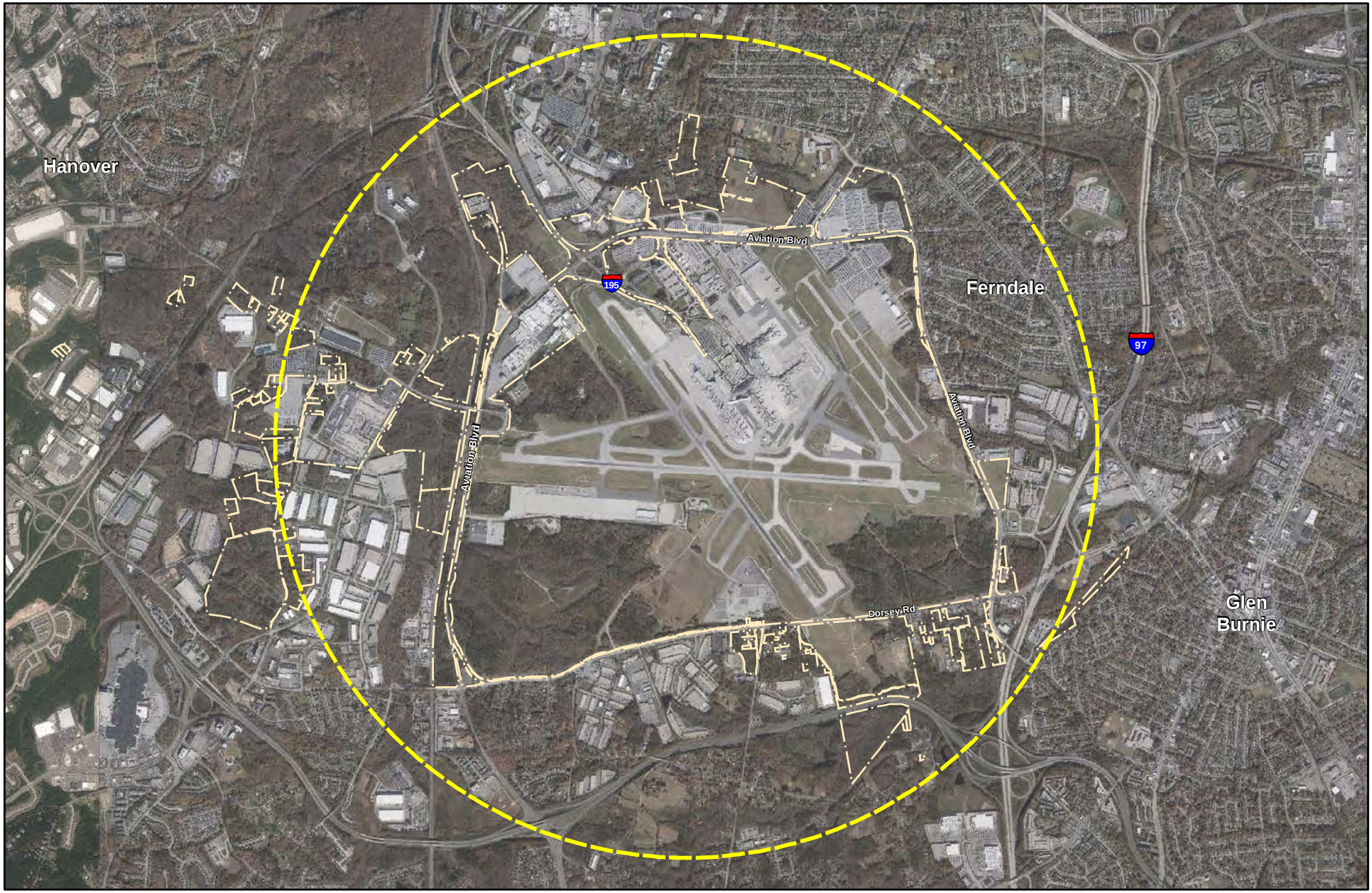
- Airport Property Boundary
- Physical Development Study Area
- All Areas are Prime Farmland
- Farmland of Statewide Importance
- Not Prime Farmland
- Prime Farmland if Drained
- Prime Farmland if Irrigated

Prime Farmland Soils
Figure 4.7-1

N

0 1,000 2,000 4,000 Feet

Source: Aerial - MDOT MAA (2018), USDA



LEGEND

Hazardous Materials Study Area

Airport Property Boundary

Hazardous Materials Study Area
Figure 4.8-1

N

0 875 1,750 3,500 Feet

Source: Aerial - MDOT MAA (2018), KBE

4.8.1 Regulations

This section describes the federal, state and local regulations associated with hazardous and solid waste.

4.8.1.1 Hazardous Materials Regulations

Federal legislation, enforced by the EPA and summarized in **Table 4.8.1**, jointly regulates the release, handling and remediation of hazardous materials. At the state level, the MDE is primarily responsible for making sure federal hazardous materials regulations are enforced and upheld. State-level regulations meant to ensure proper enforcement of federal regulations have been incorporated into the Code of Maryland Regulations (COMAR). These regulations are also summarized in Table 4.8.1.

4.8.1.2 Solid Waste Regulations

The main federal regulations by which solid waste is controlled are the Resource Conservation and Recovery Act (RCRA) Hazardous and Solid Waste Amendments (HSWA) of 1984, and the Solid Waste Disposal Act (SWDA) of 1965. As defined under the SWDA, solid waste includes any garbage, refuse or sludge from a waste treatment plant, water supply treatment plant or air pollution control facility, including that generated from industrial, commercial, agricultural and other land uses. Additionally, MDE enforces additional regulations included in COMAR that assist with maintaining federal requirements at the state level. Regulations pertaining to solid waste management are summarized in **Table 4.8.2**.

4.8.2 Solid and Hazardous Waste Disposal Facilities

The Millersville Landfill, located five miles south of BWI Marshall Airport, is the permitted solid waste facility capable of disposing of solid waste from the proposed improvements at BWI Marshall Airport.

4.8.3 Assessment Methodology

The identification of sites or facilities that utilize or store hazardous and other regulated materials, as well as sites that are known or have the potential to contain environmental contamination on and near BWI Marshall Airport was mostly derived from an electronic database search of agency records prepared by Environmental Data Resources, Inc. (EDR).[31] The search identified sites and facilities within two miles of a center point at BWI Marshall Airport as shown in Figure 4.8-1. The electronic environmental records search of the two-mile search radius was conducted in a manner such that all property acquisitions associated with the proposed improvements at BWI Marshall were accounted for.

Information assessed during the environmental screening, included:

- *Electronic Search of Regulatory Agency Records* – Sources of agency information comprised federal, state, tribal and local regulatory agency files, including those (i.) listed on the EPA National Priority List (NPL) (a.k.a. Superfund Sites), (ii.) registered users and generators of hazardous materials and wastes, (iii.) above- and underground-storage tanks (AST/UST), (iv.) and/or use and discharges of other regulated substances (EDR, 2016).

Table 4.8.1
Regulations Pertaining to Hazardous Materials Management in Anne Arundel County

Regulation	Description
Federal	
Clean Air Act (CAA) Title I	Addresses the release of hazardous or toxic contaminants into the atmosphere.
Clean Water Act (CWA)	Regulates levels of hazardous materials and other contaminants in the drinking water and groundwater.
Emergency Planning and Community Right to Know Act (EPCRA)	Informs the public and emergency officials about the presence and dangers of hazardous materials in their surrounding areas.
Comprehensive Environmental Response Compensation and Liability Act (CERCLA, or "Superfund")	Allocates government funds and resources to ensure timely remediation of accidental or unintentional release of hazardous material and environmental contaminants.
Federal Insecticide Fungicide and Rodenticide Act (FIFRA)	Guides management and regulation of toxics associated with pest and weed control.
Hazardous Materials Transportation Act (HMTA)	Manages safe transport of hazardous waste.
Pollution Prevention Act of 1990	Requires that pollution shall be prevented or reduced at the source wherever feasible.
Resource Conservation and Recovery Act (RCRA)	Sets important standards and practices regarding the generation and management of hazardous materials from "cradle to grave".
Safe Drinking Water Act (SDWA)	Regulates levels of hazardous materials and other contaminants in the drinking water.
Toxic Substances Control Act (TSCA)	Guides the process of introducing new toxic contaminants into the environment.
State	
§26.02.01 - §26.02.07	Occupational, Industrial and Residential Hazards.
§26.10.01 - §26.10.15	Oil Pollution and Tank Management.
§26.13.01 - §26.13.13	Disposal of Controlled Hazardous Substances.
§26.14.01 - §26.14.02	Hazardous Substances Response Plan.
§26.15.01 - §26.15.03	Disposal of Controlled Hazardous Substances – Radioactive Hazardous Substances.
§26.16.01 - §26.16.06	Lead Exposure, Monitoring and Abatement.
§26.26.01	Community Right-to-Know Fund.
§26.27.01	Hazardous Materials Security.

Source : KB Environmental Sciences, Inc., 2017.

Table 4.8.2
Regulations Pertaining to Solid Waste Management in Anne Arundel County

Regulation	Description
Federal	
Resource Conservation and Recovery Act (RCRA)	Sets important standards and practices regarding the generation and management of hazardous materials from "cradle to grave".
Solid Waste Disposal Act (SWDA)	Includes any garbage, refuse or sludge from a waste treatment plant, water supply treatment plant or air pollution control facility, including that generated from industrial, commercial, agricultural and other land uses.
State	
§26.03.01 - §26.03.13	Water Supply, Sewerage, Solid Waste and Pollution Control Planning and Funding.
§26.04.01 - §26.04.11	Regulation of Water Supply, Sewage Disposal and Solid Waste.

Source : KB Environmental Sciences, Inc., 2017.

- *Historical Aerial Photos* – A visual evaluation of current and historic aerial photography at the airport and its immediate vicinity was performed to help identify other facilities and sites with the potential to contain these materials and substances. Historic aerial photographs of the airport and its general vicinity were obtained for the years 1938, 1943, 1951, 1957, 1963, 1966, 1970, 1981, 1989, 1994, 1998, 2005, 2006, 2007, 2009, 2011 and 2014.
- *Topographic Gradient* – The topographic gradient of the airport was examined using GeoCheck® to identify potential contamination dispersion through groundwater flow from any historic spills located at higher elevations than the proposed improvements.
- *General Knowledge* – BWI Marshall Airport employees provided information known about hazardous wastes associated with BWI Marshall Airport.

4.8.4 Assessment Results

This section identifies those sites and facilities in the two-mile search radius of BWI Marshall Airport that are known, or have the potential, to involve hazardous materials, hazardous waste, environmental contamination and/or other regulated substances (collectively referred to as "Haz. Mat.")[32, 33, 34] which could have an effect on the proposed improvements. An assessment of the potential effects on or from Haz. Mat. sites, in relation to the proposed improvements, is discussed in ***Chapter 5, Section 5.10***.

Important environmental records that are determined noteworthy as a result of the database search include: reported petroleum or hazardous waste releases; permitted hazardous waste generation, transport, storage or disposal; presence of current or past hazardous waste disposal sites; permitted solid waste disposal facilities; registered storage tanks within the search radius; reported releases from storage tanks; and the presence of current or historic facilities with the potential to release hazardous materials (i.e., historic auto stations) within the search radius.

The research did not identify any sites or facilities at BWI Marshall Airport, or in its vicinity, which are currently on EPA's NPL. NPL sites are considered by EPA to have the most significant public health and environmental risks to neighboring areas. However, one site is identified to be on the delisted NPL site list and is reported to have soil contamination which is located just southwest of BWI Marshall Airport. Moreover, there are no reported or currently-operated landfills at the Airport or nearby.

The research identified one RCRA-permitted hazardous waste just northwest of BWI Marshall Airport. The site belongs to Northrop Grumman Systems, a Large Quantity Generator (LQG) with several violations issued in the past. Three areas at this facility operated as large quantity generators storing waste for less than 90 days: the Hangar Area, the Hazardous Waste Disposition Center, and the Paint Shop Area. The EPA reports that waste is managed in containers at these three areas as well as numerous satellite accumulation locations. Previously, the facility operated a permitted storage facility, but it is reported to no longer be in use. The site is also reported to be on the 2020 Corrective Action List[35] with the latest information from 2011 showing that human and groundwater exposures are under control. This site is also on the CORRACTS List[36] as a low priority.

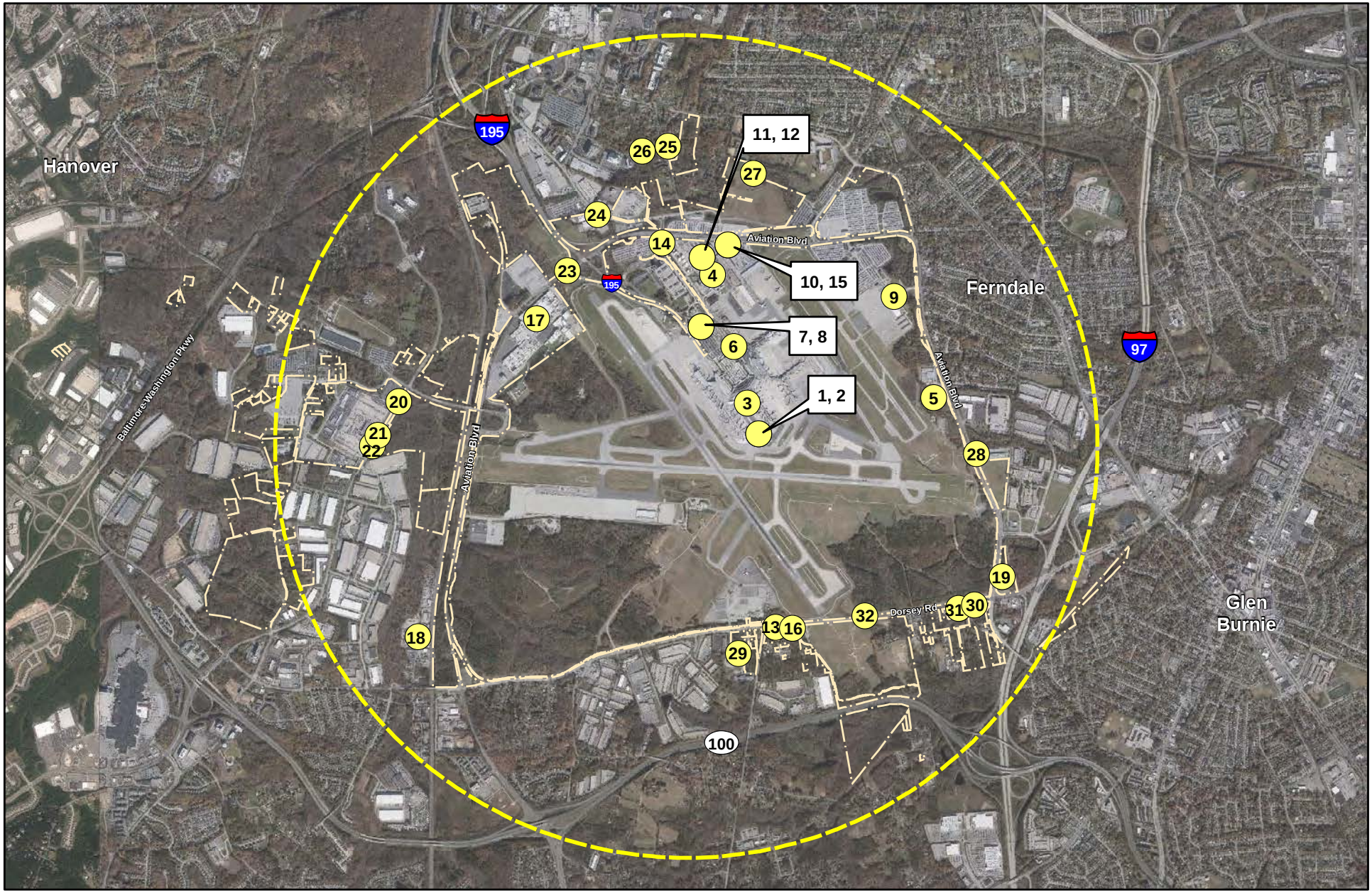
A review of the topographic gradient was performed using GeoCheck® to identify potential contamination dispersion through groundwater flow[37] from any historic spills located at higher elevations than the proposed project areas. The general topographic gradient of the area is west-southwest. An evaluation of current and historic aerial photography of the Airport and its general vicinity was also conducted to help identify other facilities and sites with the potential to contain these materials and substances. A review of these historical aerial photographs found no additional potentially hazardous sites. Historically, the Airport was used for farming and residential purposes.

The sites and facilities reported upon in this assessment are shown in **Figure 4.8-2.** For ease of review, **Table 4.8.3** contains a summary listing of on-airport sites (Site No. 1 – 15) and off-airport sites (Site No. 16 – 32) and the distance and direction from the center point of BWI Marshall Airport.

4.8.4.1 On-Airport Campus Sites

Based upon the findings of this assessment, the utilization and storage of hazardous materials and other regulated substances at BWI Marshall Airport are typical of most international airports. These activities and facilities largely comprise the storage and transfer of aircraft fuels and other petroleum-based fuels. A summary of the most pertinent sites within the vicinity of BWI Marshall Airport are discussed below.

The materials and substances currently used at BWI Marshall Airport that are classifiable as hazardous, regulated, or have the potential to cause environmental contamination are aircraft and other petroleum-based fuels. These fuels are contained in underground storage tanks (USTs) ranging in size from 550 to 15,000 gallons, the majority of which reside in the northeast side of the airport campus. The fuel types currently stored include aviation fuel, gasoline, diesel, gasohol, and kerosene.



LEGEND

- Hazardous Materials Study Area
- Potential Hazardous Materials Site
- Airport Property Boundary

Potential Hazardous Material Sites
Figure 4.8-2

N

0 875 1,750 3,500 Feet

Source: Aerial - MDOT MAA (2018), KBE

Table 4.8.3

Sites and Facilities Reported or with the Potential to Contain Hazardous Materials, Environmental Contamination, and/or Other Regulated Substances on or in the Vicinity of the Study Area

Site ID	Name	Distance (ft.) from Airport Center	Description of Findings
1	USAIR Inc.	1,800 ft. East	(1) CESQG with general generator violations issued in 1990. (1) 4,000 UST (historic). Several shipments of hazardous waste were transported to a TSD facility in 1989-1991.
2	Delta Air Lines-Baltimore	1,800 ft. East	(2) 4,000 -10,000 Gallon USTS containing gasoline and kerosene (historic).
3	Federal Aviation Administration	1,910 ft. North East	(13) 550-2,500 gallon USTs containing gasoline and diesel (historic).
4	BWI Marshall Airport	4,560 ft. North	Hazardous Waste Storage Building - BWI FMX; Several shipments to a disposal facility.
5	BWI Marshall Airport	6,410 ft. East	Hazardous/Universal Waste Storage Building - BWI BMX; Several shipments to a disposal facility.
6	Chevron Station - BWI	2,820 ft. North	(1) Case opened involving a tank closure - Motor/Lube oil in 1988 with both a release and a cleanup reported.
7	BWI/Hertz Corp	4,180 ft. North	(1) Closed case from a surface spill from UST - Motor/Lube Oil in 2002 with both a release and a cleanup reported.
8	National Car Rental	4,180 ft. North	This site is on the RCRA hazardous waste generators list. No other information provided.
9	Signature Flight Support - General Aviation Terminal	6,520 ft. NE	(3) 15,000 gallon USTs containing diesel and aviation fuel (currently in use). (10) Historic (permanently out of use) USTs containing gasoline, diesel, heating oil and other substances ranging in size from 550 gallons to 30,000 gallons.
10	Crown 141	5,280 ft. North	(1) Well/Groundwater contamination involving motor/lube oil in 2004 with both a release and a cleanup reported.
11	BWI Marshall Fuel Farm	4,880 ft. North	(1) Case opened from 2001-2003 with both a release and a cleanup reported.
12	Keibler Construction	4,880 ft. North	(1) Case of dumping reported from 1998-1999 with both a release and a cleanup reported.
13	F & J Investments	5,130 ft. South	(1) 15,000 gallon UST of diesel (historic).
14	Construction Site	5,280 ft. North	(1) Case opened in 1997 with both a release and a cleanup reported.
15	Shell Station MD-141	5,280 ft. North	(3) 12,000-15,000 gallon UST of gasohol and diesel (currently in use).
16	Krupnik Brothers Inc.	5,360 ft. South	(1) 2,000 gallon UST containing gasohol. (1) Case in 2009 involving a tank closure with a release and a cleanup reported.

Table 4.8.3

Sites and Facilities Reported or with the Potential to Contain Hazardous Materials, Environmental Contamination, and/or Other Regulated Substances on or in the Vicinity of the Study Area

Site ID	Name	Distance (ft.) from Airport Center	Description of Findings
17	Northrop Grumman Systems Corp.	5,120 ft. NW	This site is listed on the 2020 COR Action, CORRACTS, and RCRA-TSDF List. The facility operated as a large quantity generator storing waste for less than 90 days at three areas: Hazardous Waste Disposition Center, Paint Shop Area, and the Hangar Area. Waste is managed in containers at these areas and numerous satellite accumulation points. At one time, the facility operated a permitted storage facility, but it is no longer in use. This site is also listed on the TRIS Database for toxic releases of nitric acid and lead. Several shipments of hazardous waste were shipped to a TSD facility in 1984-1987 and 1997-2014. (1) SQG with violations reported, including Generators - Pre-transport, General generators, TSD - container use and management, TSD - general, and LDR - General violations. (2) Cases opened in 1994 with neither reporting a release or cleanup. (1) AST leak in 2000 with a release reported but no cleanup reported. (1) Case opened from 2003-2004 involving commercial oil with a release reported but no cleanup reported.
18	Mid-Atlantic Wood Preservers, Inc.	8,500 ft. SW	This site is a delisted NPL Site and is on the SEMS list. (1) SQG with general generator violations in 1989. This site is reported to have soil contamination.
19	MD State Police	8,690 ft. ESE	(1) Case involving soil contamination from motor/lube oil in 2012 with a release and a cleanup reported. (1) Case involving a tank closure of motor/lube oil in 1998 with a release and cleanup reported. (1) Case involving a tank closure of commercial heating oil in 2004 with both a release and a cleanup reported. (2) 2,000-10,000 gallon USTs containing heating oil and gasoline (currently in use).
20	DTG Operations, Inc. DBA Thrifty Car Rental	7,560 ft. West	(1) 15,000 gallon UST gasohol (currently in use).
21	Avis Rent A Car System, LLC	8,000 ft. West	(2) 12,000 gallon UST gasohol (currently in use).

Table 4.8.3

Sites and Facilities Reported or with the Potential to Contain Hazardous Materials, Environmental Contamination, and/or Other Regulated Substances on or in the Vicinity of the Study Area

Site ID	Name	Distance (ft.) from Airport Center	Description of Findings
22	Enterprise Rent A Car	8,140 ft. West	(1) 12,000 gallon UST gasohol (currently in use).
23	7232 Aviation Blvd.	5,500 ft. NW	ERNS: Emergency releases to the soil - 60 gallons of hydraulic oil. Crane hydraulic system/pressure burst a line. Cleanup reported.
24	LSG Sky Chef	6,410 ft. NNW	(1) Case involving ground seep investigation/cleanup in 1998 with both a release and a cleanup reported. (1) Case involving groundwater contamination from motor/lube oil from 2003-2008 with both a release and a cleanup reported.
25	Arundel Electric Co.	7,740 ft. North	(1) Tank closure due to a release in 1999. No cleanup reported.
26	Hanna Residence	7,690 ft. North	(1) Case of involving an AST containing residential heating oil in 2003. Both a release and a cleanup reported.
27	Lyman Avenue	7,200 ft. NNE	(1) Case in 2014 involving an unknown source surface spill. No cleanup reported. No additional information reported.
28	7-Eleven	7,360 ft. East	(2) 10,000-15,000 gallon UST containing gasohol (currently in use).
29	QFN #423	5,450 ft. South	(2) 11,000-14,000 gallon USTs containing gasohol and diesel (currently in use). (2) Historic (permanently out of use) USTs.
30	Wall to Wall Cleaners	8,360 ft. ESE	This site is the location of a historic dry cleaner.
31	1083 Dorsey Rd.	8,060 ft. ESE	This site is the location of a historic auto service station.
32	Maryland Garage	6,250 ft. SE	This site is the location of a historic auto service station.

Note: [1]If a site or facility is identified in this assessment it does not necessarily mean that it involves hazardous materials hazardous waste, environmental contamination and/or other regulated substances. Rather it only means that the potential exists for these materials or substances to occur presently or historically. In some cases, individual and more detailed investigations may be needed to fully ascertain the actual, and extent of, involvement with hazardous materials or environmental contamination, should it exist.

Sources: KB Environmental, 2017; and EDR, 2016.

On-airport campus sites (No. 1 – 15) include:

- One Conditionally Exempt Small Quantity Generator (CESQG) which is reported to have violations (Site No. 1);
- Two 90-day storage areas for hazardous/universal waste which have shipped waste to a disposal facility (Site Nos. 4 and 5);
- Six currently operated USTs (Site Nos. 9 and 15);
- 27 Historic USTs (Site Nos. 1, 2, 3, 9 and 13);
- Three sites which have shipped hazardous waste to a disposal facility (Site Nos. 1, 4 and 5);
- Four cases involving motor/lube oil and/or tank closures with both a release and a cleanup reported which are on the State and Tribal Leaking Storage Tank List[38] (Site Nos. 6, 7, 11 and 14);
- One case of dumping with both a release and a cleanup reported (Site No. 12);
- One site on the RCRA hazardous waste generators list (Site No. 8), and
- One site of well/groundwater contamination with both a release and a cleanup reported (Site No. 10).

Many facilities at the Airport store, use, or dispose of hazardous materials, including for airport and aircraft maintenance, for fuel storage, and for fire training activities. Hazardous materials are stored, used and disposed of in accordance with federal and state regulations, and best practices are used to prevent and minimize impacts to surface and groundwaters, soil and air.

4.8.4.2 Off-Airport Campus and Off-Airport Sites

Adjoining (off-airport) land uses include residential, industrial, and commercial. Several sites and facilities that are also known, or suspected, to involve the use of hazardous materials, fuel and/or other petroleum products have been identified on these adjoining lands.

Off-airport campus and off-airport sites (No. 16 – 32) include:

- Eleven currently operated USTs (Site Nos. 16, 20-22, 28 and 29));
- Two SQGs with general violations (Site Nos. 17 and 18);
- Thirteen cases involving releases/cleanups, including one site listed on the Emergency Release Notification System[39] (ERNS) (Site Nos. 16, 17, 19, 23, 24, 25, 26 and 27);
- Three sites with reported soil contamination (Site Nos. 18, 19, and 23);
- One site with groundwater contamination (Site No. 24);
- Two historic auto repair facilities (Site Nos. 31 and 32);
- One historic dry cleaners (Site No. 30);
- One treatment, storage and disposal facility (RCRA-TSDF[40]) (Site. No. 17); and
- One site listed on EPA's delisted NPL[41] (Site No. 18).

4.9 Historical, Architectural, Archaeological, and Cultural Resources

4.9.1 Area of Potential Effect

The Area of Potential Effect, or APE, is the geographic area within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. For the purpose of evaluating effects, it was prudent to derive an APE-Direct, where undertakings could directly affect historic properties, and an APE-Indirect, where undertakings could indirectly affect historic properties. The evaluation of potential impacts to identified historical resources within the APEs was performed in conformance with the requirements of Section 106 of the National Historic Preservation Act (NHPA). The Section 106 Consultation process was initiated with the Maryland Historical Trust (MHT), the State Historic Preservation Office (SHPO), in June 2016 with MHT's concurrence to begin the process received in July 2016 (see ***Appendix J, Historical, Architectural, and Archaeological Resources***). For the proposed undertakings at BWI Marshall Airport, the APE-Direct has the same boundaries as the Study Area. The APE-Indirect consists of areas outside of the APE-Direct which may be affected visually by the proposed work. The APE-Direct and APE-Indirect are illustrated in **Figure 4.9-1**. The MHT approved the Direct and Indirect APEs in a letter dated March 8, 2017 (see *Appendix J*). Additional project planning efforts in 2018 resulted in the need to update the Direct and Indirect APE to encompass areas for proposed utility connections and a stockpile site. MDOT MAA requested concurrence from MHT for the updated Direct and Indirect APEs on January 8, 2019. MHT provided their concurrence with the updated APEs on January 29, 2019 (see *Appendix J, Attachment 3*).

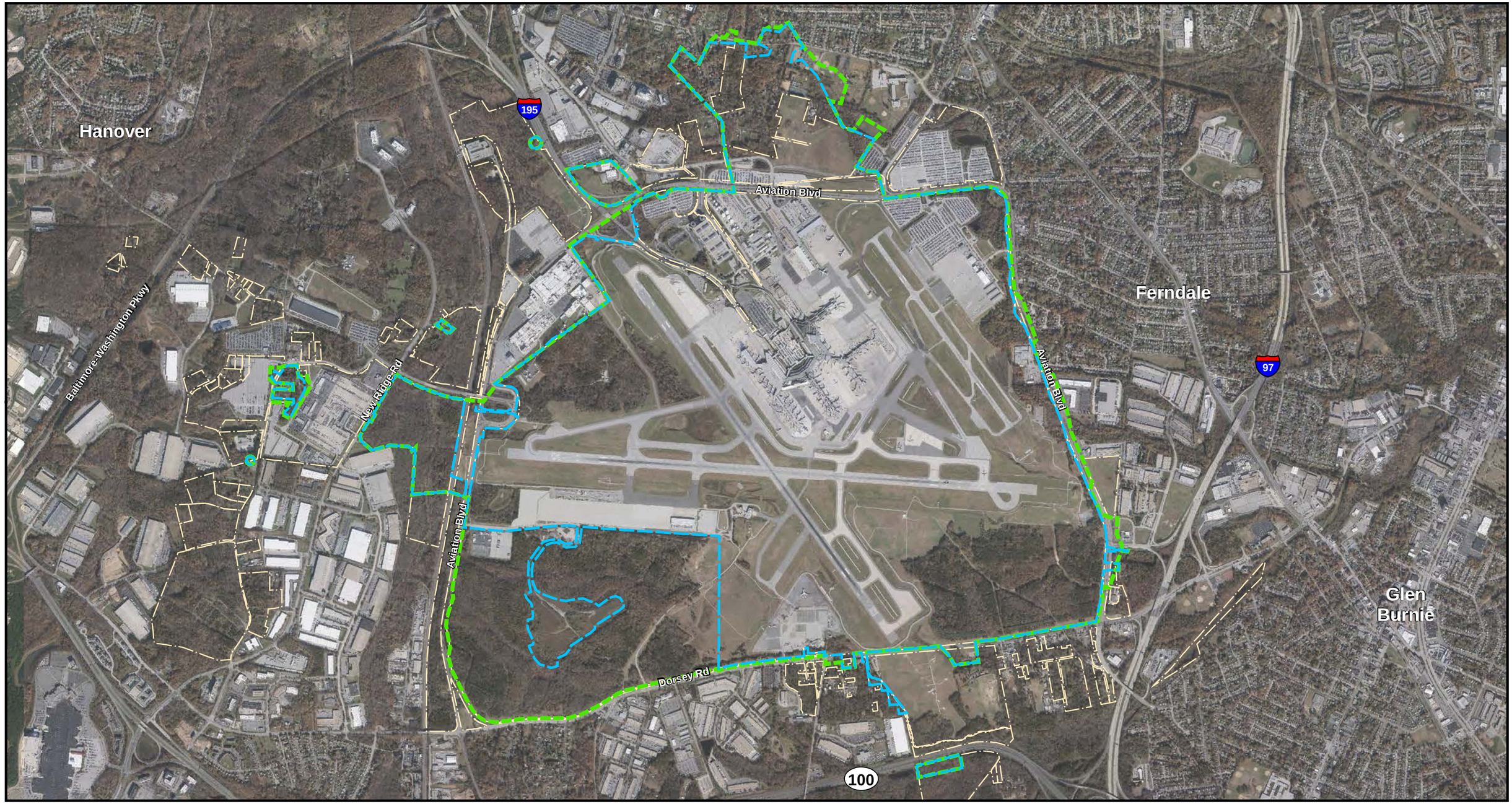
The APE-Direct defines the extent of ground-disturbing activities for the proposed work, and includes areas of tree removal, structural demolition and construction, pavement improvements, and road construction. All areas directly impacted by this work within the APE-Direct serve as the study area for subsurface archaeological resources. The study area for above-ground resources is derived from the combined APE-Direct and APE-Indirect. This study area is defined as the large contiguous on-airport property as well as off-airport properties that would be either directly or visibly affected by tree and obstruction removal.

4.9.2 Identification of Resources and Determination of Eligibility

The following sections identify the historical, architectural, archaeological and cultural resources located within the APE-Direct and APE-Indirect and includes a determination of eligibility (DOE) for each resource. For the purposes of discussion, the term "architectural resources" refers to standing buildings, sites, structures, objects, or districts. "Archaeological resource" refers to prehistoric and historical subsurface sites.

4.9.2.1 Historical Resources

Historical resources, or historic properties, as outlined in the NHPA, are any properties including buildings, sites (both surface and subsurface), structures, and objects listed or determined eligible for listing on the NRHP, the nation's inventory of historic properties of value on a state, local, or national level. Defined in this way, there is only one historical resource identified within the APE-Direct and APE-Indirect: the NRHP-listed



LEGEND

- Direct Area of Potential Effects (APE-Direct)
- Indirect Area of Potential Effects (APE-Indirect)
- Airport Property Boundary

Area of Potential Effects (APE)
Figure 4.9-1

N

0 1,000 2,000 4,000 Feet

Source: Aerial - MDOT MAA (2018)

Benson-Hammond House, discussed further in Section 4.9.2.2 as an architectural resource. There are also several properties which have not been evaluated for NRHP eligibility or have been determined ineligible. These are also discussed in Section 4.9.2.2 as architectural resources.

4.9.2.2 Architectural Resources

Four resources were previously identified in the Maryland Inventory of Historic Properties (MIHP) within the APE-Direct and APE-Indirect as architectural resources. Additionally, a cemetery was identified within the APE-Direct but has not received previous designations from the MHT. These properties are listed in **Table 4.9.1** and the resources are illustrated in **Figure 4.9-2.**

Table 4.9.1
Architectural Resources within APE

Property	Status
Hangar 1 (AA-30)	Not Eligible (Demolished)
Benson-Hammond House (AA-118)	Listed on NRHP
White Avenue Cemetery (AA-1081)	Not Eligible
Stoney Run Road Survey District (AA-2084)	Not Eligible
Friendship Cemetery (AA-2518)	Not Eligible

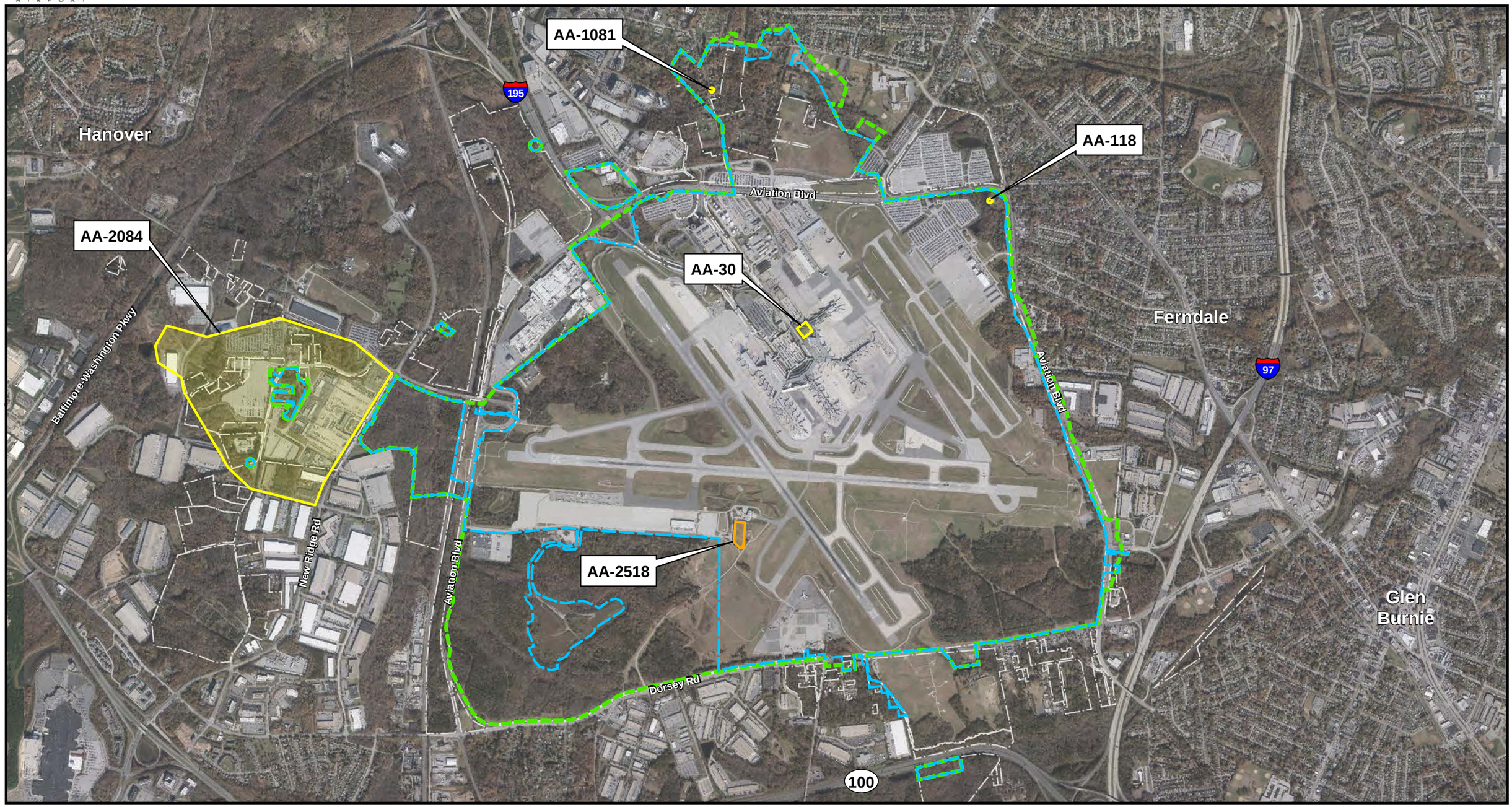
Source: MIHP and EAC/A analysis, 2017.

Hangar 1 (AA-30) at BWI Marshall Airport was located in the north-central area of the Airport near the International Terminal, within the APE-Direct. The hangar was constructed in 1951 by the Anderson Manufacturing Company for the Airport, and was the oldest facility remaining at the Airport before it was demolished in 1997. The structure was listed in the MIHP in 1994, where it was determined not eligible for the NRHP because it did not illustrate the original airport plan or design concept and was a common prefabricated metal building. It was demolished in 1997 to facilitate the construction of Concourse E, a new international terminal.
DOE: Not Eligible (Demolished)

The Benson-Hammond House (AA-118) is in the northeast corner of the Airport within the APE-Direct. The brick farmhouse was first built between 1820 and 1830, with a Greek Revival addition constructed to the north of the original structure sometime between 1855 and 1870.[42] The property was operated as a truck farm following the Civil War, serving the market of Baltimore. The house was determined to be an unusual and atypical nineteenth-century brick farmhouse in this area of the County.

Due to the major development focused in this area following the Second World War, few farmhouses from the historic period remain that exemplify Anne Arundel County's rural roots and pastoral identity. Many historic brick farmhouses similar to the Benson-Hammond House were destroyed by development in the immediate area, as well as in the County at large. As a result, the Benson-Hammond House provides a unique perspective into the County's rural past, which is now almost completely hidden under modern development. This property is further important to the study of vernacular architecture and is also associated with the truck-farming industry that developed around Baltimore in the early twentieth century. The addition to the house is unique in its portrayal of the Greek Revival style, which at the time of its construction had largely waned as a popular architectural motif.

Although the Benson-Hammond House is now surrounded by BWI Marshall Airport, as well as major roadways that grant access to the Airport terminal, the structure itself is relatively sequestered behind both a metal fence that surrounds the property and a



LEGEND

- Direct Area of Potential Effects (APE-Direct)
- Indirect Area of Potential Effects (APE-Indirect)
- Airport Property Boundary
- Maryland Inventory of Historic Properties (MIHP)
- Architectural Resource

Area of Potential Effects (APE) and Architectural Resources
Figure 4.9-2

N

0 1,000 2,000 4,000 Feet

Source: Aerial - MDOT MAA (2018)

grove of relatively thick trees to the structure's west and south. The surrounding landscape of the property has been drastically changed through the course of the twentieth century, with modern residential neighborhoods and parking lots visible from the front of the house, and the sounds of air and road traffic.

In 1990, the house was listed in the NRHP under criterion C (the embodiment of distinctive characteristics of a type, period, or method of construction, a representation of the work of a master, high artistic value, or a significant and distinguishable entity whose components may lack individual distinction), and now serves as the headquarters for the Anne Arundel County Historical Society. *DOE: Listed on NRHP*

White Avenue Cemetery (AA-1081) is located north of the Airport on residential property along White Avenue within the APE-Direct. A DOE form was prepared for the cemetery and submitted to the MHT for review and MHT concurred with the findings on June 21, 2017 that White Avenue Cemetery is not eligible for listing on the NRHP. The DOE form and MHT's concurrence are included in *Appendix J*. *DOE: Not Eligible*

Stoney Run Road Survey District (AA-2084) is located to the west of the Airport in an area scheduled for tree removal within the APE-Direct. The district consists of a neighborhood with several historic buildings. The district was evaluated under criteria A (associated with events that have made a significant contribution to the broad patterns of our history) and C, and was determined not eligible for the NRHP in 2000. *DOE: Not Eligible*

Friendship Cemetery (AA-2518) is located south of the existing ARFF within the Airport property and the APE-Direct. The cemetery was identified in the Historic Preservation Plan (HPP) and partially excavated as an archaeological site (Site 18AN1011) in 1996, but was never assigned an MIHP number. The cemetery was established in approximately 1907 by the Friendship Methodist Episcopal Church. In 1948, the church property was purchased by MDOT MAA and the church was demolished. The cemetery remains active on the site, and the graves and markers are still intact. Construction activities related to the installation of the ARFF in 1996 led to the discovery of four burials 100 feet to the north of the northern fence of the cemetery. A letter from MDOT MAA to MHT dated February 6, 1996 recommended that the portion of the site which had been excavated as part of the ARFF construction was not eligible for listing in the NRHP.[43] An MIHP form and a DOE form were prepared for the cemetery and submitted to the MHT for review. MHT concurred with the findings on June 21, 2017 that Friendship Cemetery is not eligible for listing on the NRHP. The DOE and MIHP form and MHT's concurrence are included in *Appendix J*.
DOE: Not Eligible

4.9.2.3 Archaeological Resources

Table 4.9.2 lists 17 archaeological sites which have been identified within the APE-Direct and the status of each with regard to the NRHP. None of these resources have been listed on the NRHP, nor have they been deemed eligible, but several have not yet been evaluated. The 1996 HPP created for BWI Marshall Airport states that "if a site is identified during an identification study . . . then the significance of the site is evaluated . . . In many cases evaluation is not possible because the

identification study did not provide enough information to make a full evaluation (e.g., an insufficient area of the site was excavated) and additional work at the site is needed to obtain additional information."[44] Thus, an archaeological resource may be classified as "not evaluated" because it has not proceeded past a Phase I Identification, or because the integrity of the resource is not evaluated beyond the confines of a project APE in compliance surveys. These resources are illustrated in **Figure 4.9-3.**

Table 4.9.2
Archaeological Resources within APE-Direct

Site	NRHP Status
18AN23	Not Evaluated / Potentially Eligible
18AN262*	Not Evaluated
18AN366	Not Eligible (portion within APE-Direct)
18AN705	Not Eligible / Partially Destroyed
18AN778	Not Eligible
18AN877*	Not Eligible (within APE-Direct)/ Not Evaluated (outside APE-Direct)
18AN1011	Recommended Not Eligible / Associated Historic Property Not Eligible
18AN1150	Not Eligible / Partially Destroyed
18AN1427	Not Eligible
18AN1428	Recommended Not Eligible (Portion Investigated with APE-Direct)
18AN1488	Not Evaluated
18AN1591	Not Eligible
18AN1592	Not Evaluated (Cemetery Relocated)
18AN1594	Not Eligible
18AN1595	Not Eligible
18AN1596	Not Eligible
18AN1597	Not Eligible

Source: EAC/A analysis, 2017.
*Removed from consideration due to changes during project planning/refinements that avoided impacts.

Two sites were eliminated from consideration following Phase I archaeological work in 2016 and changes during project planning: 18AN262 and 18AN877.

Site 18AN262 (Stoney Run Station) was identified in the early stages within the APE-Direct. Stoney Run Station is an important prehistoric habitation site. The site was documented in the early twentieth-century, revisited in the mid-1970s by Maryland Geological Survey staff, and rediscovered in 2016 by EAC/A. The site was initially identified through non-systematic surface collection as a Late Archaic and Woodland base camp. In 2016, EAC/A tested within and beyond the site boundaries and found that portions of the site remain intact. The site boundaries were also revised to reflect additional prehistoric finds recovered.

Tree planting was initially planned at 1143 Stoney Run Road, an area encompassing portions of Site 18AN262 (Stoney Run Station). However, following the Phase I Investigation conducted in 2016, it was determined that a Phase II Evaluation would be recommended for the site if it would be subject to subsurface disturbance. As a result, the proposed tree planting that would affect Site 18AN262 was eliminated from consideration as potential future forest mitigation. The modified work plan was submitted to MHT. In response, MHT stated in an email to MDOT MAA on August 8, 2016: "Since MAA has modified its proposed undertaking in the vicinity of 18AN262, we agree that the Phase II evaluation of the site is not warranted at this time" (See *Appendix J, Attachment 3*)."

LEGEND

- Direct Area of Potential Effects (APE-Direct)
- Airport Property Boundary
- Archaeological Resource

Area of Potential Effects (APE) and Archaeological Resources
Figure 4.9-3

N

0 1,000 2,000 4,000 Feet

*NOTE: Phase I archaeological testing in 2016 in this area determined that the boundaries of Site 18AN877 are no longer located within Airport property (MHT concurrence 2/28/2017).

Source: Aerial - MDOT MAA (2018), EAC/A

As part of this EA and Section 4(f) Determination, the project associated with Site 18AN262 site was removed from the Proposed Action.
DOE: Not Evaluated

Site 18AN877 (Leak) is in the southeast corner of the Airport in a forested area. The site was previously identified as a Late Archaic to Early Woodland lithic scatter and late nineteenth- to early twentieth-century artifact scatter. The contexts from which historic and prehistoric artifacts were recovered was clearly disturbed. The prehistoric component of the site was not rediscovered in a 2016 survey by EAC/A. Although historic finds were recovered from Shovel Test Pits (STPs) near the site, the artifacts mainly comprised brick, container glass, and coal recovered from the topsoil or E-horizon in very small quantities. The quantities and types of these artifacts are ubiquitous within the plow zone throughout the testing area and by themselves do not constitute a site. Because the portion of the site within the APE-Direct retains no integrity, it is not eligible for the NRHP and no further work is required. The unevaluated portion of the site was determined to be outside of the APE-Direct by MHT in a letter of concurrence from MHT dated February 28, 2017. *DOE: Not Eligible (within APE-Direct) and Not Evaluated (outside APE-Direct)*

Site 18AN23 is a prehistoric lithic reduction / tool production locus and historic site situated to the northwest of Airport property. An early investigation of Site 18AN23 indicated that there was considerable disturbance to the site caused by the construction of small outbuildings, approach lights for the runway, roads, and sewer lines, although the wooded sectors of the western half are less disturbed.[45] In a more recent survey, the prehistoric component of the site was recommended as "potentially eligible for inclusion in the NRHP" and recommended for Phase II testing.[46] Appendix VIII of the same final report included correspondence with the MHT, which included the following statement of concurrence in a letter dated November 14, 2012: "Based on the information presented in the report, the Trust concurs with MAA that Phase II archeological evaluation would be warranted to conclusively determine the eligibility of 18AN22 and 18AN23 for the NRHP, if the sites are slated for impact as part of the current or any future undertaking."[47] MDOT MAA modified its plans to avoid any direct physical impacts to site 18AN23. A pedestrian survey and archaeological monitoring of repair work to Unnamed Tributary 2 of Kitten Branch (UT2) were carried out by EAC/A in January 2017. No artifacts or features, prehistoric or historic, were recorded in this area. Archaeological monitoring of the repair work for UT2 concluded on Monday, January 30, 2017 and did not expose any prehistoric archaeological materials or features, and no further work was recommended at this location. The intact portion of the site remains potentially eligible but has not yet been evaluated for its inclusion in the NRHP as no ground-disturbing activities are proposed at this location.
DOE: Not Evaluated / Potentially Eligible

Site 18AN366 is located north of the Runway 10 end and just east of a service road at the west side of the Airport. The site was first identified by Petraglia et al. in 1993 as two concentrations of artifacts which included prehistoric artifacts and nineteenth-century ceramics and bottle glass.[48] Klein et al. conducted a Phase II on the site in 1993, and determined that Site 18AN366 consisted of predominantly nineteenth-century artifacts

mixed with twentieth-century materials, all located in fill or plow zone soils.[49] Due to the lack of any physical integrity of cultural deposits, the site was not recommended as potentially eligible for the NRHP. A 2016 Phase I Investigation of the area to the north located a series of structural foundations and surface scatters, as well as high concentrations of nineteenth- and twentieth-century artifacts within the plow zone. This was interpreted as the northern boundary of the previously identified multi-component Site 18AN366. The structural foundations were identified as the location of the Thomas M. Cole house, primarily due to the presence of a large grist mill stone which has been converted into a flag pole. The portion within the APE-Direct was recommended not eligible for listing in the NRHP in a letter of concurrence from MHT dated February 28, 2017.
DOE: Not Eligible (portion within APE-Direct)

Site 18AN705 consists of a late nineteenth- and early twentieth-century artifact concentration located to the north of the Airport. Visual inspection undertaken by EAC/A on January 31, 2017 revealed much of the site has been destroyed along the southern and western boundaries of the site due to the construction of a parking lot and an associated drainage ditch. Within the final report of the 1990 investigation of Runway 15L and Runway 33R improvement areas of BWI Marshall Airport, it was reported that Site 18AN705, along with four other sites identified in the survey, "do not possess the quality or significance as defined by the NRHP Criteria (36 CFR 60.4 [a-d])."[50] An MHT letter located in the site file at the MHT library, dated December 20, 1989 concurred with this finding, stating that the site "lacks integrity, does not contain evidence of significant subsurface features or deposits, and exhibits evidence of modern disturbance." As such, no further work was recommended for the site.
DOE: Not Eligible / Partially Destroyed

Site 18AN778 is located south of the Runway 28 end but directly north of the forested area. It is a prehistoric site which was identified by Petraglia et al. in 1990. This site was later subjected to a Phase II Evaluation by Klein et al. in 1993. According to the HPP, this site encompassed an older prehistoric isolated find designated 18AN357.[51] Research into the site revealed no historic-period farmsteads located within or in the vicinity of the site, and therefore the historic material was interpreted as refuse disposal or field scatter rather than occupational debris. The final report detailing the Phase II Evaluation determined that Site 18AN778 does not contain any archaeological deposits that are recommended as potentially eligible for listing in the NRHP: "No additional archaeological or historical investigations are recommended. Further, the impact area within and to the southwest of Site 18AN778 does not contain archaeological deposits that are recommended as potentially eligible for listing in the National Register."[52]
DOE: Not Eligible

Site 18AN1011 (Friendship Cemetery) is a cemetery formerly associated with the Friendship Episcopal Methodist Church, which was built in 1901. The structure was razed in 1948 prior to the Airport construction.[53] Only surface recording was undertaken for the site. A 1991 report for investigations in the vicinity of the site states, without any formal recommendation, "Friendship Cemetery was recorded as a historic archaeological site, however, no other archaeological resources of significance were identified by the survey."[54]

The area to the north of the fence of Friendship Cemetery was extensively disturbed by the construction of the existing ARFF in 1996. Five unmarked graves were excavated in this area. The burials were overlain by five to ten centimeters of mixed clay fill, indicating that grading for construction impacted the burials prior to the construction of the facility. This portion of the site was evaluated and determined not eligible for the NRHP under Criteria A, B, C, or D. [55] A letter from MDOT MAA to the MHT dated February 6, 1996 recommended that the portion of the site which had been excavated was not eligible for listing in the NRHP. Only the portion impacted by the existing ARFF has been evaluated. The current archaeological site boundaries maintained by MHT appear to encompass a far greater surface area than indicated by the visible remains of the cemetery. The associated historic property, AA-2518, however, was found not eligible for inclusion in the NRHP (see Section 4.9.2). *DOE: Recommended Not Eligible/ Associated Historic Property Not Eligible*

Site 18AN1150 is a nineteenth- to twentieth-century domestic site located to the west of the BWI Marshall Airport Rental Car Facility. Phase II work on the site determined that it possessed little if any significant research value, and no further work was recommended. After the archaeological investigation, the construction of the Rental Car Facility has destroyed part of the site. Remaining portions have been disturbed by twentieth century road construction. An "Individual Property/District, Internal NR-Eligibility Review Form" for Site 18AN1150, on-file at the MHT Library and dated to August 3, 2000, indicates that the site is not eligible for inclusion in the NRHP: "This site is one of the 14 project sites that yielded artifacts dating primarily or exclusively from the twentieth-century. These sites served a domestic function. Pieces of coal and clinker often comprised the majority of recovered material. The relatively recent dates of these sites indicate that they can provide little important historical information. Many of them also exhibited disturbed soils and compromised physical integrity. For these reasons, these sites are ineligible for the National Register."
DOE: Not Eligible / Partially Destroyed

The T.W. Cole Site (***Site 18AN1427***) is located in the forested area of the proposed Airline Maintenance Facility. The site was originally identified in 2009 and consists of a concentration of architectural and domestic artifacts and several surface features associated with a nineteenth- to twentieth-century dwelling. [56] The site was rediscovered and its boundaries expanded in a later investigation by EAC/A in 2016. Surface features included: a cylindrical concrete roller, an abandoned gravel roadway oriented north-south and passing through two stone pillars, a concrete boundary marker with a cruciform symbol, a stone and concrete culvert, a rectangular stone and concrete block, a circular concrete and brick wellhead, a carved granite block, and a circular depression lined with stones. The site was heavily disturbed, and as such was not recommended for a Phase II Evaluation nor NRHP eligibility in 2009. The 2016 shovel-testing investigation by EAC/A produced even less evidence for site integrity Based on the investigation, which demonstrated integrity loss and lack of potential to yield important information, MHT determined that the site was not eligible for the NRHP and required no further work. *DOE: Not Eligible*

The Jas. Phelps Site (***18AN1428***), located at the Runway 33L end, is the historic site of a late nineteenth- and twentieth-century dwelling. A letter of concurrence from MHT dated January 28, 2010, in response to a 2009 Phase IB investigation states: "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 recommended no further work for either site as part of the current project, given site disturbances within the proposed impact areas, yet stated that the sites may extend beyond the project area. MHT concurred that no further archeological investigations were warranted for either site as part of the currently proposed improvements. The NRHP eligibility of the sites remains unresolved since the resources extend beyond the limits and scope of the current project."[57] A portion of the site where obstruction (tree) removal is proposed was investigated during a survey in 2009 which revealed a heavily to moderately disturbed site stratigraphy. Because of this, the portion of the site that was investigated was recommended not eligible for the NRHP. *DOE: Recommended Not Eligible (Portion Investigated in APE-Direct)*

Site 18AN1488 is located off the Runway 10 end, along the west side of Aviation Blvd. It is a scatter of nineteenth- to twentieth-century domestic artifacts which has been interpreted as a temporary railroad work camp. The 2014 report for the investigations which identified the site recorded it as "Unevaluated, outside the APE" with the recommendation "No action, unless plans change."[58] This may be a significant resource since it is a site type which has not been extensively investigated in this region. It has not been previously evaluated.
DOE: Not Evaluated

Site 18AN1591 is located on the west side of the Airport, directly west of Taxilane W. It is a very small prehistoric site consisting of a concentration of prehistoric artifacts. The site was initially located when prehistoric ceramic sherds were recovered during the excavation of a regular-interval Shovel Test Pit (STP). The prehistoric ceramic was recovered from fill which also generated whiteware, shell, and bottle glass fragments. Normal and close-interval radials recovered one additional prehistoric artifact, a quartzite flake from the plow zone. A historic feature from another STP indicated the possibility of sealed deposits below the plow zone. MHT determined that the Site 18AN1591 was not eligible for the NRHP and recommended no further work for the site in 2017.
DOE: Not Eligible

Site 18AN1592 represents the historic presence of as many as three cemeteries documented in the northwest corner of the Airport. These include St. Andrew Cemetery, the Holy Trinity Russian Orthodox Cemetery, and the Warfield family burial plot. EAC/A investigated Site 18AN1592 with a total of 96 STPs. Artifacts were confined to the topsoil and mixed plow zone and fill, but no subsurface deposits or materials were recovered that were clearly associated with the cemeteries. Eleven surface features were identified within the boundaries of Site 18AN1592, although additional surface features within the boundaries of Site 18AN1427 are clearly associated with the cemetery. These include a road defining the western and southern edges of the cemetery; a second abandoned, overgrown roadway that forms part of the road network

within the former cemetery; a third abandoned, overgrown roadway that is not oriented on the same axis as the other roads within the cemetery road network; an upright concrete marker with cruciform engraving on all four sides; a concrete and stone culvert that carried water beneath the abandoned interior cemetery road; an L-shaped block of concrete; a marble block with a concrete base; a concrete block; a long piece of weathered stone, which is possibly an additional stone gatepost; a large sunken area to the west of the north-south road; and an additional area of concrete debris. The cemeteries were excavated and relocated during the mid-twentieth century. MHT recommended no further work for Site 18AN1592 in 2017, stipulating that if burials were encountered during construction work, MDOT MAA must comply with appropriate provisions of Maryland cemetery law.
DOE: Not Evaluated (Cemetery Relocated)

Site 18AN1594 is in the northwest corner of the Airport. It was identified as a multi-component site, consisting of the remains of a historic road adjacent to a historic cemetery (Site 18AN1592) and a dispersed scatter of prehistoric flakes. The remains of a historic road, visible in historic aerial photographs, were observed both on the surface and in the subsoil during testing. A small assemblage of historic artifacts was recovered by EAC/A in 2016. Three quartz flakes were also recovered from within cultural layers associated with historic land use. Due to the disturbance associated with removal of burials and the demolition of structures in this area, both components appear to retain little to no subsurface integrity. MHT concurred with the recommendation that the site was not eligible for the NRHP and required no further work in 2017.
DOE: Not Eligible

Site 18AN1595 is located in the northwest corner of the Airport. It is a historic site that was identified in 2016 by EAC/A. The site is associated with a historic building depicted in twentieth-century maps and aerial photographs. A large concentration of historic artifacts was recovered from the topsoil and mixed plow zone of the site (282 fragments). Temporally diagnostic artifacts included pottery and glass manufactured from the eighteenth to the twentieth centuries. Three prehistoric flakes were also recovered from these same historic layers. Because artifacts were restricted to the plow zone within the part of the site identified, the site has limited subsurface integrity, it was recommended as not eligible for the NRHP and that no further work was necessary on the site. MHT concurred with these recommendations in 2017.
DOE: Not Eligible

Site 18AN1596 was identified in the southeast corner of the Airport by EAC/A in 2016. The site was identified as an unusually dense concentration of structural materials in the mixed plow zone of a single STP, suggesting the presence of a historic structure in the vicinity. The site is bounded on its western side by the road adjacent to the tree line and is oriented north-south. Severe disturbance is noted near the site's western edge due to a large earth berm which runs parallel to the road within the tree line. A historic structure was noted in the historic aerials of 1938 and 1943 and the 1944 USGS topographic map. Its function is uncertain, but it appears to relate to the arboricultural or agricultural work taking place in the vicinity. Because of the limited subsurface integrity of the site, and the ubiquitous nature of twentieth-century structures throughout the airport property, EAC/A recommended that the site was not

eligible for the NRHP, and that no further work was necessary. MHT concurred with these recommendations in 2017.
DOE: Not Eligible

Site 18AN1597 is a historic site identified in 2016 by EAC/A located in the southeast corner of the Airport. Deep layers of artifact-bearing fill were present, which generated an unusual concentration of historic artifacts. The greater proportion of structural artifacts signalled the remains of a structure in the vicinity. A structural complex is first noted in a 1938 aerial photograph approximately 35 meters to the northeast of the site. This complex is visible in the 1940s, 1950s, and 1960s documentation, but is not present in the 1974 aerial photograph, suggesting it had been demolished. The site is defined by a very small area of concentrated, disarticulated structural artifacts, almost certainly associated with the structural complex located to the northeast during the twentieth century (now occupied by Aviation Boulevard). The fill deposits recorded in this site are likely associated with the demolition of structures and roads in the vicinity. Because further excavation of the site is not likely to yield additional information about the structural complex, EAC/A recommended that the site was not eligible for the NRHP and that no further work was necessary at the site. MHT concurred with these recommendations in 2017.
DOE: Not Eligible

In summary, there are four archaeological resources within the APE-Direct that have not received an MHT determination: Sites 18AN23, 18AN1011, 18AN1428, and 18AN1488. Potential impacts to these sites are considered in *Section 5.8.4.*

4.9.2.4 Cultural Resources

Cultural resources, which include historic resources, may be defined as the physical evidence or place of past human activity. As such, the definition includes the historical resources discussed in the previous sections, along with landscapes or natural features of significance to a group of people traditionally associated with it. The only cultural resources within the affected environment of the project are those historic resources which are discussed above.

4.10 Land Use

The following sections describe the land use and zoning in the Study Area and immediate vicinity. On-airport land use is described in Section 1.1.1, *Existing Airport Facilities*.

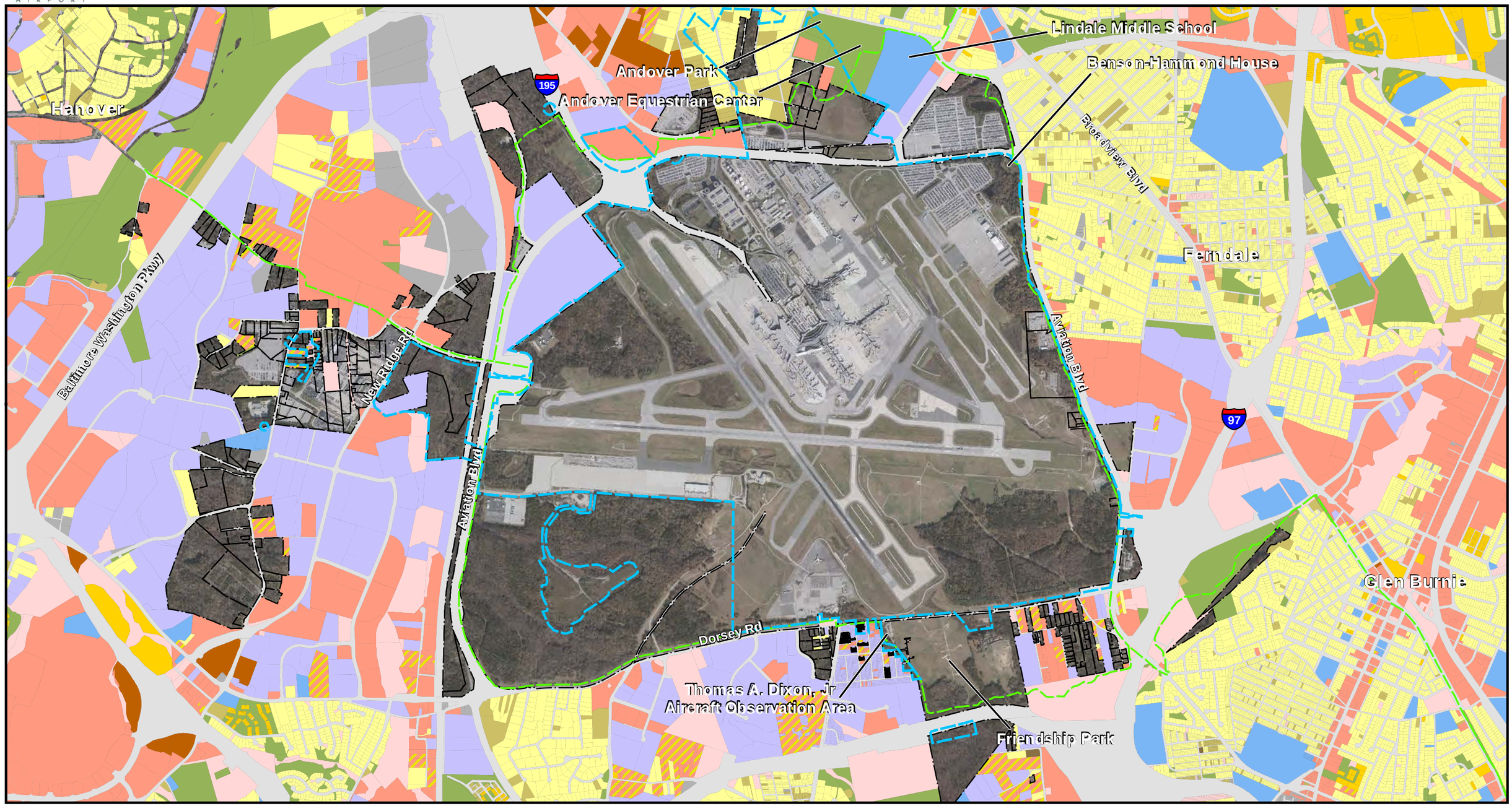
4.10.1 Surrounding Land Use

Existing land use in the Study Area and immediate vicinity is shown on **Figure 4.10-1**. The majority of the Study Area is made up of the airfield and other MDOT MAA property including transportation and forested land uses. A portion of the Study Area north of the Runway 15L end includes some residential and commercial land uses.

The Airport is bounded on the west, north, and east by Aviation Boulevard and on the south by Dorsey Road. Anne Arundel County describes land use on Airport property as Transportation/Utility, Retail, and Industrial.

4.10.2 Airport Noise Zone

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 MDOT MAA to adopt an Airport Noise Zone (ANZ) and Noise Abatement Plan (NAP) that minimizes the impact of



LEGEND

Physical Development Study Area

Existing Land Use

- Single Family
- Multi-Family Residential
- Mobile Home
- Transient Lodging
- Public Use
- Recreational Open Space
- Mixed Use
- Commercial Use
- Commercial Use Exempt
- Manufacturing and Production
- Transportation
- Vacant / Undefined
- Undeveloped Zoned Residential
- BWI Airport Property
- BWI Trail

Existing Land Use
Figure 4.10-1

N

0 1,000 2,000 4,000 Feet

Sources: Aerial - MDOT MAA (2018), Maryland Department of Planning

aircraft noise on people living near BWI Marshall Airport and prevents incompatible land development around the airport.

MDOT MAA first established an ANZ and NAP for BWI Marshall Airport in 1976. There have been several updates to the ANZ and NAP, with the most recent update in 2014. The ANZ is based on an assessment of aircraft noise levels at BWI Marshall Airport during 2014 and noise levels anticipated in the years 2019 and 2024. As **Figure 4.10-2** illustrates, the DNL 65 dB contour extends off-airport property primarily to the west and south, with a small area extending north. The area to the west and north within the DNL 65 dB contour is almost entirely industrial land use. The area to the south includes a mixture of commercial, industrial and residential land use.

The State uses the noise contours adopted in the ANZ to restrict new development that would be incompatible with the cumulative noise exposure level acceptable for an area. MDOT MAA regulates land use within the ANZ. Anyone desiring to construct or modify a structure or land use within the ANZ and/or Airport Zoning District is required to obtain an approved Airport Zoning Permit (AZP) from MDOT MAA prior to obtaining County permits.[59]

MDOT MAA is required by law to approve or deny zoning permits based on the location relative to the ANZ and compatibility with Airport Development Plans. For instance, a request to build a new housing development within the DNL 65 dB noise contour would be denied a permit by MDOT MAA, as the maximum noise threshold for new residential land use is DNL 65 dB.

4.10.3 Zoning

Figure 4.10-3 indicates the existing zoning classifications within the Study Area. The airport is bordered by industrial, residential, open space, and small areas of commercial zones. Industrial zones are concentrated in the area west of the airport. Residential zones are scattered around the airport and are concentrated northeast of the airport.

4.10.4 Proposed Land Use

The Anne Arundel County General Development Plan (GDP) was adopted in 2009. The GDP provides recommendations to guide land use decisions over a 10- to 20-year planning horizon. The GDP and the sub-area plan that includes the Airport, the *BWI/Linthicum Small Area Plan*, lists key growth areas along the Baltimore/Washington Parkway between Fort Meade and BWI Marshall Airport. Two key areas near the Airport include the Airport Square Business Park along West Nursery Road, and the Ridge Road Area near the BWI AMTRAK Station. The Airport Square Business Park is planned to be rezoned to Employment Mixed Use to create more live/work opportunities in the area. The Ridge Road Area was previously designated industrial use and is planned to be rezoned to Transit Mixed Use. This would allow for office, retail, and high density residential uses near major employers around the airport and near AMTRAK, and MARC transit/multi-modal opportunities.

Developers have also 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,

LEGEND

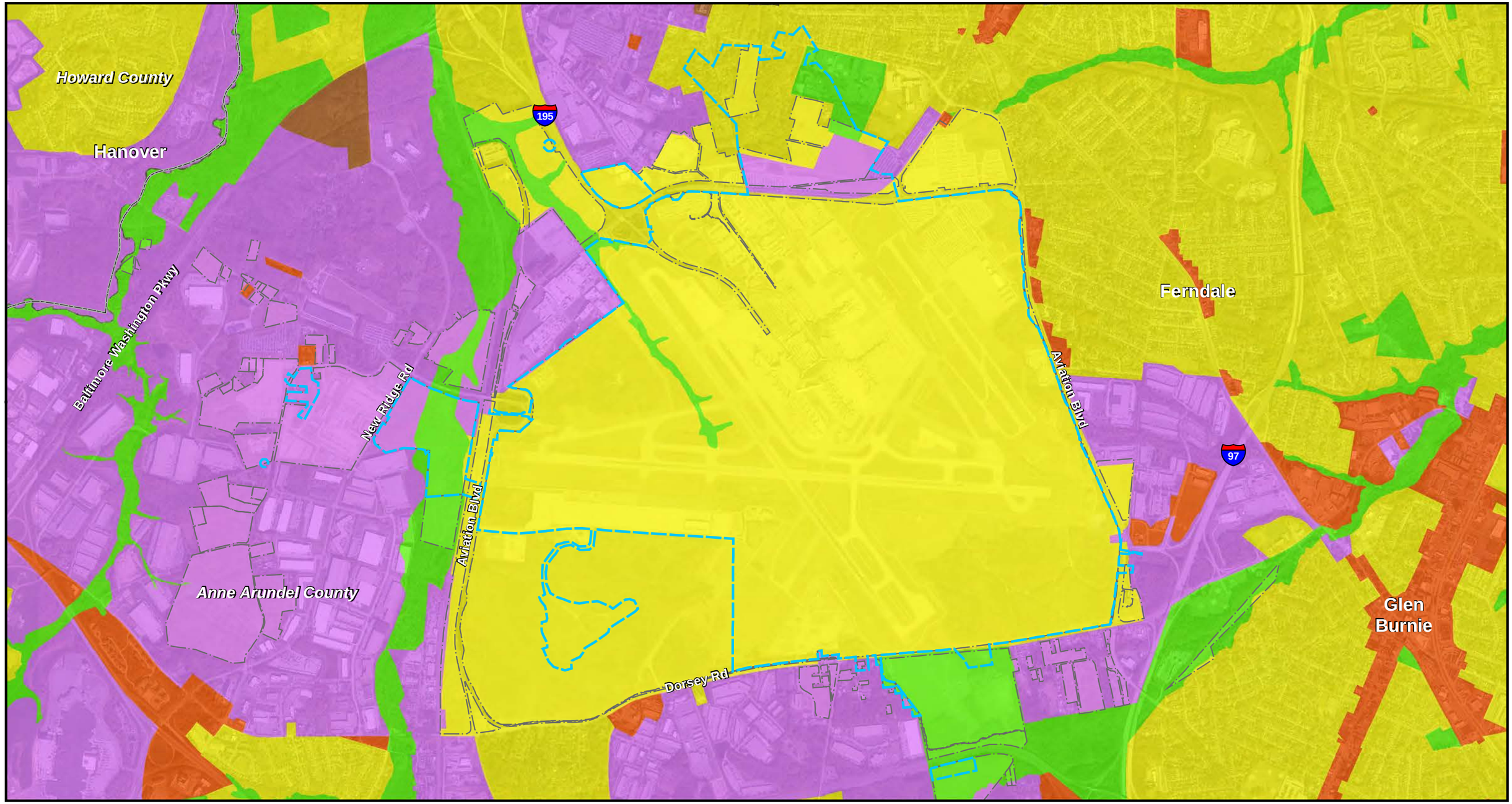
- Airport Noise Zone
- Airport Property Boundary

Airport Noise Zone
Figure 4.10-2

N

0 1,500 3,000 6,000 Feet

Sources: Aerial - MDOT MAA (2016), HMMH, BWI Marshall Airport 2014 Airport Noise Zone Update and Noise Abatement Plan, October 2014.



LEGEND

- Airport Property Boundary
- Physical Development Study Area
- County Boundary
- Residential
- Commercial
- Industrial
- Open Space
- Mixed Use Transit

Zoning
Figure 4.10-3

N

0 1,000 2,000 4,000 Feet

Source: Aerial - MDOT MAA (2018), Anne Arundel County GIS, Howard County GIS

Hanover Road, and Aviation Boulevard.[60] Since the publication of the 2009 GDP, development in these key growth areas is underway.

4.11 Natural Resources and Energy Supply

The Study Area is comprised mostly of the BWI Marshall Airport campus. Power, water, communications, gas, sanitary system and closed storm drain systems are all within the Airport property. Areas located within the Study Area west of the Airport campus are currently forested, undeveloped and not currently using energy resources. Where the Study Area extends north of the Airport campus, there are forested, undeveloped areas, private residences and businesses, and a public park.

Baltimore Gas and Electric (BGE) provides natural gas and electricity to the Airport, Verizon provides communication services, and the Anne Arundel County Bureau of Utility Operations (Department of Public Works) provides water services. BGE and Anne Arundel County also provide power, water, and sewer service to the remainder of the Study Area. Communication services are available from Verizon and other industry service providers.

According to the Anne Arundel County GDP, Background Report on Natural Resources (April 2008), the County has 17 active mining operations. However, there are no surface mining operations located in the immediate vicinity of the Study Area.

There are no known deposits of valuable natural resources located on or near the Study Area. Natural resources needed for airport projects or construction come from a variety of suppliers. Concrete for larger projects involves setting up an on-site batch plant. Smaller projects use "ready mix" that is available from multiple local suppliers. Aggregates that are needed for Airport projects are typically provided from LaFarge quarry in Texas, Maryland and/or Savage quarry in Jessup, Maryland. If fly ash is needed, an out-of-state source would be needed as fly ash is in high demand and is not readily available locally.

Asphalt is available locally from several suppliers, including: P. Flanigan and Sons (Baltimore, Maryland); Independence Construction (Pennsylvania and Delaware); Gray & Son, Inc. (Timonium, Maryland); and Image Asphalt Maintenance, Inc. (Pasadena, Maryland). For earth material, MDOT MAA maintains an on-Airport stockpile south of Mathison Way.

Building materials needed for airport projects come from various suppliers with the most recent building projects using steel provided by Crystal Steel Fabricators in Delmar, Delaware.

4.12 Noise and Noise-Compatible Land Use

The FAA has developed specific guidance and requirements for the assessment of aircraft noise to comply with NEPA requirements. This guidance, specified in FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*, requires that aircraft noise be analyzed in terms of the annual DNL metric. In practice, this requirement means that DNL noise levels are computed for the Average Annual Day (AAD) of operations for the year of interest. DNL noise levels are calculated by using FAA's authorized noise model, Aviation Environmental Design Tool (AEDT) version 2d. Noise model development, methodology, and operational data are described in ***Appendix K, Noise.***

4.12.1 Existing Conditions Noise

The 2018 existing noise conditions were evaluated using AEDT version 2d. Several inputs are required by AEDT. The following sub-sections describe the necessary inputs. See ***Appendix K-2, Existing Conditions Noise Analysis Technical Report,*** for additional details on the development of the 2018 noise contours.

4.12.1.1 AEDT Inputs

2018 Aircraft Operations and Fleet Mix

The base year fleet mix was developed based on BWI Marshall Airport's ANOMS radar data scaled to match the most recent twelve months (May 2018 through April 2019) of ATCT counts from the FAA's OPSNET database. In summary for the base year, the total number of operations was 262,477, which is equivalent to 719.06 average daily operations. **Table 4.12.1** provides the total number of base year aircraft operations at BWI Marshall Airport by operational category. The fleet mix for the base year is summarized in *Appendix K-2, and is detailed in Appendix C, Attachment 2*.

Table 4.12.1
Base Year Total Operations Numbers

Operations Category	Number of Operations
Scheduled Passenger Air Carrier[a]	217,893
Air Taxi	31,351
GA	12,153
Military	1,080
TOTAL[b]	**262,477**

Notes:
(a) Includes both air carrier and regional carrier operations
(b) Totals may not add up due to rounding

Source: Based on actual May 2018 to April 2019 ANOMS data adjusted to match FAA ATADS data (to account for unavailable ANOMS operations data).

2018 Runway Utilization

Runway use throughout the year for arrival and departure operations at BWI Marshall Airport has a notable effect on the noise impact around the airport. The runway utilization was calculated from ANOMS radar data from May 2018 to April 2019. Table K-2.7 in *Appendix K-2* provides the 2018 runway use percentages.

2018 Flight Tracks

A sample of ANOMS radar data was selected from four representative weeks between 2018-2019. Sample weeks were selected in a way that the overall runway use in the sample weeks is similar to the overall annual AAD runway use based on the FAA's Aviation System Performance Metrics (ASPM). Four weeks were selected to represent a week in each season while maintaining a manageable amount of flight tracks. A flight track development validation package was developed as part of the process and was reviewed by MDOT MAA. The model itself was run with a full year of operations based on the forecast. Runway use was also developed using a full year of operations. The sample radar data were used to develop representative arrival and departure flight tracks. Aircraft were categorized into four operation groups including commercial jets, commercial propellers, GA jets, and GA propellers. The flight tracks were developed by operation type (arrival and departure), runway, and operation group. Figures K-2-1 and K-2-2 in *Appendix K-2* show the AEDT arrival and departure flight tracks used to develop the 2018 existing conditions noise contour.

Engine Maintenance Run-ups

Aircraft maintenance engine run-ups can be modeled in AEDT2d, and depending on their

frequency and orientation, may influence the size and location of noise exposure contours. MDOT MAA provided detailed engine run-up logs for use in the engine run-up contour modeling. A total of six run-ups were modeled for the existing noise conditions.

2018 Atmospheric Conditions

AEDT 2d default weather parameters for BWI Marshall Airport were used for the development of the 2018 existing noise contours. The default temperature of 54.0 degrees Fahrenheit and wind speed of 6.1 Knots were used in the AEDT modeling process. A pressure of 1,011 millibars and a relative humidity of 67.9 percent were also used.

Terrain

Terrain data is used to account for effects that variations in terrain have on noise propagation. Terrain data was obtained from the National Land Cover Database (NLCD) developed by the U.S. Department of Interior.

4.12.1.2 2018 Existing Conditions Noise Contour

Federal guidelines in 14 CFR Part 150 establish the DNL 65 dB as the threshold of non-compatibility for noise sensitive land uses (e.g., homes, schools, places of worship, etc.). **Figure 4.12-1** shows the Year 2018 existing conditions noise exposure contour. The DNL 65 dB noise exposure contour stays almost entirely within Airport property to the north and east. The noise exposure contour stretches west and south off the Runway 10 and Runway 33R ends, respectively, off airport property.

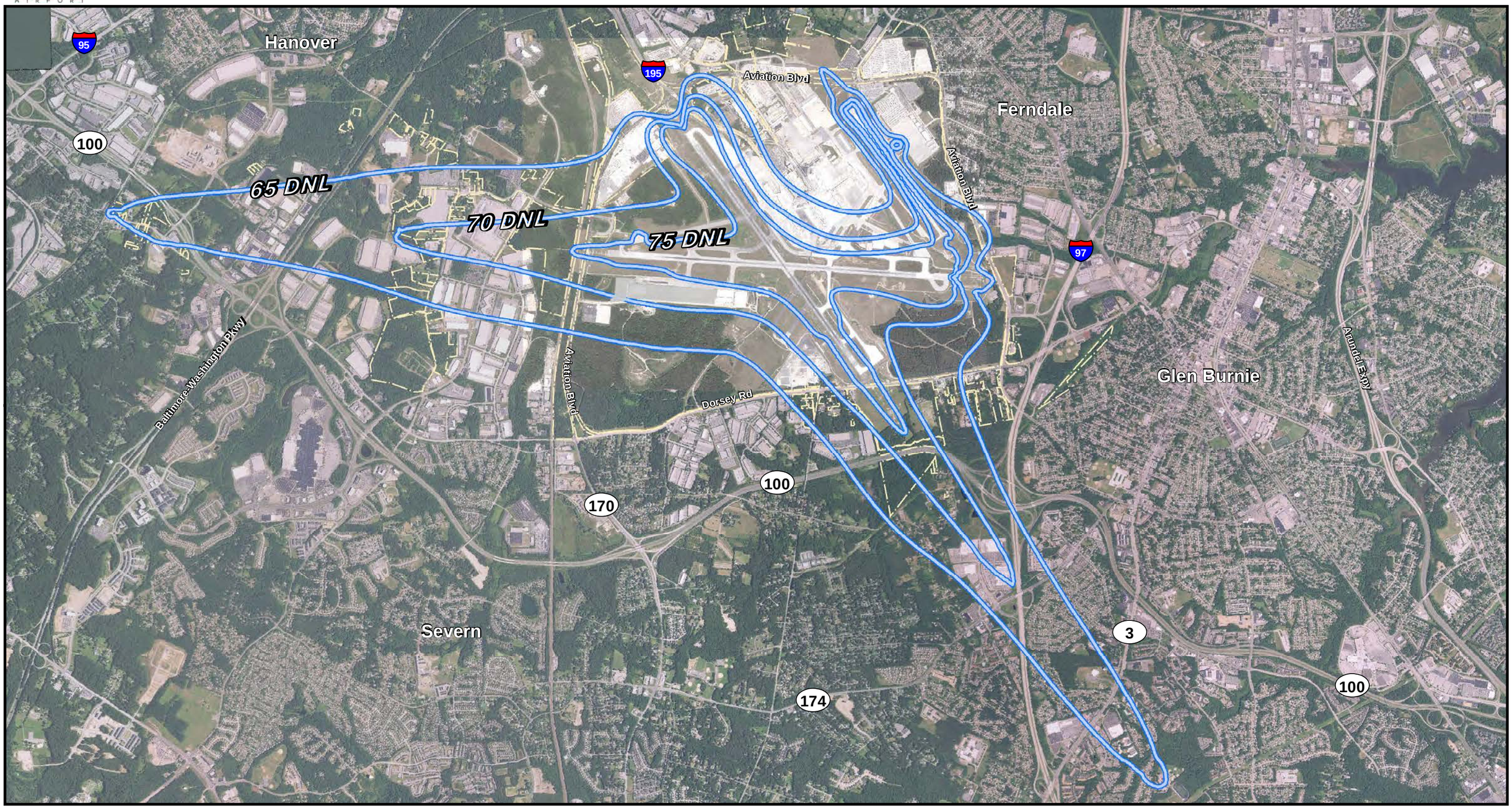
4.12.2 Noise-Compatible Land Use

A noise sensitive area is "an area where noise interferes with normal activities associated with its use. Normally noise sensitive areas include residential, educational, health, and religious structures and sites, and parks, recreational areas, areas with wilderness characteristics, wildlife refuges, and cultural and historical sites. For example, in the context of noise from airplanes and helicopters, noise sensitive areas include such areas within the DNL 65 dB noise contour."[61]

Table 4.12.2 summarizes land use types and noise sensitive sites, including population and housing counts, within the 2018 existing conditions noise contour. **Figure 4.12-2** illustrates the land use and noise sensitive sites within the 2018 existing noise contour.

The majority of the land use within the noise contours is BWI Marshall Airport property (57 percent). Approximately 5 percent of the total land use is residential. Population and housing units within the contours were determined using 2010 U. S. Census Bureau block data. The population and housing units calculated within a contour were based on the assumption that residential populations within a block were evenly distributed by area, resulting in an estimated population of approximately 2,807 and 1,111 housing units within the 2018 existing noise contour. These population and housing unit counts are not associated with the acreage of residential land use types.

MDOT MAA's Homeowners Assistance Program and School Soundproofing Program provide sound insulation for eligible residents and schools identified within the 65 dB DNL contour as defined by the current Part 150 Study Noise Exposure Maps (NEMs). As of April 30, 2014, MDOT MAA has provided sound insulation to 669 homeowners and four schools. Based on the 2014 and 2019 approved NEMs, there were



LEGEND

Existing 2018 DNL Noise Contour

Airport Property Boundary

Existing Noise Contour
Figure 4.12-1

N

0 1,500 3,000 6,000 Feet

Source: Aerial - MDOT MAA (2016), USDA NAIP (2015)

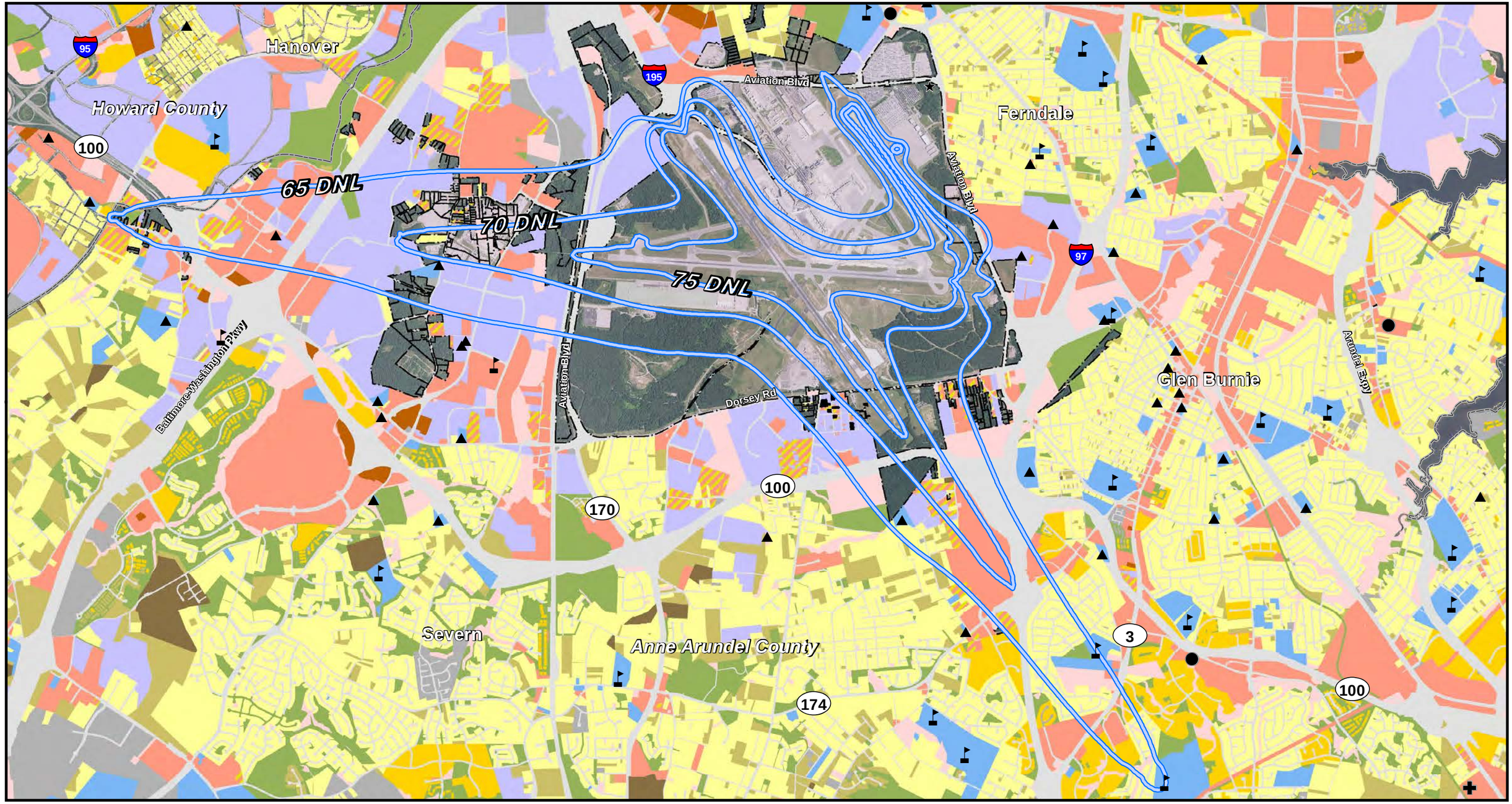
an additional 170 single family homes and 488 multi-family units in 26 buildings, located in five complexes eligible for sound insulation. MDOT MAA is currently putting together a project team to provide sound insulation to the interested eligible residents in 2020. The 2014 NEM, which defines eligibility for sound insulation, is compared to the existing 2018 contour in *Appendix K-2.*

Table 4.12.2
2018 Existing Conditions Noise Exposure

Land Use Classification (acres)	65 to 70 DNL	70 to 75 DNL	Over 75 DNL	Total
BWI Airport	944	822	590	2,356
Commercial Use	261	64	0	325
Commercial Use Exempt	102	12	0	114
Manufacturing and Production	507	43	2	551
Mixed Use Residential	54	15	0	70
Mobile Home	0	1	0	1
Multi-Family Residential	25	0	0	25
Public Use	37	0	0	37
Recreational Open Space	26	0	0	26
Single Family Residential	135	10	0	146
Transient Lodging	0	0	0	0
Transportation	386	60	7	454
Undeveloped Residential	9	0	0	9
Vacant Undefined	7	0	0	7
Total	2,494	1,027	599	4,120
Number of Noise Sensitive Sites	**65 to 70 DNL**	**70 to 75 DNL**	**Over 75 DNL**	**Total**
Places of Worship	3	0	0	3
Schools	2	0	0	2
Historic	0	0	0	0
Hospitals and Nursing Homes	0	0	0	0
Population and Housing Units	**65 to 70 DNL**	**70 to 75 DNL**	**Over 75 DNL**	**Total**
Population	2,756	51	0	2,807
Housing Units	1,094	17	0	1,111

Notes:
(a) Totals may not add up due to rounding.
(b) Population and Housing Units are noise-sensitive sites. Population and housing units within the contours were determined using 2010 U.S. Census Bureau block data. The population and housing units calculated within a contour were based on the assumption that residential populations within a block were evenly distributed by area. These population and housing unit counts are not associated with the acreage of residential land use types.

Sources: Anne Arundel County and Howard County Land Use, US Census Bureau 2010 Block data, and HNTB analysis, 2019.



LEGEND

- Existing 2018 DNL Noise Contour
- Hospital
- Nursing Home
- School
- Place of Worship
- Historic Resource

Existing Land Use

- Single Family
- Multi-Family Residential
- Mobile Home
- Transient Lodging
- Public Use
- Recreational Open Space
- Mixed Use
- Commercial Use
- Commercial Use Exempt
- Manufacturing and Production
- Transportation
- Vacant / Undefined
- Undeveloped Zoned Residential
- BWI Airport Property
- County Boundary

Noise Compatible Land Use
Figure 4.12-2

N

0 1,500 3,000 6,000 Feet

Source: Aerial - MDOT MAA (2016), National Park Service, Maryland Department of Planning, Google Earth

There are five noise sensitive sites within the existing noise contours between the 65 dB DNL and 70 dB DNL contours, three places of worship and two schools:

- Open Door Baptist Church and Open Door Christian School;
- Metropolitan United Methodist Church;
- Qodesh Family Church (Lighthouse Chapel International);
- Glen Burnie Park Elementary School; and
- Rippling Woods Elementary School.

The Open Door Baptist Church and Christian School, and Qodesk Family Church are located west of the Airport on Ridge Road, and west of MD295, respectively. Metropolitan United Methodist Church is located south of the Airport. Glen Burnie Park and Rippling Woods Elementary Schools are located southeast of the Airport. Potential impacts to Glen Burnie Elementary School were mitigated by adding sound insulation as part of MAA's School Soundproofing Program.[62]

The DNL 65 dB noise exposure contour off the Runway 10 end includes mostly industrial, commercial, and transportation areas (with several pockets of residential areas). To the south of the Airport off the Runway 33L end, the contour encompasses a greater area of residential and commercial uses. See *Section 4.10.2, Airport Noise Zone* for details on existing noise management programs at the Airport.

4.13 Socioeconomics, Environmental Justice and Children's Environmental Health and Safety Risks

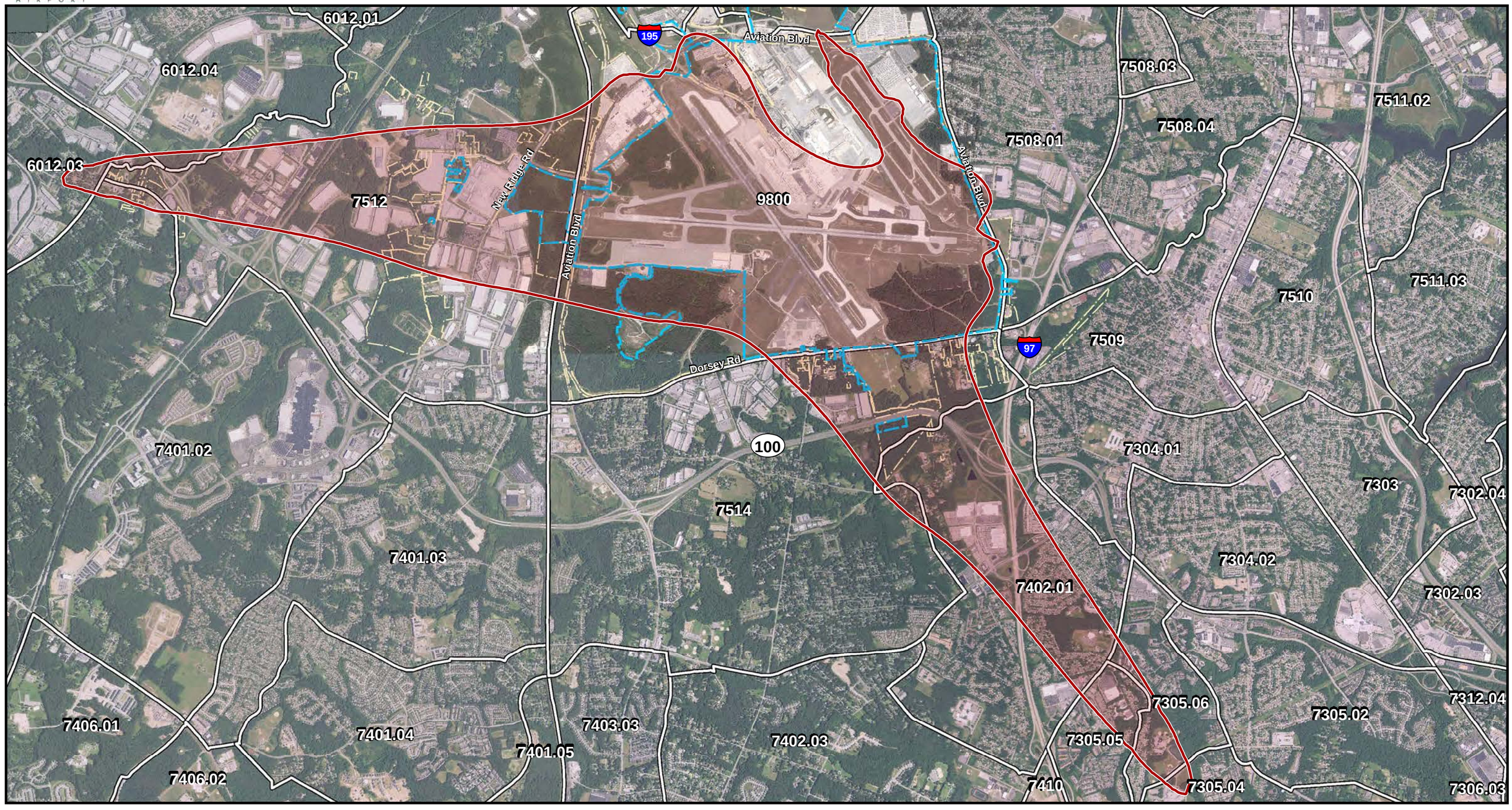
4.13.1 Demographics

U.S. Census Bureau (2010-2014) data at the Census tract level was used to develop a profile of the population, housing and employment characteristics within the Noise Impact Study Area and the Physical Development Study Area.

BWI Marshall Airport is in northern Anne Arundel County. Anne Arundel County is located just south of Baltimore and is part of the Baltimore-Washington Metropolitan Area. The County has a total area of approximately 588 square miles (nearly 415 square miles of land) and is primarily suburban in nature.

The Noise Impact Study Area and the Physical Development Study Area encompass parts of 11 Census tracts (CTs), nine within Anne Arundel County: 9800, 7512, 7401.02, 7508.01, 7514, 7305.04, 7305.05, 7305.06, and 7402.01; and two within Howard County: 6012.03 and 6012.04. As illustrated in **Figure 4.13-1**, the Airport property makes up much of CT 9800, which has a population of 9. Therefore, CT 9800 is not included in the demographic analysis. The following ten CTs are analyzed within the Study Areas.

- CT 7512 borders BWI Marshall Airport to the north and west, and is within the Physical Development Study Area and the Noise Impact Study Area. This CT includes a variety of land use, with residential and commercial prominent to the north of the Airport, and open space and industrial prominent to the west of the Airport.



LEGEND

- Census Tract
- Physical Development Study Area
- Noise Impact Study Area
- Airport Property Boundary

Census Tracts
Figure 4.13-1

N

0 1,500 3,000 6,000 Feet

Source: Aerial - MDOT MAA (2016), USDA NAIP (2015), U.S. Census Bureau

- CTs 6012.03, 6012.04, and 7401.02 are located west of BWI Marshall Airport and fall within the Noise Impact Study Area off the Runway 10 end. These CTs include residential and mixed use land area within the Noise Impact Study Area.
- CT 7508.01 borders BWI Marshall Airport to the east. Approximately 10 acres of commercial and industrial land use within CT 7508.01 is within the Noise Impact Study Area, and a small tract of transportation land use required for utility connections under Aviation Blvd to the relocated fire training facility is within the Physical Development Study Area
- CT 7514 borders BWI Marshall Airport to the south, and is within the Physical Development Study Area and the Noise Impact Study Area. This CT includes mostly park/open space, with some commercial, industrial and residential areas.
- CTs 7305.04, 7305.05, 7305.06, and 7402.01 are located south of BWI Marshall Airport and fall within the Noise Impact Study Area off the Runway 33L end. These CTs include residential and public land use area within the Noise Impact Study Area.

For purposes of comparison, the relevant CTs are compared to Anne Arundel County, Howard County, and Maryland.

As shown in **Table 4.13.1**, the demographic profile of the surrounding CTs varies greatly from 8.9 percent (CT 7512) to 70.8 percent (CT 6012.03) minority population. Six of the eight CTs within Anne Arundel County have minority populations greater than the County (30.4 percent), and both of the CTs within Howard County have minority populations greater than the County (45.9 percent). Three CTs have over 50 percent minority population (CTs 7305.05, 7305.06 and 6012.03). The Black or African American population makes up the largest percent of the minority population in all CTs, Anne Arundel County, and Howard County. However, the Asian population in Howard County (17.3 percent) is almost equal to the Black or African American population (18.1 percent).

CT 7512, located west and north or the Airport, and CT 7508.01, located east of the Airport, have low minority populations, with an estimated 8.9 percent and 18.7 percent, respectively. The CTs located south of the Airport (7514, 7402.01, 7305.04, 7305.05, and 7305.06) have a much more diverse population with 38.1 percent to 68.8 percent minority populations. Most of these CTs are more representative of the demographics of Maryland which has 48.1 percent minority populations.

Table 4.13.2 provides the median household income and poverty status for families in the surrounding CTs, Anne Arundel County, Howard County, and Maryland.

Table 4.13.1
Study Area Demography by Census Tract (CT), Anne Arundel County, Howard County and Maryland

Subject		CT 7305.04[1] South		CT 7305.05[1] South		CT 7305.06[1] South		CT 7402.01[1] South		CT 7514[2] South		CT 7508.01[2] East		CT 7512[2] North/West		6012.03[1] West		6012.04[1] West		7401.02[1] West		Howard		Anne Arundel County		Maryland	
		Est.	%	Est.	%	Est.	%	Est.	%	Est.	%	Est.	%	Est.	%	Est.	%	Est.	%	Est.	%	Est.	%	Est.	%	Est.	%
Total Population		7,430	100.0%	4,673	100.0%	3,416	100.0%	7,474	100.0%	3,935	100.0%	6,391	100.0%	4,254	100.0%	5,816	100.0%	5,832	100.0%	10,522	100.0%	312,495	100.0%	564,600	100.0%	5,996,079	*100.0%*
Children (Under 18 yr old)		1,656	22.3%	1,247	26.7%	751	22.0%	1,548	20.7%	585	14.9%	1,254	19.6%	989	23.2%	1,666	28.6%	1,576	27.0%	1,885	17.9%	76,848	24.6%	126,857	22.5%	1,347,613	*22.5%*
Not Hispanic or Latino	White	4,269	57.5%	1,518	32.5%	1,066	31.2%	3,903	52.2%	2,435	61.9%	5,198	81.3%	3,876	91.1%	1,699	29.2%	3,054	52.4%	5,444	51.7%	169,069	54.1%	393,139	69.6%	3,109,275	*51.9%*
	Black or African American	2,305	31.0%	2,264	48.4%	1,629	47.7%	1,363	18.2%	953	24.2%	517	8.1%	144	3.4%	2,241	38.5%	1,158	19.9%	2,021	19.2%	56,630	18.1%	89,635	15.9%	1,754,143	*29.3%*
	American Indian & Alaska Native	0	0.0%	0	0.0%	0	0.0%	0	0.0%	12	0.3%	0	0.0%	0	0.0%	0	0.0%	1	0.0%	41	0.4%	556	0.2%	798	0.1%	11,634	*0.2%*
	Asian	190	2.6%	342	7.3%	238	7.0%	682	9.1%	226	5.7%	127	2.0%	128	3.0%	980	16.9%	671	11.5%	1,794	17.0%	54,179	17.3%	20,460	3.6%	370,660	*6.2%*
	Native Hawaiian and Other Pacific Islander	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	41	0.0%	395	0.1%	2,441	*0.0%*
	Other Race	0	0.0%	11	0.2%	11	0.3%	0	0.0%	0	0.0%	0	0.0%	27	0.6%	0	0.0%	29	0.5%	0	0.0%	1,159	0.4%	1,223	0.2%	17,279	*0.3%*
	Two or More Races	402	5.4%	142	3.0%	40	1.2%	265	3.5%	168	4.3%	424	6.6%	43	1.0%	225	3.9%	117	2.0%	406	3.9%	10,518	3.4%	17,675	3.1%	157,344	*2.6%*
Hispanic or Latino		264	3.6%	396	8.5%	432	12.6%	1,261	16.9%	141	3.6%	125	2.0%	36	0.8%	671	11.5%	802	13.8%	816	7.8%	20,343	6.5%	41,275	7.3%	*573,303*	*9.6%*
Total Minority		3,161	42.5%	3,155	67.5%	2,350	68.8%	3,571	47.8%	1,500	38.1%	1,193	18.7%	378	8.9%	4,117	70.8%	2,778	47.6%	5,078	48.3%	143,426	45.9%	171,461	30.4%	2,886,804	*48.1%*

Notes: [1] CT is within the Noise Impact Study Area.
[2] CT is within both the Physical Development Study Area and the Noise Impact Study Area.

Source: US Census Bureau, 2017 American Community Survey 5-year estimates (2013-2017).

Table 4.13.2

Median Household Income and Poverty Status by CT, Anne Arundel County, Howard County and Maryland

Subject	CT 7305.04[1]	CT 7305.05[1]	CT 7305.06[1]	CT 7402.01[1]	CT 7514[2]	CT 7508.01[2]	CT 7512[2]	6012.03[1]	6012.04[1]	7401.02[1]	Howard County	Anne Arundel County	Maryland
	South	South	South	South	South	East	North/West	West	West	West			
Number of Households	2,856	2,104	1,799	2,722	1,475	2,101	1,357	1,823	2,099	4,491	111,337	205,395	2,181,093
Average Household Size	2.6	2.22	1.9	2.74	2.63	3.03	3.11	2.86	2.78	2.34	2.79	2.67	2.68
Median Household Income ($)	89,274	50,784	44,831	80,227	103,682	94,904	97,284	104,975	92,480	105,059	115,576	94,502	$78,916
Poverty Status													
Number of families	2,027	1,233	611	1,784	1,028	1,689	993	1,337	1,509	2,684	82,294	142,696	1,460,186
Percent of families below poverty line	4.7%	1.9%	12.9%	4.4%	3.6%	2.9%	1.9%	5.3%	1.6%	2.8%	3.6%	3.9%	6.6%
Population for whom poverty status is determined	7,430	4,673	3,401	7,474	3,883	6,367	4,219	5,205	5,815	10,522	310,234	548,112	5,856,088
Number of individuals below the poverty line	384	201	578	349	299	186	325	361	159	478	16,001	33,246	566,966
Percent individuals below the poverty line	5.2%	4.3%	17.0%	4.7%	7.7%	2.9%	7.7%	6.9%	2.7%	4.5%	5.2%	6.1%	9.7%

Notes: [1] CT is within the Noise Impact Study Area.
[2] CT is within both the Physical Development Study Area and the Noise Impact Study Area.

Source: US Census Bureau, 2017 American Community Survey 5-year estimates (2013-2017).

The median household income in the CTs surrounding the Airport also varies greatly, from $44,831 (CT 7305.06) to $105,059 (CT 7401.02). Eight of the ten CTs have median household incomes comparable to Anne Arundel County ($94,502) and Howard County ($115,576). Two of the ten CTs (7305.05 and 7305.06) have median household incomes much lower than the Counties ($50,784 and $44,831). The percent of families below the poverty line ranges from 1.9 percent (CT 7512) to 12.9 percent (CT 7305.06), and the percent of individuals below the poverty line ranges from 2.9 percent (CT 7508.01) to 17.0 percent (CT 7305.06). Four of the CTs have a greater percent of families below the poverty line as compared to the Counties (3.9 percent and 3.6 percent), and four CTs have a greater percent of individuals below the poverty line as compared to the Counties (6.1 percent and 5.2 percent). All CTs, except for 7305.06, have lower percentages of poverty than the State.

Table 4.13.3 provides the educational attainment and employment rates of the CTs surrounding the Airport, along with Anne Arundel County, Howard County, and Maryland as a comparison. The CTs have high school graduation rates between 85.1 percent (7305.05) and 95.5 percent (7305.04), consistent with the Counties (92.0 percent and 95.3 percent). The percent of population (25 years and over) with a bachelor's degree or higher is between 23.4 percent (7402.01) and 56.9 percent (6012.03) in the nearby CTs.

The percent of the labor force population employed in the CTs near BWI Marshall Airport is generally comparable or greater than that of the Counties (64.4 percent and 68.4 percent). Five of the ten CTs have employment rates greater than 70 percent. The unemployment rates in the nearby CTs range from 2.0 percent (CT 6012.04) to 8.2 percent (CT 7306.06), with four of the CTs having an unemployment rate higher than the Counties (5.2 percent and 4.2 percent).

4.13.2 Environmental Justice

EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations*, requires federal agencies to identify and address the disproportionately high and adverse human health or environmental effects of their actions on minority and low-income populations with the goal of achieving environmental protection for all communities.

In accordance with DOT Order 5610.2(a), minority refers to people who classified themselves as African American or Black; Hispanic or Latino; Asian American; American Indian or Alaskan Native; or Native Hawaiian or Other Pacific Islander.

Minority populations are defined as "any readily identifiable group of minority persons who live in a geographic proximity, and if circumstances warrant, geographically dispersed/transient persons who will be similarly affected by a proposed DOT program, policy or activity."[63]

As summarized in Table 4.13.1, the Black or African American population makes up the largest percent of the minority population in the CTs and the Counties. Eight of the ten CTs have minority populations greater than their respective County (30.4 percent and 45.9 percent), and three CTs have over 50 percent minority populations.

Table 4.13.3

Educational Attainment and Employment by CT, Anne Arundel County, Howard County and Maryland

Subject	CT 7305.04[1]	CT 7305.05[1]	CT 7305.06[1]	CT 7402.01[1]	CT 7514[2]	CT 7508.01[2]	CT 7512[2]	6012.03[1]	6012.04[1]	7401.02[1]	Howard County	Anne Arundel County	Maryland
	South	South	South	South	South	East	North/West	West	West	West			
Educational Attainment													
Population 25 years and over	5,330	2,989	2,244	5,275	2,895	4,441	2,842	3,713	3,680	7,714	210,338	387,306	4,095,427
Less than 9th grade	1.7%	4.9%	0.4%	3.6%	3.7%	2.1%	1.8%	4.2%	4.3%	1.7%	2.2%	2.4%	4.1%
9th to 12th grade, no diploma	2.8%	10.0%	8.6%	7.5%	3.6%	7.8%	6.9%	7.0%	3.1%	6.0%	2.6%	5.7%	6.1%
High school graduate (includes equivalency)	21.8%	17.9%	29.1%	31.0%	30.5%	33.5%	32.8%	16.7%	19.9%	18.2%	14.0%	24.2%	25.1%
Some college, no degree	27.8%	24.9%	25.2%	24.4%	22.5%	19.9%	18.5%	12.4%	16.4%	14.1%	14.4%	20.1%	19.2%
Associate's degree	6.7%	10.9%	11.1%	10.0%	8.9%	12.3%	6.5%	2.7%	10.2%	7.6%	5.6%	7.6%	6.5%
Bachelor's degree	25.0%	23.5%	20.2%	13.5%	18.4%	19.1%	19.3%	28.5%	32.1%	34.1%	30.1%	23.4%	21.0%
Graduate or professional degree	14.2%	7.9%	5.4%	10.0%	12.4%	5.3%	14.2%	28.4%	14.0%	18.4%	31.1%	16.7%	18.0%
	□	□	□	□	□	□	□	□	□	□	□	□	□
Percent high school graduate or higher	95.5%	85.1%	91.1%	88.9%	92.8%	90.1%	91.4%	88.8%	92.6%	92.3%	95.3%	92.0%	89.8%
Percent bachelor's degree or higher	39.3%	31.4%	25.6%	23.4%	30.8%	24.4%	33.5%	56.9%	46.1%	52.4%	61.2%	40.1%	39.0%
Employment Status													
Population 16 years and over (Total)	6,107	3,531	2,732	6,097	3,464	5,298	3,353	4,294	4,519	8,780	244,975	451557	4,800,851
In labor force (%)	77.6%	75.5%	80.4%	71.6%	66.9%	71.6%	70.1%	67.6%	76.8%	81.2%	72.0%	70.6%	68.1%
Employed (%)	74.9%	70.8%	73.8%	68.6%	61.8%	65.9%	67.6%	62.4%	73.4%	74.2%	68.4%	64.4%	63.3%
Unemployment rate (%)	3.3%	5.6%	8.2%	3.9%	6.9%	7.6%	3.1%	2.8%	2.0%	3.9%	4.2%	5.2%	6.1%

Notes: [1] CT is within the Noise Impact Study Area.
[2] CT is within both the Physical Development Study Area and the Noise Impact Study Area.

Source: US Census Bureau, 2017 American Community Survey 5-year estimates (2013-2017).

As summarized in Table 4.13.2, eight of the ten CTs have median household incomes comparable to Anne Arundel County ($94,502) and Howard County ($115,576). Four of the ten CTs have a greater percent of families below the poverty line as compared to Anne Arundel County (3.9 percent) and Howard County (3.6 percent).

4.13.3 Children's Environmental Health and Safety Risks

EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks,* directs federal agencies to identify and assess disproportionate impacts to children's environmental health and safety risks. EO 13045 states that, "'Environmental health risks and safety risks' mean risks to health or to safety that are attributable to products or substances that the child is likely to encounter or ingest (such as the air we breathe, the food we eat, the water we drink or use for recreation, the soil we live on, and the products we use or are exposed to)." Therefore, the assessment of potential air quality, hazardous materials and water quality impacts are pertinent to this category.

As summarized in Table 4.13.1, the population of children (under 18 years old) within the CTs range from 14.9 percent (CT 7514) to 28.6 percent (CT 6012.03). Four of the ten CTs have populations of children greater than their respective County (22.5 percent and 24.6 percent), and half have populations less than the County.

There are no daycare facilities located within or adjacent to the Physical Development Study Area. Section 4.6, Department of Transportation, Section 4(f) Resources includes a discussion of the parks and school located near the Physical Development Study Area.

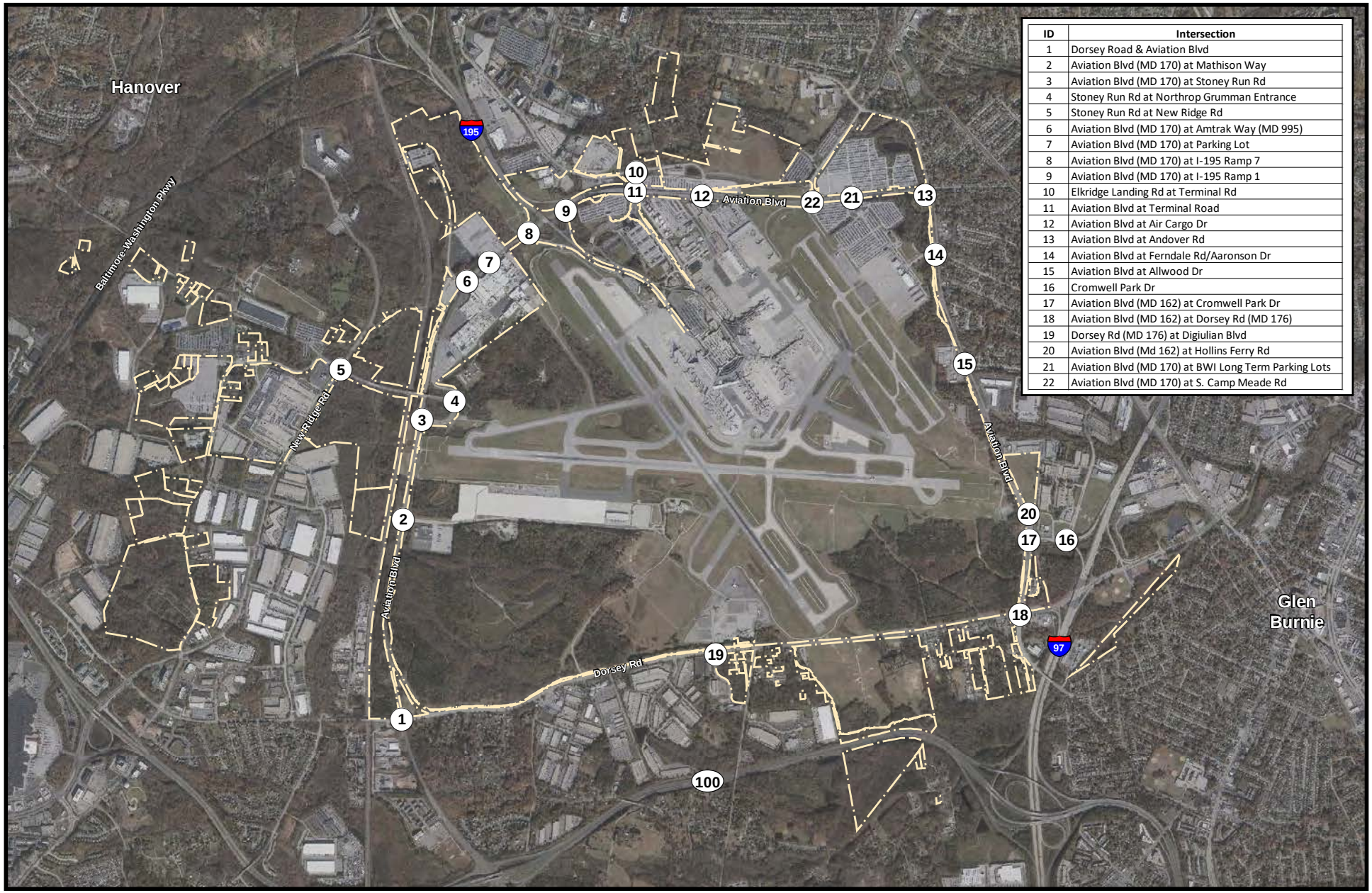
4.13.4 Off-Airport Existing Traffic Conditions

The off-Airport traffic analysis intersections, shown in **Figure 4.13-2**, includes 22 intersections on and adjacent to Aviation Boulevard (MD 162/MD170) and Dorsey Road (MD 176) that encircle BWI Marshall Airport. The Traffic Study Area was developed through coordination meetings with MDOT MAA, the County and SHA, and includes the limit of where the proposed projects could alter traffic patterns. See *Appendix A, Attachment 3*, for the Existing Conditions *Traffic Impact Study* for details on the existing traffic conditions analysis and coordination with the County and SHA.

Existing traffic conditions were analyzed in 2016 and will serve as a baseline for various future scenarios. AM peak hours (7:00 AM to 9:00 AM) and PM peak hours (4:00 PM to 6:00 PM) of a typical weekday were analyzed at each intersection. The AM and PM peak hours at the intersections were typically 7:00 AM to 8:00 AM and 4:30 PM to 5:30 PM, respectively. The hour with the highest volume during the peak periods at each intersection was used in the analysis to reflect a worst-case scenario.

The EA off-airport traffic analysis was developed based on traffic counts obtained between 2014 and 2016 at 22 study intersections. Due to the extended time between the issuance of the Draft EA and Draft Section 4(f) Determination in January 2018 and the Updated Draft EA and Draft Section 4(f) Determination, the affected environment was updated to consider the year 2018 as existing conditions.

Following a comparison of 2016 traffic volumes to 2018 traffic volumes, it can be assumed that the volumes developed in



ID	Intersection
1	Dorsey Road & Aviation Blvd
2	Aviation Blvd (MD 170) at Mathison Way
3	Aviation Blvd (MD 170) at Stoney Run Rd
4	Stoney Run Rd at Northrop Grumman Entrance
5	Stoney Run Rd at New Ridge Rd
6	Aviation Blvd (MD 170) at Amtrak Way (MD 995)
7	Aviation Blvd (MD 170) at Parking Lot
8	Aviation Blvd (MD 170) at I-195 Ramp 7
9	Aviation Blvd (MD 170) at I-195 Ramp 1
10	Elkridge Landing Rd at Terminal Rd
11	Aviation Blvd at Terminal Road
12	Aviation Blvd at Air Cargo Dr
13	Aviation Blvd at Andover Rd
14	Aviation Blvd at Ferndale Rd/Aaronson Dr
15	Aviation Blvd at Allwood Dr
16	Cromwell Park Dr
17	Aviation Blvd (MD 162) at Cromwell Park Dr
18	Aviation Blvd (MD 162) at Dorsey Rd (MD 176)
19	Dorsey Rd (MD 176) at Digiulian Blvd
20	Aviation Blvd (Md 162) at Hollins Ferry Rd
21	Aviation Blvd (MD 170) at BWI Long Term Parking Lots
22	Aviation Blvd (MD 170) at S. Camp Meade Rd

LEGEND

Airport Property Boundary

Off-Airport Traffic Analysis Intersections
Figure 4.13-2

N

0 750 1,500 3,000 Feet

Source: Aerial - MDOT MAA (2018)

2016 to represent existing conditions now represent 2018 existing conditions. Additionally, it can be assumed that the growth rate used to grow traffic volumes for the years of analysis within the January 2018 Draft EA and Draft Section 4(f) Determination traffic analysis remains valid. See *Appendix A, Attachment 3*, for a comparison of 2016 traffic volumes to 2018 traffic volumes.

4.13.4.1 Delays and LOS

A key metric used in assessing traffic operations is Level of Service (LOS). LOS is an estimate of the performance efficiency and overall operation of an intersection as established by the Highway Capacity Manual (HCM) methodology. The HCM methodology measures the degree of delay at intersections using a letter scale from A to F, "A" being the free flow condition and "F" being the total gridlock. The delay thresholds and associated LOS for signalized and unsignalized intersections are listed in **Table 4.13.4**.

The AM and PM peak hour delay and LOS for the Existing Conditions at the study intersections are presented in **Table 4.13.5** and **Table 4.13.6**. In the existing year, all intersections operate at an acceptable level of service during both the AM and PM peak hours. Intersection 1 (Aviation Boulevard at Dorsey Road - West) is the only intersection that operates at LOS E in the AM and PM peak hours; however, this is within the acceptable thresholds defined by SHA[1].

Table 4.13.4
Intersection Delay Threshold for Level of Service

LOS	Signalized Delay (sec/veh)	Unsignalized Delay (sec/veh)	Description
A	0~10	0~10	Free-flow operations.
B	10~20	10~15	Free flow conditions with slightly lesser freedom to maneuver.
C	20~35	15~25	Might impact travel speeds with maneuverability affected by other vehicles.
D	35~55	25~35	Ability to maneuver is severely restricted due to traffic congestion.
E	55~80	35~50	Operations at or near capacity, often causing queues.
F	> 80	> 50	Forced or breakdown flow with demand exceeding the capacity.

Source: HCM 2000, Chapter 12.

Table 4.13.5

Existing Conditions AM Peak Hour Intersection LOS - Synchro

Node	Intersection	Control	Delay (sec/veh)	Equivalent LOS
1	Aviation Boulevard at Dorsey Road - West	S	63.5	E
2	Aviation Boulevard at Mathison Way	S	5.2	A
3	Aviation Boulevard at Stoney Run Road	S	25.2	C
4	Stoney Run Road at Northrop Grumman Entrance	S	19.0	B
5	Stoney Run Road at New Ridge Road	S	37.5	D
6	Aviation Boulevard at Amtrak Way	S	11.4	B
7	Aviation Boulevard at Northrup Grumman Gate 1A	S	8.2	A
8	Aviation Boulevard at SB I-195 Ramps	S	3.3	A
9	Aviation Boulevard at NB I-195 Ramps	S	6.9	A
10	Aviation Boulevard at Terminal Road	S	19.5	B
11	Terminal Road at Elkridge Landing Road	S	26.3	C
12	Aviation Boulevard at Air Cargo Drive	S	12.8	B
13	Aviation Boulevard at Andover Road	S	14.4	B
14	Aviation Boulevard at Aaronson Drive (unsignalized)	U	3.6	A
15	Aviation Boulevard at Allwood Drive	S	6.9	A
16	SB I-97 Ramps at Cromwell Park Drive	S	15.6	B
17	Aviation Boulevard at Cromwell Park Drive	S	21.7	C
18	Aviation Boulevard at Dorsey Road- East	S	21.3	C
19	Dorsey Road at Digiulian Boulevard (unsignalized)	U	0.7	A
20	Aviation Boulevard at Hollins Ferry Road	S	2.3	A
21	Aviation Boulevard at BWI Long Term Parking Lots	S	5.3	A
22	Aviation Boulevard at S. Camp Meade Road	S	3.7	A

Note: S = signalized; U = unsignalized

Source: HCM reports from HNTB's Synchro analysis of 2016 Existing Conditions (*Appendix A, Traffic Studies, Attachment 3*).

Table 4.13.6

Existing Conditions PM Peak Hour Intersection LOS - Synchro

Node	Intersection	Control	Delay (sec/veh)	Equivalent LOS
1	Aviation Boulevard at Dorsey Road - West	S	57.5	E
2	Aviation Boulevard at Mathison Way	S	3.9	A
3	Aviation Boulevard at Stoney Run Road	S	20.0	B
4	Stoney Run Road at Northrop Grumman Entrance	S	36.2	D
5	Stoney Run Road at New Ridge Road	S	47.8	D
6	Aviation Boulevard at Amtrak Way	S	17.9	B
7	Aviation Boulevard at Northrup Grumman Gate 1A	S	11.3	B
8	Aviation Boulevard at SB I-195 Ramps	S	8.5	A
9	Aviation Boulevard at NB I-195 Ramps	S	25.8	C
10	Aviation Boulevard at Terminal Road	S	9.6	A
11	Terminal Road at Elkridge Landing Road	S	18.7	B
12	Aviation Boulevard at Air Cargo Drive	S	45.0	D
13	Aviation Boulevard at Andover Road	S	13.4	B
14	Aviation Boulevard at Aaronson Drive (unsignalized)	U	1.9	A
15	Aviation Boulevard at Allwood Drive	S	3.6	A
16	SB I-97 Ramps at Cromwell Park Drive	S	28.1	C
17	Aviation Boulevard at Cromwell Park Drive	S	30.4	C
18	Aviation Boulevard at Dorsey Road- East	S	27.3	C
19	Dorsey Road at Digiulian Boulevard (unsignalized)	U	1.9	A
20	Aviation Boulevard at Hollins Ferry Road	S	1.4	A
21	Aviation Boulevard at BWI Long Term Parking Lots	S	5.8	A
22	Aviation Boulevard at S. Camp Meade Road	S	6.6	A

Note: S = signalized; U = unsignalized

Source: HCM reports from HNTB's Synchro analysis of 2016 Existing Conditions (*Appendix A, Attachment 3*).

4.13.4.2 Queues

Queue lengths at the study intersections were analyzed. **Table 4.13.7** presents intersections and specific movements where the 50th and/or 95th percentile queue lengths exceed the storage lengths of the respective turn bays for the existing conditions. With the exception of Intersections 1, 4, 5 and 13, queues for turning movements are contained within the respective turn bays.

4.13.4.3 Critical Lane Volume and LOS

The Critical Lane Volume (CLV) technique was also used to analyze peak hour traffic volumes. The CLV technique is not defined for unsignalized intersections. **Table 4.13.8** presents the CLV threshold for LOS.

The AM and PM peak hour CLV, equivalent LOS and Volume to Capacity (V/C) ratio are shown in **Table 4.13.9** and **Table 4.13.10,** respectively. All intersections operate at CLV LOS C or better during both peak periods.

Table 4.13.7
Existing Turn Movement Queues Exceeding Storage Length

	Intersection	Movement	Turn Bay Length (ft)	Queue Length (ft) 50th Percentile	Queue Length (ft) 95th Percentile
AM Peak Hour					
1	Aviation Boulevard at Dorsey Road - West	NBL	455	-	630
		SBL	250	-	260
		EBL	175	317	#558
5	Stoney Run Road at New Ridge Road	WBL	300	423	423
13	Aviation Boulevard at Andover Road	WBL	175	-	187
PM Peak Hour					
1	Aviation Boulevard at Dorsey Road - West	SBL	250	364	#636
		SBR	175	210	368
		EBL	175	290	424
		EBR	225	-	301
		WBL	200	-	239
4	Stoney Run Road at Northrop Grumman Entrance	SBR	85	-	163
5	Stoney Run Road at New Ridge Road	WBL	300	342	#593
13	Aviation Boulevard at Andover Road	WBL	175	-	214

Notes:
Queues that are within the turn bay storage length of the movement are excluded
m : Volume for the 95th percentile queue is metered by upstream signal
~ : Volume exceed capacity, queue is theoretically infinite
# : 95th percentile volume exceeds capacity, queue may be longer
- : Queues are within storage

Source: HNTB analysis (*Appendix A, Attachment 3)*, 2017.

Table 4.13.8
CLV Threshold for Level of Service

Volume	LOS
Less than 1,000	A
1,000-1,150	B
1,150-1,300	C
1,300-1,450	D
1,450-1,600	E
More than 1,600	F

Source: SHA.

Table 4.13.9

Existing Conditions AM Peak Hour Intersection LOS – CLV

Node	Intersection	CLV	Equivalent LOS	V/C
1	Aviation Boulevard at Dorsey Road - West	1,289	C	0.81
2	Aviation Boulevard at Mathison Way	842	A	0.53
3	Aviation Boulevard at Stoney Run Road	1,058	B	0.66
4	Stoney Run Road at Northrop Grumman Entrance	689	A	0.43
5	Stoney Run Road at New Ridge Road	551	A	0.34
6	Aviation Boulevard at Amtrak Way	862	A	0.54
7	Aviation Boulevard at Northrop Grumman Parking	963	A	0.60
8	Aviation Boulevard at I-195 SB Ramps	725	A	0.45
9	Aviation Boulevard at I-195 NB Ramps	695	A	0.43
10	Elkridge Landing Road at Terminal Road	873	A	0.55
11	Aviation Boulevard at Terminal Road	773	A	0.48
12	Aviation Boulevard at Air Cargo Road/Elkridge Landing	738	A	0.46
13	Aviation Boulevard at Andover Road	866	A	0.54
15	Aviation Boulevard at Allwood Drive	782	A	0.49
16	I-97 SB Ramps at Cromwell Park Drive	399	A	0.25
17	Aviation Boulevard at Cromwell Park Drive	809	A	0.51
18	Aviation Boulevard at Dorsey Road - East	779	A	0.49
20	Aviation Boulevard at Hollins Ferry Road	571	A	0.36
21	Aviation Boulevard at BWI Long Term Parking	719	A	0.45
22	Aviation Boulevard at Camp Meade Road	932	A	0.58

Note: Includes signalized intersections only.

Source: HNTB's CLV analysis of 2016 Existing Conditions (*Appendix A, Attachment 3)*.

Table 4.13.10
Existing Conditions PM Peak Hour Intersection LOS - CLV

Node	Intersection	CLV	Equivalent LOS	V/C
1	Aviation Boulevard at Dorsey Road - West	1,280	C	0.80
2	Aviation Boulevard at Mathison Way	919	A	0.57
3	Aviation Boulevard at Stoney Run Road	1,036	B	0.65
4	Stoney Run Road at Northrop Grumman Entrance	624	A	0.39
5	Stoney Run Road at New Ridge Road	702	A	0.44
6	Aviation Boulevard at Amtrak Way	1,205	C	0.75
7	Aviation Boulevard at Northrop Grumman Parking	1,150	C	0.72
8	Aviation Boulevard at I-195 SB Ramps	1,201	C	0.75
9	Aviation Boulevard at I-195 NB Ramps	741	A	0.46
10	Elkridge Landing Road at Terminal Road	551	A	0.34
11	Aviation Boulevard at Terminal Road	640	A	0.40
12	Aviation Boulevard at Air Cargo Road /Elkridge Landing	1,061	B	0.66
13	Aviation Boulevard at Andover Road	836	A	0.52
15	Aviation Boulevard at Allwood Drive	676	A	0.42
16	I-97 SB Ramps at Cromwell Park Drive	596	A	0.37
17	Aviation Boulevard at Cromwell Park Drive	772	A	0.48
18	Aviation Boulevard at Dorsey Road - East	777	A	0.49
20	Aviation Boulevard at Hollins Ferry Road	322	A	0.20
21	Aviation Boulevard at BWI Long Term Parking	570	A	0.36
22	Aviation Boulevard at Camp Meade Road	592	A	0.37

Note: Includes signalized intersections only.

Source: HNTB's CLV analysis of 2016 Existing Conditions (*Appendix A, Attachment 3)*.

4.13.4.4 Pedestrian and Bicycles

The BWI Trail runs parallel to most of Aviation Boulevard and Dorsey Road that encircle BWI Marshall Airport. Currently, BWI Trail users and vehicular traffic in the study area interact at seven study intersections with exclusive pedestrian phases at two intersections: Intersection 4 (Stoney Run Road at Northrop Grumman Entrance) and Intersection 10 (Elkridge Landing Road at Terminal Road).

Pedestrian counts taken during field visits were considered in the analysis of these intersections to ensure that the exclusive pedestrian phase was accounted for in computing of intersection delay and LOS.

4.13.5 On-Airport Existing Traffic Conditions

The on-airport loop roadway system consists of inbound and outbound roadways to/from the BWI Marshall Airport terminal. Traffic from inbound roadways I-195 and Terminal Road merge before separating into the Lower Level (arrivals) and Upper Level (departures) terminal roadways. After the roadway split, there is access to the Hourly

Garage from the Lower Level roadway. The Upper Level roadway divides into an "Authorized Airport Vehicles Only" and "General Purpose Roadway." The Lower Level and Upper Level roadways loop around from Concourse A to Concourse E (International Terminal). There is ramp access from the fifth floor of the Hourly Garage to the Upper Level roadway near the International Concourse, and access from the Hourly Garage to the Lower Level outbound roadway through the lower level ticket plaza. Both the Upper and Lower Level terminal roadways outbound to I-195, Terminal Road, and Elm Road to Terminal Road. Two recent on-airport traffic studies were completed and are utilized in this EA and Section 4(f) Determination to describe the existing conditions of the on-airport roadway system.

- *BWI Marshall Lower Level Inbound Roadway Study, Traffic Analysis Study – Draft Report*, AECOM and JMT, August 31, 2016.
- *Traffic Analysis Study – Draft Report*, *BWI Marshall International Concourse Roadway Widening Study*, AECOM and JMT, July 29, 2016.

4.13.5.1 Terminal Approach Roadway

A traffic analysis study was completed to identify opportunities to improve inbound traffic operations at BWI Marshall Airport during peak demand periods. The study assessed existing (and future) traffic conditions along the inbound roadways and lower level terminal roadways through analysis of traffic volumes, vehicle dwell times and field observations.

Video cameras were set up during three separate weeks in Summer 2014 along the inbound and arrival roadways to record data during the peak period on Friday (8:30 PM to 10:30 PM). Observations showed that during the peak hours, the two inside arrival parking lanes are highly utilized between doors two and four and result in queues upstream. Due to the queuing in the parking lanes, pedestrians were also observed to walk into the arrival travel lanes, further degrading the roadway operations.

Observations for inbound traffic queuing indicate queuing starts around 9:05 PM, peaks between 10:00 PM and 10:15 PM and dissipates by 10:40 PM. The peak queue is observed as far as 3,100 feet upstream toward the I-195 and Terminal Return Road inbound roadways.

As the inbound queue grows, access to the following roadways become blocked: Express Lane (200 feet), Authorized Road (600 feet), Hourly Garage (830 feet), and Upper Level Roadway (1,500 feet)[64]. A major concern with the extensive queuing observed is the possibility of blocking the ramp from MD 170 to I-195 southbound or the Terminal Road/Scott Drive intersection upstream.

Maximum travel times from I-195 at the MD 170 underpass to the Arrivals Roadway (4,200 feet) and from the Terminal Road/Scott Drive intersection to the Arrivals Roadway (3,800 feet) were modeled to be over 13 minutes.

4.13.5.2 International Concourse Roadway

A traffic analysis study completed as part of the International Concourse Roadway Widening Study (JMT, 2016) included field observations, and a weave and intersection analysis for the existing conditions roadways.[65] Field observations showed there was no significant queuing observed at the study intersections within BWI Marshall

Airport property and no capacity constraints along the Upper or Lower Level curbside parking during peak hours.

An existing traffic demand volume of 22 million annual passengers (MAP) was utilized in the traffic model analysis. The study analyzed two weave segments where the Upper and Lower Level roadways merge and diverge to outbound roadways, and four intersections (two along Terminal Road and two along Elm Road). The study analyzed traffic during two peak hours (5:00 PM and 6:00 PM and 6:00 PM and 7:00 PM). The analysis showed that the weave segments operate at an LOS C or better and the intersections operate at an LOS B or better in the existing conditions peak hours.

4.14 Visual Effects

Visual effects can be the result of light emission impacts as well as impacts to the aesthetics or visual character of a site. Visual effects within the Study Area and adjacent areas must be considered where light emissions or the visual character of a site may be impacted.

4.14.1 Light Emissions

An analysis of the impact of light emissions on the surrounding environment is required when proposed projects introduce new lighting that may affect residential or other sensitive land uses. To evaluate the potential for light emissions impact, the extent to which any lighting associated with an action would create an annoyance among people, wildlife and land uses must be considered.

The primary sources of existing light emissions at BWI Marshall Airport are from airfield and apron flood lighting, navigational aids, terminal and parking facility lighting, roadway lighting and safety lighting.

4.14.2 Visual Resources and Visual Character

Visual resources can include buildings, sites, historic properties, and other landscape features that are visually important. Visual character refers to the visual makeup of an environment, such as urban, open fields, or mountains.

Visual, or aesthetic, impacts are inherently more difficult to define than light emission impacts because of the subjectivity involved. Aesthetic impacts deal more broadly with the extent that the development contrasts with the existing environment and whether nearby communities consider this contrast objectionable. Therefore, the potential for proposed development to contrast with the surrounding environment must be accessed. The existing visual character and visual resources within and surrounding the Study Area are of an urban nature.

4.15 Water Resources

4.15.1 Floodplains

Executive Order 11988 directs federal agencies to "take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by floodplains…"[66]

DOT Order 5650.2, *Floodplain Management and Protection*, contains DOT's policies and procedures for implementing Executive Order 11988. Per DOT Order 5650.2, "Federal agencies are directed to avoid conducting, allowing, or supporting actions on the base [100-year] floodplain unless the agency [FAA] finds that base floodplain is the only practical alternative location…"[67]

Portions of the Study Area are located within the 100-year floodplain boundaries as indicated on the Federal Emergency

Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Panels 24003C0040E and 24003C0041E for Anne Arundel County, Maryland, dated October 16, 2012. In 1996, additional 100-year floodplains were delineated by MDOT MAA along Signal Branch, Hawkins Branch, and Clark Branch.

Figure 4.15-1 shows the 100-year (one percent annual chance flood) floodplain boundaries. The 500-year floodplain designates the boundary of the 0.2% annual chance flood which is considered a moderate risk (the risk of being flooded is reduced but not removed) area. The 500-year floodplain boundary is not located within the Study Area.

As shown in Figure 4.15-1 within the Study Area, FEMA designated floodplain areas are located along Kitten Branch running parallel to the west of Runway 15R-33L, and along Stony Run running parallel to the west of Aviation Boulevard (west of the Airport). Also within the Study Area, MDOT MAA delineated floodplain areas are located along Signal Branch.

4.15.2 Surface Waters

BWI Marshall Airport and the Study Area are located within two watersheds: the Baltimore Harbor watershed (Maryland 8-digit watershed number 02130903) and the Patapsco River Lower North Branch watershed (Maryland 8-digit watershed number 02130906). The Airport sits on a low peak in the landscape. Several small intermittent and ephemeral streams have their sources on the Airport, draining radially from the center. Most of the headwaters of these streams have been graded over or incorporated into the Airport drainage system as the Airport has developed and expanded over the years.

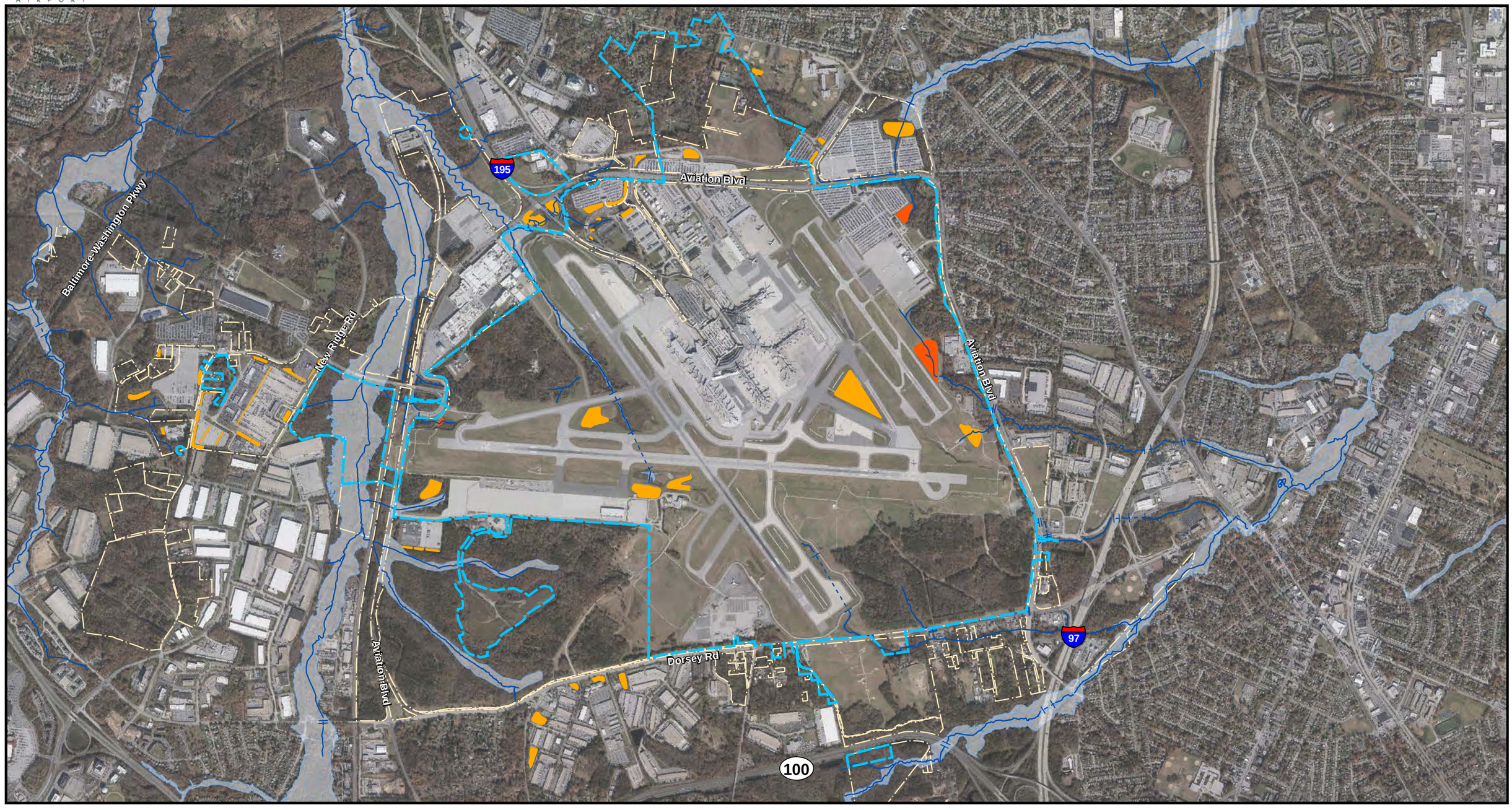
Portions of the site draining to the west are collected in Stony Run and Piny Run, which flow north into the non-tidal portion of the Lower North Branch of the Patapsco River. Portions of the site draining to the north are collected in Cabin Branch, which flows east into the tidal Patapsco River. Portions of the site draining to the south and east are collected in Sawmill Creek, which also flows into the tidal Patapsco River. Tidal waters of the Chesapeake Bay and its tributaries are located a few miles east of the Airport. However, all streams within the Study Area are non-tidal waters and therefore only non-tidal waters are discussed.

BWI Marshall Airport is broken into subwatersheds named after the streams and tributaries which collect runoff from that area. **Table 4.15.1** summarizes the subwatersheds/streams at BWI Marshall Airport, as depicted in **Figure 4.15-2**.

The MDE designates a Use Class for each surface water body in the State. The Use Class is a grouping or set of designated uses that apply to a water body which individually may or may not be supported now but should be attainable. All of the streams within and surrounding BWI Marshall Airport are classified as Use Class I: Water Contact Recreation, and Protection of Nontidal Warmwater Aquatic Life.

Within the Use Class 1 group, the designated water uses are as follows:

- Growth and propagation of fish (not trout), other aquatic life and wildlife
- Water Contact Sports
- Leisure activities involving direct contact with surface waters
- Fishing
- Agricultural Water Supply
- Industrial Water Supply



LEGEND

- Airport Property Boundary
- Physical Development Study Area
- Stream
- Culverted Stream
- 100-Year Floodplain
- Stormwater Management Pond
- USACE Jurisdictional Pond

Floodplains and Surface Waters
Figure 4.15-1

N

0 1,000 2,000 4,000 Feet

Sources: Aerial - MDOT MAA (2018), BWI NRI Map,
FEMA and 1996 MAA-delineated floodplains (Signal, Hawkins, and Clark Branch)

Table 4.15.1

Subwatersheds at BWI Marshall Airport

Watershed (Watershed No.)		Stream	Drainage Area
Patapsco River Lower North Branch (02130906)	Stony Run	Sachs Branch Tributary	North of the Airport, including residential, forested, parking lots, Aviation Boulevard and Elkridge Landing Road.
		Sachs Branch	The Central Garage, the Fuel Farm and the North Air Cargo Complex.
		Kitten Branch	The terminal, western sides of Runways 15R-33L and 10-28, surrounding paved taxiways and a forested area north of Runway 10-28.
		King Branch	Forested area north of the Runway 10 end, parking lots and areas southwest of the Northrop Grumman campus.
		Bowden Branch	Maintained turf at the Runway 10 end, portions of Taxiway F, a small forested area and impervious areas associated with Stony Run Road.
		Bowden Branch Tributary	Maintained turf at the Runway 10 end and Aviation Boulevard.
		Signal Branch	Maintained turf south of the Runway 10 end, a forested area and impervious surfaces associated with Mathison Way and the Midfield Cargo Facility.
		Hawkins Branch	Forested areas south of Midfield Cargo Facility parking lots.
		Clark Branch	Forested area at the southwest of the Airport, and from residential and commercial areas south of Dorsey Road.
		Stony Run	The Consolidated Rental Car Facility (CRCF) and a small residential area north of the facility.
	Piny Run	*Piny Run Tributary*	The Tenant Parking Lot Facility and Bus Maintenance Facility, and surrounding areas.
Baltimore Harbor (02130903)	Sawmill Creek	Sawmill Creek Tributary	The Gold Lot and maintained turf west of the Gold Lot.
		Sawmill Creek 2	The Gold Lot and forested area south of the Gold Lot. Drainage ponds in forested area.
		Sawmill Creek 3	A small grassy area adjacent to Dorsey Road, south of the Runway 33L end.
		Fork Branch	The southern portion of the main Airport campus including portions of Runway 15R-33 and 4-22, Taxiway D, and a portion of the Gold Lot.
		Phelps Branch	Undeveloped, forested area on the southeast portion of the Airport.
		Southeast Corner Tributary	Undeveloped, forested area at the southeast corner of the Airport.
		Irving Branch	Runway 10-28 (east of Runway 4-22 and south of Taxiway U), maintained turf and forested area south of Runway 10-28.
		Irving Branch Tributary	The Runway 10 end, and maintained turf and forested area along Aviation Boulevard.
		Southwest Branch	Maintained turf areas at the south end of Runway 15L-33R and portions of Taxiway C.
		Muddy Bridge Branch	The northeast portion of the airport, including Runway 15L-33R and portions of the main terminal.
	Cabin Branch	Cabin Branch	The northeast corner of the Airport including parking lots on and off-airport property, as well as residential areas east of Aviation Boulevard.

Note: *Stream names in italics are not within the Study Area.*

Source: BWI Marshall Airport Stormwater Institutional Management Plan, Existing Conditions, July 2016.

LEGEND

- Airport Property Boundary
- Physical Development Study Area
- Point of Investigation
- Stream
- Culverted Stream
- Baltimore Harbor Subwatershed (MDE No. 02130903)
- Patapsco River Lower North Branch Subwatershed (MDE No. 02130906)

Subwatersheds
Figure 4.15-2

N

0 1,000 2,000 4,000 Feet

Sources: Aerial - MDOT MAA (2018), BWI NRI Map

4.15.2.1 Stormwater

MDOT MAA has developed and maintains the *BWI Stormwater Institutional Management Plan* (IMP). The IMP includes an Existing Conditions and Future Conditions report, which analyze stormwater runoff quantities by subwatershed. The latest Existing Conditions IMP was approved in January 2015. The Future Conditions report provides conceptual best management practice (BMP) designs for future proposed projects to meet Maryland stormwater regulations for quality and quantity. The Future Conditions IMP was approved in June 2017. As part of the IMP, MDOT MAA maintains water quality credit tables by subwatershed at BWI Marshall Airport. Many subwatersheds have water quality credits available which can be used to meet stormwater management requirements for future projects. ***Appendix L, Water Resources,*** *Attachment 1, Stormwater Management Report,* provides details on stormwater treatment requirements for the Airport and summarizes the available water quality credits by subwatershed.

As shown on Figure 4.15-1, there are stormwater management ponds and USACE jurisdictional ponds located at the Airport and within the Study Area. See *Section 4.15.4* for details on the four jurisdictional ponds within the Study Area.

As required by the FAA for airports of its size, MDOT MAA maintains a National Pollutant Discharge Elimination System (NPDES) permit for stormwater runoff at BWI Marshall Airport and Martin State Airport (MTN). In Maryland, NPDES permits are authorized by MDE.

4.15.2.2 TMDLs

Total Maximum Daily Loads (TMDLs) are required under the Clean Water Act of 1972 (CWA) and are used as a tool for implementing State water quality standards (WQSs). "A TMDL establishes the maximum amount of an impairing substance of stressor that a waterbody can assimilate and still meet WQSs and allocates that load among pollution contributors."[68]

Estuaries of Baltimore Harbor watershed have TMDLs for Nitrogen and Phosphorus and Chlordane. Non-tidal waters of the Patapsco River Lower North Branch watershed have TMDLs for E. coli and total suspended solids (TSS).

Additionally, BWI Marshall Airport is part of the Chesapeake Bay TMDL. The Chesapeake Bay TMDL established limits for nitrogen, phosphorus, and suspended solids.

4.15.2.3 Waters of the U.S.

The term "waters of the United States" as it applies to the jurisdictional limits of the authority of USACE under the Clean Water Act is defined in 33CFR Part 328. The definition of "waters of the United States" includes, but is not limited to: 1) All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; and 2) tributaries of waters identified in paragraph (1) - (4) of this section of the CFR. Streams within and surrounding BWI Marshall Airport and the Study Area all meet the definition of "waters of the United States." Table 4.15.1 summarizes the streams (waters of the U.S.) within the Study Area.

4.15.3 Groundwater

Two aquifers, the Patapsco and the Patuxent, have been identified to lie beneath BWI Marshall Airport and the Study Area. The Patapsco aquifer varies between 200 to 300 feet thick and consists of sand, clay deposits, and some thin lenses of iron-cemented sandstone. The Patuxent aquifer ranges from 100 to 300 feet thick and consists of sand, gravel and clay.

Groundwater recharge for both the Patuxent and Patapsco aquifers is primarily through precipitation or stream recharge flow in their outcrop areas.

Anne Arundel County uses water from deep wells in the Patapsco, Patuxent, Magothy and Aquia aquifers. Water is pumped from confined and semi-confined aquifers, which are protected from contaminants at the ground surface by confining layers. However, contaminants could reach the water supply around the wellhead protection area (WHPA) due to poorly constructed or abandoned wells. While there are no state or federal ground water quality standards in place, the discharge of pollutants to ground water is regulated by the MDE Water Resources Administration.[69]

Due to population growth, the water levels in the confined aquifers have declined. A study completed in 2007 found that groundwater will be available to supply projected demand through 2040 at 73 million gallons per day (MGD).[70]

A search of EPA's Sole Source Aquifer Program website was conducted to determine if any EPA designated Sole Source Aquifers are near the Study Area. A Sole Source Aquifer is defined as an aquifer that supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer. The search documented that there are no Sole Source Aquifers in the vicinity of the Study Area.

4.15.4 Wetlands

Federal and State of Maryland regulations address activities conducted in "waters of the US (WUS)," including jurisdictional wetlands, in order to minimize reduction and degradation of these resources and achieve a no net loss of wetlands.

4.15.4.1 Federal Regulations

Section 404 of the Clean Water Act (CWA) (33 U.S.C. 1344) regulates proposed discharges of dredged or fill materials into waters of the US, including jurisdictional 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 US, which includes lakes, rivers, streams, mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, and natural ponds.

Wetlands are delineated with USACE and MDE verification. The agencies typically do not assert jurisdiction over the following features:

- Swales or erosional features (e.g., gullies, small washes characterized by low volume, infrequent or short duration flow).
- Ditches (including roadside ditches) excavated wholly in and draining only uplands and that do not carry a relatively permanent flow of water.

Executive Order 11990, *Protection of Wetlands*, directs all Federal agencies to minimize the destruction, loss, and

degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands.

4.15.4.2 State Regulations

The Maryland Nontidal Wetlands Protection Act was enacted in 1991 to further protect nontidal wetlands by regulating and restricting all activities that could impact nontidal wetlands or waters of the State. Maryland law differs from Federal law through additional regulations of the 25-foot nontidal wetland buffer and isolated wetlands. The regulated nontidal wetland buffer is increased to 100 feet for Nontidal WSSC. These wetlands are those designated by the State as having exceptional ecological or educational value of statewide significance. Nontidal WSSC associated with the Stony Run floodplain occur within the Study Area.

The COMAR 26.23.01 definition of an isolated wetland is a nontidal wetland that is not hydrologically connected, through surface or subsurface flow to streams, tidal or nontidal wetlands, or tidal waters. MDE, through their Wetland and Waterways Program, is responsible for regulating and permitting use of tidal and non-tidal wetlands and their buffers and waterways in Maryland.

4.15.4.3 Wetland Identification

MDOT MAA maintains a wetland inventory for the BWI Marshall Airport Campus, which is routinely re-verified by USACE and MDE when projects require Section 404 authorization. The wetlands within the Study Area were identified through the wetland inventory. A new wetland system (MBB-1) was field-delineated in July 2016 near the MAC Building, as shown on **Figure 4.15-3** in an area where removal of tree obstructions is proposed. During the agency field review in April 2017, an additional wetland system (IB-1) was identified and subsequently delineated; neither this wetland nor its 25-foot buffer are anticipated to be impacted by any of the proposed improvements.

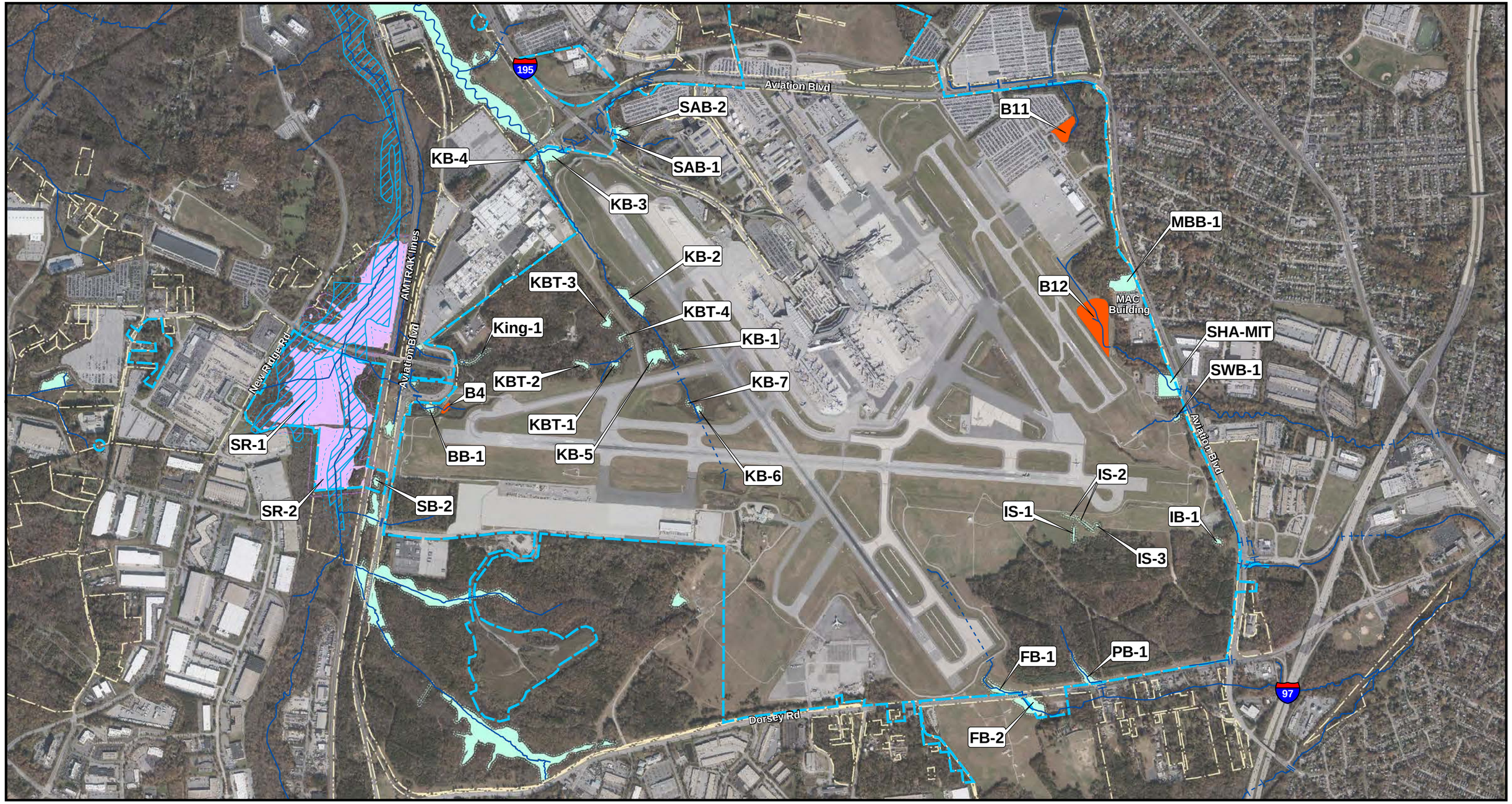
4.15.4.4 Previous/Current Wetland Delineations

A wetland verification was conducted within the Study Area in July 2016 to confirm previous wetland delineations and to identify additional wetlands that may be impacted by Proposed Action. The wetland delineation report is provided in *Appendix L, Attachment 2*. Subsequently, a pre-application meeting and field review of impact areas occurred in April 2017. Meeting minutes are provided in *Appendix L, Attachment 4*.

Numerous wetlands and streams are reflected in the wetland inventory and are considered to be jurisdictional by either the USACE, MDE, or both agencies. These wetlands are shown in Figure 4.15-3. See *Section 4.15.2, Surface Waters,* for a discussion of streams within the study area.

4.15.4.5 Wetland Cover Types

Wetland cover types present within the Study Area include palustrine emergent (PEM), palustrine scrub-shrub (PSS), palustrine forested (PFO), and palustrine unconsolidated bottom (PUB), which are ponds or open water. **Table 4.15.2** lists the cover type, size and jurisdictional status of the identified wetlands within the Study Area. Additionally, several stormwater management facilities are considered jurisdictional due to the presence of a perennial or intermittent watercourse; these ponds are “in-line” with the watercourse, see **Table 4.15.3**.



LEGEND

- Airport Property Boundary
- Physical Development Study Area
- USACE Jurisdictional Ponds
- Wetlands with 25' Buffers
- Wetlands of Special State Concern with 100' Buffers (MAA-delineated)
- Wetlands of Special State Concern with 100' Buffers (MDNR data)
- Stream
- Culverted Stream.

Note: Wetlands and Jurisdictional Ponds called out by name are located within Physical Development Study Area.

Wetlands, USACE Jurisdictional Ponds (On-Airport), and Streams
Figure 4.15-3

N

0 750 1,500 3,000 Feet

Sources: Aerial - MDOT MAA (2018), BWI NRI Map

Table 4.15.2

Jurisdictional Wetlands within the Study Area

Wetland Name	Wetland Cover Type	Acreage	Jurisdiction
Sachs Branch-1	Emergent	0.06	USACE/MDE
Sachs Branch-2	Emergent/Scrub-shrub	0.52	USACE/MDE
Kitten Branch-1	Emergent	0.2	USACE/MDE
Kitten Branch-2	Forested	1.4	USACE/MDE
Kitten Branch-3	Emergent/Scrub-shrub	2.5	USACE/MDE
Kitten Branch-4	Forested	0.3	USACE/MDE
Kitten Branch-5	Forested	1.3	USACE/MDE
Kitten Branch-6	Emergent	0.18	USACE/MDE
Kitten Branch-7	Emergent	0.04	USACE/MDE
Kitten Branch Trib-1	Forested	0.1	USACE/MDE
Kitten Branch Trib-2	Forested	0.22	USACE/MDE
Kitten Branch Trib-3	Forested	0.4	USACE/MDE
Kitten Branch Trib-4	Forested	0.1	USACE/MDE
King Branch-1	Forested	0.13	USACE/MDE
Stony Run-1	Forested	31.8	USACE/MDE
Stony Run-2	Forested	14.1	USACE/MDE
Signal Branch-2	Forested	0.23	USACE/MDE
Bowden Branch-1	Open Water/Scrub-shrub	0.30	USACE/MDE
Fork Branch-1	Emergent/Scrub-shrub	0.72	USACE/MDE
Fork Branch-2	Forested	1.81	USACE/MDE
Phelps Branch-1	Forested	0.91	USACE/MDE
SHA-MIT	Emergent/Scrub-shrub	2.53	USACE/MDE
Muddy Bridge Branch-1	Forested	1.98	USACE/MDE
Southwest Branch-1	Forested	0.15	USACE/MDE
Irving Branch-1	Forested/Vernal Pool	0.13	MDE
Isolated-1	Forested	0.13	MDE
Isolated-2	Scrub-shrub	0.16	MDE
Isolated-3	Scrub-shrub	0.03	MDE

Source: MDOT MAA, 2016 and JMT, Wetland Delineation Report, 2016.

Table 4.15.3

USACE Jurisdictional Stormwater Management Facilities within the Study Area

Pond Name	Wetland Cover Type	Acreage	Jurisdiction
Pond B4	Scrub-shrub	0.31	USACE/MDE
Pond B11	Emergent/Open Water	1.15	USACE/MDE
Pond B12	Emergent/Scrub-shrub	3.17	USACE/MDE

Source: MDOT MAA, 2016.

The PEM wetlands occur in both mowed and non-maintained areas. Vegetation in emergent wetlands is characterized by erect, rooted, herbaceous hydrophytes that are present for most of the growing season. PEM wetlands in the Study Area include vegetation such as common reed (*Phragmites australis*), soft rush (*Juncus effusus*), and wool-grass (*Scirpus cyperinus*).

Wetlands classified as PSS are dominated by woody vegetation less than 20 feet tall. Scrub-shrub wetland habitats within the Study Area include vegetation such as southern arrowwood (*Viburnum dentatum),* highbush blueberry (*Vaccinium corymbosum*), sweet pepperbush (*Clethra alnifolia*), swamp azalea (*Rhododendron viscosum*), and common blackberry (*Rubus allegheniensis*).

Wetlands designated as PFO are located in forested areas surrounding the airfield and within the floodplain of Stony Run, west of the AMTRAK lines. These PFO wetlands predominantly consist of red maple (*Acer rubrum*), sweetgum (*Liquidambar styraciflua*), black gum (*Nyssa sylvatica*), and skunk cabbage (*Symplocarpus foetidus*).

PUB wetlands are freshwater ponds characterized by areas of standing open water, which may or may not be associated with jurisdictional waters of the US. Most PUB wetlands are man-made water management features and lack vegetation. In many cases, PUB systems are surrounded by uplands; however, PEM and/or PSS fringes are not uncommon.

4.15.5 Wild and Scenic Rivers

The *Wild and Scenic River Act* defines river areas eligible for protection under the legislation as those that are free flowing and have "outstanding remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, and similar values."[71] River segments that have been designated as Wild and Scenic are included in the National and Wild and Scenic Rivers System. River segments that potentially qualify for inclusion in the National Wild and Scenic River System are listed on the Nationwide Rivers Inventory (NRI), compiled by the National Park Service (NPS).

There are no river segments listed in the Wild and Scenic River System nor the NRI located within the vicinity of BWI Marshall Airport and the Study Area.

4.16 Past, Ongoing and Reasonably Foreseeable Projects

This section describes cumulative actions near the Study Area. A review of several information sources was conducted to determine past, present, and reasonably foreseeable development actions at BWI Marshall Airport and the surrounding area. The primary source of information used is the Draft BWI Marshall Airport Layout Plan Update Narrative Report (January 2015), which identifies multiple phases of improvements needed at BWI Marshall Airport to comply with FAA design standards and meet projected demand. Sources for off-airport projects are summarized in Section 4.16.2.

The analysis of cumulative impacts in this EA and Section 4(f) Determination considers the development actions, both on and off the Airport, that are related in terms of time or proximity. In terms of the ALP, projects identified in later phases are considered for cumulative impacts where recent planning indicates a project may occur by 2027.

The construction activities associated with the Proposed Action are anticipated to occur between 2020 and 2022. Past (2013-2018), current (2019), and future (2020-2027) projects in the vicinity of the Proposed Action are considered for cumulative impacts.

4.16.1 On-Airport Projects

MDOT MAA is responsible for the planning, design and construction of various airport projects on BWI Marshall Airport property intended to improve the functionality of the Airport as well as maintain its economic vitality. The Draft *BWI Marshall Airport Layout Plan Update Narrative Report* (January 2015), which addresses the long-term facility needs of the Airport through 2030 and beyond, is categorized by Airfield and Airside Improvements, Terminal Enhancements, Landside Improvements, General Aviation, and Support Facilities. Additional sources of information for on-airport projects include Maryland's FY 2017-2022 Consolidated Transportation Program and on-going BWI Master Planning updates. **Table 4.16.1** contains a list of recently completed, current and future projects that occur between 2013 and 2027, to qualitatively assess potential cumulative impacts for this project as well as those six years in the past and eight years in the future.

4.16.2 Off-Airport Projects

In considering cumulative impacts, off-airport projects that are planned for implementation in proximity to BWI Marshall Airport were also evaluated. 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 Airport area. The projects listed are reasonably foreseeable based on state and local planning documentation.

To identify major transportation and development projects for the assessment of cumulative impacts, a variety of information sources were reviewed. Maryland's FY 2017-2022 Consolidated Transportation Program, Maryland Transit Administration, the Baltimore Region Transportation Improvement Program 2017-2020, the Anne Arundel County BWI/Linthicum Small Area Plan (2003), the Anne Arundel County General Development Plan (2009), the Anne Arundel County Pedestrian and Bicycle Master Plan (2013 Plan Update), and, Baltimore Metropolitan Council Transportation Outlook, and were reviewed to identify projects that were included for capital improvement funding.

Table 4.16.1
BWI Marshall On-Airport Cumulative Projects

Time	Project Name (Type of Project[1])	Year
Past (2013-2018)	Comprehensive Paving Improvements (A)	2011 - 2014
	Runway 10-28 Improvements (Including Runway 15R-33L Intersection) (A)	2011-2014
	Concourse B/C Connector Improvements (T)	2011 - 2015
	Runway 15L-33R FAA Standards Compliance (A)	2012-2015*
	International Terminal Bag Screening Improvements (T)	2014-2015*
	Homeowner Assistance Program (M)	2012 - 2016
	Sheraton Four Points Demolition (L)	2014-2015*
	Runway 15L-33R FAA Improvements (A)	2015*

Table 4.16.1
BWI Marshall On-Airport Cumulative Projects

Time	Project Name (Type of Project[1])	Year
	Runway 15R-33L Improvements (A)	2015*
	Runway 10-28 Improvements (as part of Airfield Standards and Pavement Rehabilitation Project) (A)	2015*
	Taxiway Uniform (U) Relocation (A)	2015*
	Airfield Standards and Pavement Rehabilitation Project (A)	2015*
	Expansion of CUP (S)	2015*
	On-Airport Roadway Improvements (S)	2015*
	Parking Revenue Control System (Maryland CTP)	2015
	DC Optimization of Airspace and Procedures in the Metroplex (Implemented by FAA)	2013-2016
	Loading Bridge Replacement Program (Maryland CTP)	2014-2017
	Conversion of Runway 4-22 into new Taxiway P (Maryland CTP)	2015-2017
	Apron Fill at North Cargo Positions F18/F20 (A)	2016-2017
	Concourse E 2-Gate Expansion + 4 Additional Arrival-Only Gates (Phase 1 Expansion) (T)	2016-2018
	Concourse D-E Connector (T)	2015-2017*
	Stairtower at Concourse B	2017
	Midfield Cargo Facility Apron Expansion (as included in the 2017 Re-Evaluation)	2017
	Consolidated Rental Car Facility Shuttle Bus Fleet Replacement (Maryland CTP)	2018
Current (2019)	Midfield Cargo Facility Improvements (as included in the 2018 WR/ROD)	2019
	RTR Relocation	2019
	Concourse B Apron Reconstruction (A)	2019
	Taxiway B Reconstruction	2019
	BC Alleyway Reconstruction	2019
	A/B Connector and Baggage Handling System	2019-2022
	Concourse A 5-Gate Extension (T)	2019-2020
	Residential Sound Insulation Program (RSIP)	2019-2024
Future (2020-2027)	Concourse E 2-Gate Expansion (Phase 2 Expansion) (T)	Construct or Under Construction by 2020
	Taxiway Connectors (between Taxiways T-P) (A)	
	New Terminal Response Fire Rescue Station (L)	
	Service Station Plaza (M)	
	New Fuel Storage Tanks at Fuel Farm	
	Midfield Cargo Office Expansion (4,000 SF)	2021-2027
	Helipad Relocation (A)	
	Hotel Construction, Hourly Garage Expansion, and Sky Bridge E (L)	
	New Airport Traffic Control Tower (S)	
	C Apron Reconstruction	
	Demolish and Relocate Taxiway Foxtrot (Stub) – in conjunction with Taxiway T Reconstruction	
	Upgrade BHS at Concourse B-C	

Table 4.16.1
BWI Marshall On-Airport Cumulative Projects

Time	Project Name (Type of Project[1])	Year
	Taxiway Uniform (U) 3 – Phase 2 (A)	
	Widening of Taxiway J (A)	
	Airline Cargo Demolition	
	Demolition of Maintenance Facilities (A)	
	Perimeter Road Improvements (A)	
	Substation Relocations/Expansions (A)	
	Relocation of I-195/Aviation Blvd (L)	
	Relocation of Light Rail Tracks and Light Rail Station (L)	
	Daily Garage Expansion (L)	
	Limo/Bus/Shared Ride Staging (L)	
	New Police Station – northeast of existing GA terminal area (L)	
	Co-Gen and Chiller Plant Expansion (L)	
	Pump Stations (L)	
	Bus Staging Fuel Facility (L)	
	Hiker/Biker Trail Relocation (L)	
	Consolidation of Long-Term Parking Lots (L)	

Notes:

[1]Type of Project: (A) – Airfield and Airside improvements; (T) – Terminal enhancement; (S) – Support facility; (L) – Landside; (P) – Private investment project; (M) – MDOT MAA project; (G) – General Aviation.

*Indicates Project Name and/or Year updated based on Draft BWI Marshall ALP Narrative, January 2015. Construction years may vary as airport planning is ongoing.

Sources: Draft *BWI Marshall ALP Narrative*, January 2015, and Maryland's FY 2017-2022 Consolidated Transportation Program (CTP).

Maryland's FY 2017-2022 Consolidated Transportation Program (CTP)

- MD 170 – MD 648 to Andover Road, as part of a Retrofit Bicycle Program (Bike and Pedestrian Related Projects in Anne Arundel County). This project was completed in FY 2016. This area of roadway is located to the northeast of BWI Marshall Airport property, off airport property approximately two miles from the Study Area.
- Study to widen MD 295 from four to six lanes from MD 100 to I-195, including an interchange at Hanover Road and improvements to Hanover Road from the CSX tracks to MD 170. The planning is complete; no construction date is known.

Maryland Transit Administration (MTA)

- MARC BWI Rail Station Improvements and Fourth Track Project – Structural improvements to the BWI Rail Station parking garages and improvements to the existing station, including more passenger-friendly station with additional seating and a new pedestrian overpass connecting the garage and station, and nine miles of a new fourth track. An EA/FONSI was approved in January 2016.[72] Anticipated to be implemented by 2020 with an overall 42-month

construction phasing schedule. The station is approximately ½-mile from the Study Area. Design for station improvements is currently underway.

Baltimore Region Amended 2017-2020 Transportation Improvement Program (TIP)

- BWI MARC Facilities: Comprehensive structural inspection of both garages, with design and construction of recommended structural repairs (same as MTA project above). This project is combined with MARC Riverside Procurement, West Baltimore Station Improvements, and MARC Martin State Airport projects to create a new project (MARC Facilities). The BWI station is approximately ½-mile from the Study Area.

Anne Arundel County, BWI/ Linthicum Small Area Plan (2003)

Proposed land use changes and land development projects in various phases, including:

- 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/multi-modal opportunities.

Anne Arundel County General Development Plan (2009) and The Business Monthly Article (6/6/16)

- Proposed extension of the Light Rail Yellow Line from the BWI Business Park to the Dorsey Road MARC station.
- Aerotropolis – 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. The Business Monthly states that the BWI Aerotropolis is planned to include two phases: Aerotropolis North, which is 300 acres around Nursery and Elkridge Landing roads with 3.5 million square feet of office space, more than 1,000 hotel rooms, the Alexan Concorde and the planned mixed-use redevelopment of the Hoyts Cinemas parking lot. The mixed-use development is planned to include 80,000 square feet of destination retail and restaurants, a boutique hotel and 300 urban-style townhouses and apartments. According to The Business Monthly, the Aerotropolis project was delayed for several years, but is currently underway with the opening of a 310-unit luxury apartment complex (Alexan Concorde) off West Nursery Road behind the Hoyt's Cinemas. The apartments opened in the summer of 2016. Construction of 400 high-end apartment units are planned to commence next year.[73]

  The 200-acre Aerotropolis South is planned to be constructed northwest of the airport, north of Stoney Run Road on

Corporate Center Drive and Ridge Road, around the Maryland Department of Transportation headquarters. Aerotropolis south plans are "in their infancy," and not in the foreseeable future, as anticipated development is expected to be "within 20 years."[74]

Anne Arundel County Pedestrian and Bicycle Master Plan (2013 Plan Update)

The 2013 Plan Update includes improvement projects surrounding BWI Marshall Airport. Projects are ranked into tiers (I, II or III) based on a set of evaluation criteria. The following Tier I project is directly adjacent to the Airport:

- Aviation Blvd (MD 162) / Telegraph Road (MD 170) / Dorsey Road (MD 176) – Bicycle Improvements along Airport Loop.

Various pedestrian and bicycle improvements are planned in Linthicum, Glen Burnie, and Severn surrounding BWI Marshall Airport, such as:

- MD 3 from MD 648 to I-97 – Pedestrian and bicycle improvements (Glen Burnie)
- MD 648 from 8th Avenue NW to New Cut Road – Bicycle improvements (Glen Burnie)

Baltimore Metropolitan Council Transportation Outlook (2035)

- MD 295 – I-195 to MD 100: Widen to 6 lanes; Full interchange at Hanover Road (2015)
- MD 100 – Anne Arundel/Howard County Line to I-97: Widen to 6 lanes (2025)
- MD 170 – MD 175 to MD 100: Widen to 4 lanes (2020)
- MARC Improvements – on-going

Endnotes

[1] EPA, National Ambient Air Quality Standards (NAAQS), http://www.epa.gov/air/criteria.html. (January 2017).

[2] Ozone Transport Commission (OTC), http://www.otcair.org/. (January 2017).

[3] OTC members include: Connecticut, Delaware, the District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and Virginia.

[4] The EPA made a final determination that Baltimore, MD (including Anne Arundel County) attained the 2008 ozone standard by its applicable attainment date of July 20, 2018. As designated by the determinations published in the Federal Register on August 23, 2019, "These determinations of attainment do not constitute a redesignation to attainment as provided for under CAA section 107(d)(3). Redesignations require states to meet additional statutory criteria, including the EPA approval of a state plan demonstrating maintenance of the air quality standard for 10 years after redesignation, as required under CAA section 175A. As for all NAAQS, the EPA is committed to working with states that choose to submit redesignation requests for the 2008 ozone NAAQS."

[5] VOC and NO_x are considered ozone precursor pollutants.

[6] *Implementation, Maintenance, and Enforcement of the 0.70 ppm 8-hour Ozone National Ambient Air Quality Standard State Implementation Plan Section 110(a)(2)(D) Maryland 70 ppb Ozone Transport State Implementation Plan* (September 24, 2019)

[7] *Baltimore Nonattainment Area PM2.5 State Implementation Plan and Base Year Inventory*. SIP Number: 08-04. (March 24, 2008).

[8] MDE, Baltimore Nonattainment Area PM2.5 Redesignation Request SIP Number: 13-10. May 28, 2013, http://mde.maryland.gov/programs/Air/AirQualityPlanning/Documents/SIPDocuments/1_RedesRequest.pdf. (January 2017).

[9] MDE, *Ambient Air Monitoring Network Plan for Calendar Year 2017*. April 15, 2016, http://www.mde.state.md.us/programs/Air/AirQualityMonitoring/Documents/MDNetworkPlanCY2017.pdf. (January 2017).

[10] MDE, *Baltimore Serious Nonattainment Area 0.08 ppm 8-Hour Ozone State Implementation Plan*. SIP Number: 13-07. (June 17, 2013).

[11] Maryland Department of Natural Resources, http://dnr.maryland.gov/streams/Pages/streamhealth/default.aspx, accessed 2/16/17.

[12] USDA-WS WHA for BWI Marshall, 2012.

[13] USDA-WS WHA for BWI Marshall, 2012.

[14] USDA-WS WHA for BWI Marshall, 2012.

[15] MDOT MAA, FMPU, 2014.

[16] Red List. The IUCN Red List of Threatened Species, https://www.iucnredlist.org/, accessed 7/24/19

[17] A forest stand is defined as "a grouping of trees with similar characteristics (such as species, age, or condition) that can be distinguished from adjacent groups."

[18] Global Change Research Act of 1990, Pub. L. 101–606, Sec. 103 (November 16, 1990). For additional information on the United States Global Change Research Program, http://www.globalchange.gov. (January 2017)

[19] See generally Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act, 74 Fed. Reg. 66496 (Dec. 15, 2009).

[20] EPA, *Final Rule for Carbon Pollution Emission Guidelines for Existing Stationary Sources Electric Utility Generating Units*, 80 Fed. Reg. 64661, 64677 (Oct. 23, 2015).

[21] GHG allocation by economic sector. Environmental Protection Agency (2016). *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2014*, https://www3.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2016-Main-Text.pdf. (January 2017).

[22] Center for Climate and Energy Solutions. *International Civil Aviation Organization (ICAO)*. https://www.c2es.org/international/icao. (January 2017).

[23] FAA Order 1050.1F Desk Reference (July 2015), p. 4-1.

[24] FAA, Order 1050.1F Desk Reference (July 2015), p. 5-6.

[25] FAA, Order 1050.1F Desk Reference (July 2015), p. 5-6.

[26] Section 6(f) resources are those properties that were acquired or developed with assistance from the Land and Water Conservation Fund Program.

[27] Anne Arundel County, Maryland, *BWI Trail (Thomas A. Dixon Observation Area)*, http://www.aacounty.org/locations-and-directions/bwi-trail, accessed 5/15/18.

[28] US Department of the Interior National Park Service, Land &Water Conservation Fund Detailed Listing of Grants Grouped by County, http://waso-lwcf.ncrc.nps.gov/public/index.cfm, accessed 10/1/15.

[29] US Department of Agriculture (USDA), *USDA Environmental Compliance Library Farmland Protection Policy Act*, §2(b), 1994.

[30] USDA, *USDA Environmental Compliance Library Farmland Protection Policy Act,* §2(c)(1), 1994.

[31] EDR, 2016. Records searched included, but were not limited to, the Federal National Priority List (NPL), Federal Superfund Liens and delisted NPL, CERCLIS, CORRACTS, TSDF, RCRA, and Federal/State/Tribal leaking UST/AST.

[32] If a site or facility is identified in this assessment it does not necessarily mean that it involves hazardous materials hazardous waste, environmental contamination and/or other regulated substances. Rather it only means that the potential exists for these materials or substances to occur presently or historically. In some cases, individual and more detailed investigations may be needed to fully ascertain the actual, and extent of, involvement with hazardous materials or environmental contamination, should it exist.

[33] Deicing chemicals are not classifiable as hazardous materials under federal or state regulations.

[34] The sites listed in this report are not all-inclusive. Environmental Data Resources, Inc. (EDR) records reported additional sites, but due to the regulatory status and nature of these sites they are not considered to be of concern.

[35] 2020 Corrective Action List: Includes properties that are heavily contaminated, but also others that were contaminated but have since been cleaned up (EPA, 2016), https://www.epa.gov/hw/baselines-resource-conservation-and-recovery-act-rcra-corrective-action-sites#2020. (January 2017).

[36] CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

[37] A particular site's groundwater flow direction is best determined by a qualified environmental professional using site-specific well data.

[38] OCPCASES: State and Tribal leaking storage tank lists. Cases monitored by the Oil Control Program.

[39] The ERNS Database is used to store information on notifications of oil discharges and hazardous substances releases (EPA, 2016).

[40] TSDFs treat, store, or dispose of the waste.

[41] Deletion of sites from the NPL may occur once all response actions are complete and all cleanup goals have been achieved.

[42] Richard Meyer, National Register of Historic Places Registration Form for Benson-Hammond House.

[43] Barbara, Grey, Discovery of unmarked burials and National Register evaluation of burials, Baltimore/Washington International Airport, Anne Arundel County, Maryland (Letter to Gary Shaffer, 1996), 3-4.

[44] Brown, Marvin A., Joseph M. Herbert, Terry H. Klein, and Frank J. Vento, Part 2: Historic Preservation Plan, Baltimore/Washington International Airport, Anne Arundel County, Maryland (Timonium: Greiner, Inc., 1996), 32.

[45] Conrad, Geoffrey W., *Archeological Reconnaissance of the Baltimore-Washington International Airport and the Noise Corridors of its Runways, Anne Arundel, Howard, and Baltimore Counties* (Baltimore: Maryland Geological Survey, 1976).

[46] Fuess, Martin T., Ryan W. Robinson, Bryan C. Cunning, Denise Grantz Bastianini, Keith R. Bastianini, and Eric J. Filkins, *Phase I Geomorphological and Archeological Survey of the Kitten Branch Mitigation Site, Baltimore/Washington International Thurgood Marshall Airport, Anne Arundel County, Maryland* (Linthicum: Michael Baker, Inc., 2012), 87, 92.

[47] Fuess, Martin T., Ryan W. Robinson, Bryan C. Cunning, Denise Grantz Bastianini, Keith R. Bastianini, and Eric J. Filkins, *Phase I Geomorphological and Archeological Survey of the Kitten Branch Mitigation Site, Baltimore/Washington International Thurgood Marshall Airport, Anne Arundel County, Maryland* (Linthicum: Michael Baker, Inc., 2012), Appendix VII.

[48] Petraglia, Michael D., Catharine Toulmin, and Madeleine Pappas, *Phase I Archaeological Survey, Baltimore/Washington International Airport Improvements to Runway 10/28, Area F* (Washington: Engineering Science, 1992), 32-34.

[49] Klein, Terry H., Robert D. Wall, and Marvin A. Brown, *Phase II Archaeological Testing Sites 18AN366 and 18AN778, Improvements to Runway 10/28, Baltimore/Washington International Airport* (Timonium: Greiner, Inc., 1993), 36.

[50] Neumann, Thomas, *Phase I Intensive Archeological Survey of the Runway 15L and Runway 33R Improvement Areas, Baltimore/Washington International Airport, Anne Arundel County, Maryland* (Frederick: R. Christopher Goodwin & Associates, Inc., 1990), 36-37.

[51] Brown, Marvin A., Joseph M. Herbert, Terry H. Klein, and Frank J. Vento, *Part 1: Historic Preservation Plan, Baltimore/Washington International Airport, Anne Arundel County, Maryland, Overview and Inventory* (Timonium: Greiner, Inc., 1996), 3.5.

[52] Klein, Terry H., Robert D. Wall, and Marvin A. Brown, *Phase II Archaeological Testing Sites 18AN366 and 18AN778, Improvements to Runway 10/28, Baltimore/Washington International Airport* (Timonium: Greiner, Inc., 1993), 37.

[53] Haynes, Jr., John H. and Paula Bienenfeld, *Report on Phase I Archaeological Survey at Baltimore-Washington International Airport, Proposed Runway 10R/28L* (McLean: Wapora, Inc., 1991), 71.

[54] Haynes, Jr., John H. and Paula Bienenfeld, Report on Phase I Archaeological Survey at Baltimore-Washington International Airport, Proposed Runway 10R/28L (McLean: Wapora, Inc., 1991), 79.

[55] Grey, Barbara, Letter to Gary Shaffer, Subject: Discovery of Unmarked Burials and National Register Evaluation of Burials, Baltimore/Washington International Airport, Anne Arundel County, Maryland, February 6, 1996.

[56] Blades, Brooke, and Richard White, *Phase IB Archeological Investigations of the Near-Term Improvement Projects (2008-2012) at Baltimore/Washington International Thurgood Marshall Airport* (Owings Mills: A.D. Marble & Company, 2009), 30-32.

[57] Blades, Brooke, and Richard White, *Phase IB Archeological Investigations of the Near-Term Improvement Projects (2008-2012) at Baltimore/Washington International Thurgood Marshall Airport* (Owings Mills: A.D. Marble & Company, 2009), 173.

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[59] Maryland Department of Transportation, Maryland Aviation Administration Airport Zoning Permit, http://www.marylandaviation.com/content/permitsandforms/constructionzoning/, accessed 2/16/17.

[60] Anne Arundel County General Development Plan, April 2009, *Key Plan Use Plan Changes for 2009*, p. 120.

[61] FAA, Order 1050.1F Desk Reference (July 2015), p. 11-7.

[62] BWI Marshall Airport Part 150 Update, September 2014, pg. 78.

[63] FAA, Order 1050.1F Desk Reference (July 2015), p. 12-9.

[64] Access blocked for vehicles inbound from the Terminal Return Road only.

[65] *Traffic Analysis Study – Draft Report, BWI Marshall International Concourse Roadway Widening Study*. MAA-AE-14-006, AECOM and JMT, July 29, 2016.

[66] Executive Order 11988-*Floodplain management*, May 24, 1977, Section 1.

[67] Department of Transportation Order 5650.2, *Floodplain Management and Protection*, 4/23/79, pp. 1-2.

[68] MDE. Total Maximum Daily Loads (TMDL), http://www.mde.state.md.us/programs/Water/TMDL/Pages/Programs/WaterPrograms/tmdl/index.aspx

[69] Anne Arundel County, Maryland. Master Plan for Water Supply & Sewerage Systems 2013. p. 2-14

[70] Anne Arundel County General Development Plan, April 2009. *Assessment of Water Supply Capacity*, p. 196

[71] U.S. Congress, *National Wild and Scenic Rivers Act (16 USC 1271-1287),* October 2, 1968.

[72] MDOT, MAA, BWI Amtrak Rail Improvement, https://mta.maryland.gov/bwi-amtrak-rail-improvement

[73] Smith, Mark R., "The BWI Aerotropolis: Is Now the Time?" *The Business Monthly*, June 6, 2016, http://www.bizmonthly.com/the-bwi-aerotropolis-is-now-its-time/ (accessed 6/22/16).

[74] Alderton, Matt, "'Aerotropolis' A Town Square with Transit," gb&d Magazine, September/October 2014, http://gbdmagazine.com/2014/29-heffner-weber/ (access 6/22/16).

Chapter 5: ENVIRONMENTAL CONSEQUENCES

The potential for environmental effects resulting from implementation of the 2015 ALP Alternative, Sponsor's Preferred Alternative and No Action Alternative are presented in this chapter. The alternatives are discussed in *Chapter 3, Alternatives*, of this EA and Section 4(f) Determination.

Potential impacts are discussed in relation to their respective Study Areas per environmental resource category, as defined in *Chapter 4, Affected Environment*. Potential cumulative impacts resulting from the incremental effects of the alternatives when added to the effects of past, present, and reasonably foreseeable future actions are also analyzed. Where necessary, potential mitigation measures are discussed that would reduce or eliminate anticipated environmental impacts for each of the alternatives.

In accordance with guidance provided in FAA Orders 5050.4B, *National Environmental Policy Act Implementing Instructions for Airport Actions*, and 1050.1F, *Environmental Impacts: Policies and Procedures*, environmental resources not present within the Study Area would not be affected by the alternatives, and therefore are not discussed within this chapter. The only environmental resources not present, and therefore not affected by the alternatives are Section 6(f) and Wild and Scenic Rivers (Water Resources).

5.1 Air Quality

This section presents the findings of an air quality assessment that was conducted to evaluate the proposed improvements at BWI Marshall Airport.

5.1.1 Laws and Regulations

As discussed in Chapter 4, *Section 4.2.1, Regulatory Information*, the NEPA and CAA are the two primary regulations that apply to the assessment of air quality impacts attributable to the Proposed Action. The NEPA requires the disclosure of the proposed project's impacts on the human environment; and, because the project is in an EPA-designated non-attainment area for the air pollutants O_3 (2015 standard) and SO_2, the CAA requires that the Proposed Action does not cause, or contribute to, violations of the NAAQS for these pollutants.

5.1.2 Methodology

Emissions inventories were prepared to evaluate the change in pollutant or pollutant precursor emissions associated with the proposed airport improvements. The two primary sources for emissions were from aircraft and construction vehicles. *Appendix G, Attachment 1 and Attachment 3,* provides a detailed discussion of, and presents detailed data for the development of the inventories for both sources. The proposed improvements considered as part of the Proposed Action serve to maintain efficient and safe operations while achieving a quality level of service. Without the proposed improvements, operations would continue to

grow as there are no constraints to continued growth, i.e., the airfield, general aviation, terminal, landside, and support facilities can accommodate additional operations without improvements. Therefore, an identical number of flight operations, with the exception of run-up operations[1], are included in the No Action, 2015 ALP, and Sponsor's Preferred Alternatives aircraft emission model. However, without the proposed improvements, inefficiencies would become more apparent and the airport user experience would be of lower quality even though the number of operations will not increase.

The following provides a brief overview of the methodologies that were used.

Aircraft, GSE, and APU emissions were estimated using the FAA's Aviation Environmental Design Tool (AEDT Version 2d) for which the input of aircraft fleet, engine assignments and runway use are discussed in Chapter 4, *Section 4.10*, *Noise and Compatible Land Use,* of this EA and Section 4(f) Determination. With the exception of ground-based aircraft taxi times, which would change with proposed improvements to Taxiways F and R, the default times in AEDT were used for the aircraft operational modes (e.g., approach, takeoff, climbout). The aircraft taxi times assumed in the analysis for the No Action Alternative were obtained from the FAA's Aviation System Performance Metrics (ASPM). For the Action Alternatives, the change in taxi times for arrivals on Runway 28 and departures on Runway 10 as a result of the Taxiways F and R relocation project were derived assuming an aircraft taxi speed of 20 miles per hour.[2]

The Action Alternatives do not include fuel storage or transfer facilities. Because aircraft operations into and out of BWI Marshall Airport will be the same between the No Action, 2015 ALP, and Sponsor's Preferred Alternatives, the volume of vehicular traffic would be the same. The roadway improvements included in the Action Alternatives would serve to reduce congestion within the terminal area and therefore has the potential to reduce vehicular pollutant emissions. However, any reduction would be insignificant from a regional perspective and therefore vehicular emissions were not considered in the emissions analysis. Additionally, the loss of parking spaces as a result of the Section FBO project would be fully accommodated for with existing available capacity in the Hourly Garage and Daily Garage.

Air pollutant and pollutant precursor emissions associated with construction activity were estimated based on, among other factors, the projected construction schedule and the number of vehicles/ pieces of equipment anticipated for each construction task. The emission factors that were used to derive the construction-related inventories were obtained from EPA's Motor Vehicle Emissions Simulator (MOVES, Version 2014a) for which the modeling parameters were those utilized by the MDE in the development of their SIP.

5.1.3 Thresholds of Significance

As identified in FAA Order 1050.1F, the threshold for significance for air quality impacts is defined to be when "the action would cause pollutant concentrations to exceed one or more of the National Ambient Air Quality Standards (NAAQS), as established by the Environmental Protection Agency under the Clean Air Act, for any of the time periods analyzed , or to increase the frequency or severity of any such existing violations."[3]

As discussed in Chapter 4, *Section 4.2.5*, *Conformity Requirements*, because the project is in a non-attainment area for the air pollutants O_3 (2015 standard) and SO_2, project-related emissions of these pollutants and their pollutant precursors (NO_x, VOC, and SO_2) are subject to the General Conformity requirements of the CAA. As such, and with the exception of VOCs, the threshold of significance for these pollutants/precursors is 100 tons per year (the *de minimis* level). The *de minimis* level for VOC is 50 tons per year. A comparison of the project-related emissions to the *de minimis* levels indicate whether the General Conformity requirements of the CAA are applicable to the proposed improvements.

Pollutants for which the area is designated by the EPA to be in attainment (CO, NO_2, PM_{10}, and Pb) are not subject to General Conformity requirements, and therefore do not have *de minimis* level thresholds. As such, the emission estimates presented in this EA and Section 4(f) Determination are presented for the purpose of disclosure.

5.1.4 Impact Analysis

Potential impacts to air quality related to aircraft operations and construction emissions were identified and evaluated.

5.1.4.1 2015 ALP Alternative

Airport Operations

Table 5.1.1 and **Table 5.1.2** present the airport operation (aircraft, GSE, and APU) inventories for future years 2022 and 2027 for the No Action and 2015 ALP Alternative, respectively. The level of airport emissions of CO, VOC, NO_x, SO_2, PM_{10}, and $PM_{2.5}$ increase between 2022 and 2027 due to projected growth in operations unrelated to the Proposed Action. As described in Section 5.11.2.1 the only difference in aviation operations between the Proposed Action and No Action is an increase in run-up operations associated with the proposed Airline Maintenance Facility. This increase in run-up operations was modeled; however, their contribution to each of the criteria pollutants reviewed is two tons or less.

Construction Emissions

Table 5.1.3 presents the construction emission inventories for the years of proposed construction (2020-2022). The level of construction related emissions of CO, NO_x, SO_2, PM_{10}, $PM_{2.5}$ and VOC would vary by pollutant and year, with the greatest total emissions to occur in the year 2021.

None of the pollutants/precursors for which there are *de minimis* levels (NO_x, VOC, and SO_2) would exceed the threshold levels in any year, even when combining the project-related Airport operations emissions and construction emissions in 2021. As a result, the General Conformity regulations do not require a conformity determination and it can be presumed that the emissions would not cause or contribute to a violation of or exceed the NAAQS for O_3 (precursors NO_X and VOC) or SO_2 and therefore would not result in a significant impact. Because the differences in pollutant levels between the 2015 ALP and No Action Alternatives are minor, an emissions dispersion analysis is not necessary to demonstrate emissions would meet the NAAQS for all criteria pollutants.

Table 5.1.1

2022 Airport Operation Emissions (tons per year)

Alternative	Source	CO	VOC	NOx	SO_2	PM_{10}	$PM_{2.5}$
No Action	Aircraft	1,083	186	1,372	114	10	10
	GSE	326	12	38	2	2	2
	APU	34	3	48	7	5	5
	No Action Total	*1,443*	*201*	*1,459*	*123*	*17*	*17*
2015 ALP/ Sponsor's Preferred	Aircraft	1,085	186	1,373	114	10	10
	GSE	326	12	38	2	2	2
	APU	34	3	48	7	5	5
	2015 ALP Total	*1,445*	*201*	*1,459*	*123*	*17*	*17*
Difference (Project-Related)		***2***	***<1***	***<1***	***<1***	***<1***	***<1***
De Minimis Levels		*--*	*50*	*100*	*100*	*--*	*--*
Exceed De Minimis?		*--*	*No*	*No*	*No*	*--*	*--*

Note: Although lead (Pb) is a criteria pollutant, it was not evaluated because the proposed project would have no impacts on lead emissions.

Source: AEDT and HNTB analysis, 2019.

Table 5.1.2

2027 Airport Operation Emissions (tons per year)

Alternative	Source	CO	VOC	NOx	SO_2	PM_{10}	$PM_{2.5}$
No Action	Aircraft	1,094	185	1,659	129	10	10
	GSE	347	13	41	2	2	2
	APU	36	3	51	7	6	6
	No Action Total	*1,477*	*201*	*1,750*	*138*	*18*	*18*
2015 ALP/ Sponsor's Preferred	Aircraft	1,096	185	1,659	129	10	10
	GSE	347	13	41	2	2	2
	APU	36	3	51	7	6	6
	2015 ALP Total	*1,479*	*201*	*1,750*	*138*	*18*	*18*
Difference (Project-Related)		***2***	***<1***	***<1***	***<1***	***<1***	***<1***
De Minimis Levels		*--*	*50*	*100*	*100*	*--*	*--*
Exceed De Minimis?		*--*	*No*	*No*	*No*	*--*	*--*

Note: Although lead (Pb) is a criteria pollutant, it was not evaluated because the proposed project would have no impacts on lead emissions.

Source: AEDT and HNTB analysis, 2019.

Table 5.1.3

Construction Operations Emissions for the 2015 ALP Alternative and Sponsor's Preferred Alternative (tons per year)

Year	CO	VOC	NOx	SO_2	PM_{10}	$PM_{2.5}$
2020	39	5	11	0.06	53	6
2021	64	7	18	0.12	88	10
2022	27	6	7	0.05	59	6
De Minimis Levels	--	*50*	*100*	*100*	--	--
Exceed De Minimis?	--	*No*	*No*	*No*	--	--

Note: Although lead (Pb) is a criteria pollutant, it was not evaluated because the proposed project would have no impacts on lead emissions.

Sources: KB Environmental Sciences, Inc. analysis, March 2017, and HNTB analysis, July 2019. (See *Appendix G, Air Quality and Climate, Attachment 1 and Attachment 3*).

5.1.4.2 Sponsor's Preferred Alternative

The air quality emissions analysis for the Sponsor's Preferred Alternative is identical to that described for the 2015 ALP Alternative. The airport operations (aircraft, GSE and APU) emissions are based on the forecast operations in 2022 and 2027 and do not vary between the 2015 ALP and Sponsor's Preferred Alternative. The construction emissions are based on a preliminary construction schedule and construction activities for individual projects and does not vary between the between the 2015 ALP and Sponsor's Preferred Alternative

None of the pollutants/precursors for which there are *de minimis* levels (NO_x, VOC, and SO_2) would exceed the threshold levels in any year. As a result, the General Conformity regulations do not require a conformity determination and it can be presumed that the emissions would not cause or contribute to a violation of or exceed the NAAQS for O_3 (precursors NO_X and VOC) or SO_2 and therefore would not result in a significant impact. Because the differences in pollutant levels between the Sponsor's Preferred and No Action Alternatives are minor, an emissions dispersion analysis is not necessary to demonstrate emissions would meet the NAAQS for all criteria pollutants.

5.1.4.3 No Action Alternative

As indicated in Tables 5.1.1 and 5.1.2, there is a two ton or less difference in airport emissions between the No Action and 2015 ALP Alternative/Sponsor's Preferred Alternative for either future year.

The proposed improvements would not be constructed under the No Action Alternative and therefore no construction related emissions would occur.

5.1.5 Mitigation

There are no mitigation measures required for the project because the project-related emissions would not exceed the CAA/General Conformity *de minimis* levels for O_3 or SO_2.

5.1.6 Permitting

As stated in *Chapter 4, Affected Environment*, certain stationary source air emissions from BWI Marshall Airport are regulated under the airport's current Title V permit (valid through January 31, 2024). Any additional air emission sources that are created as a result of the proposed projects at BWI Marshall Airport would be subject to requirements under this permit.

5.2 Biological Resources

Potential impacts to biological resources are addressed at the habitat level. The MDNR Wildlife and Heritage Service (WHS), 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 Stony Run WSSC. No critical habitat supporting either state- or federally-listed threatened or endangered species occurs within the areas of potential impact.

Impacts to wildlife and plant communities within the Study Area are provided in the following sections. A description of construction impacts and measures to be taken to minimize potential adverse impacts are provided in addition to a qualitative discussion of potential cumulative impacts.

5.2.1 Laws and Regulations

Applicable laws and regulations for biological resources are presented in Chapter 4, *Section 4.3, Biological Resources*.

5.2.2 Methodology

MDOT MAA consulted with MDNR WHS (see *Appendix H, Attachment 2*) and Environmental Review Program (see *Appendix H, Attachment 5* for fisheries resources review), and USFWS (see *Appendix H, Attachment 1*), to document the presence of any state- or federally-listed threatened or endangered species as well as the presence of any critical habitats designated for those species.

The USFWS Official Species List indicated that no critical habitat, refuge lands or fish hatcheries occur within the project area, however, the NLEB and swamp pink were listed as threatened species. By email dated April 11, 2019, MDNR WHS confirmed that there are no known hibernacula or maternity roosts in the vicinity of the BWI Marshall Airport project area (*Appendix H, Attachment 7*). The project area lies within the zone of white-nose syndrome for the species, where Federally funded projects that clear more than 15 acres of forest are subject to additional coordination with USFWS for the NLEB. The IPaC also identified the northern long-eared bat/ NLEB (*Myotis septentrionalis)* as potentially occurring in the study area. Correspondence with MDNR WHS, dated April 11, 2019, indicated that there are no known hibernacula or maternity roost trees for the NLEB within the vicinity of BWI Marshall Airport (See *Appendix H, Attachment 7*). The FAA consulted with USFWS through the NLEB 4(d) Rule Streamlined Consultation process and received a “may effect however, any take that may occur as a result of the Action is not prohibited under the ESA Section 4(d) rule adopted for this species at 50 CFR §17.40(o).” determination on July 16, 2020 (See *Appendix H, Attachment 10*).

MDNR WHS completed an updated swamp pink survey in the Stony Run floodplain area in November 2019. FAA consultation with the USFWS CBFO was completed. A Biological Assessment was prepared in January 2020, including the survey results, which indicated that the project "May Affect, but is Not Likely to Adversely Affect" the swamp pink. The USFWS CBFO rendered a Not Likely to Adversely Affect determination for the swamp pink in February 2020. See *Appendix H, Attachment 8 and Attachment 9* for the Biological Assessment and USFWS CBFO determination, respectively.

MDOT MAA calculated impacts to forest stands using worst-case scenario LODs for individual projects independently. Impacts associated with vegetative obstruction removals were quantified in acres and individual tree obstructions. Impacts to wetlands, wetland buffers and 100-year floodplains are presented in *Section 5.14, Water Resources*.

5.2.3 Thresholds of Significance

Per the FAA Order 1050.1F Desk Reference, "a significant impact to biological resources would occur when: The U.S. Fish and Wildlife Service or the National Marine Fisheries Service determines that the action would be likely to jeopardize the continued existence of a Federally-listed threatened or endangered species, or would result in the destruction or adverse modification of federally-designated critical habitat."

Additional factors for consideration listed in the FAA Order 1050.1F Desk Reference when determining impacts to biological resources include (but are not limited to) "situations in which the proposed action or alternative(s) would have the potential for:

- A long-term or permanent loss of unlisted plant or wildlife species, i.e., extirpation of the species from a large project area (e.g., a new commercial service airport);
- Adverse impacts to special status species (e.g., state species of concern, species proposed for listing, migratory birds, bald and golden eagles) or their habitats;
- Substantial loss, reduction, degradation, disturbance, or fragmentation of native species' habitats or their populations; or
- Adverse impacts on a species' reproductive success rates, natural mortality rates, non-natural mortality (e.g., road kills and hunting), or ability to sustain the minimum population levels required for population maintenance."

5.2.4 Impact Analysis

Nine of the proposed improvement projects could potentially impact forests and other biological resources. Impacts associated with each alternative carried forward are discussed.

5.2.4.1 2015 ALP Alternative

Table 5.2.1 summarizes the impacts to forest resources associated with the 2015 ALP Alternative projects. Cumulatively, implementation of the 2015 ALP Alternative will result in approximately 219.38 acres of forest clearing. Of the 1,303 individual on-airport tree obstructions, 948 obstructions overlap with the Part 77 obstruction removal areas, therefore the 2015 ALP Alternative will result in the removal of 355 individual tree obstructions on airport property. With respect to impacts on off-airport property,

implementation of the 2015 ALP Alternative will result in the removal of 1,147 individual tree obstructions in the residential area within the approach surface associated with Runway 15L, as illustrated in **Figure 5.2-1**.

Figure 5.2-2 illustrates the 2015 ALP Alternative projects, in relation to Part 77 Obstruction Removal, that could impact vegetation on-airport property. See Figure 3.7-2 for an illustration of the 2015 ALP Alternative vegetation removal, including all project related Part 77 Obstruction Removal areas on- and off-airport.

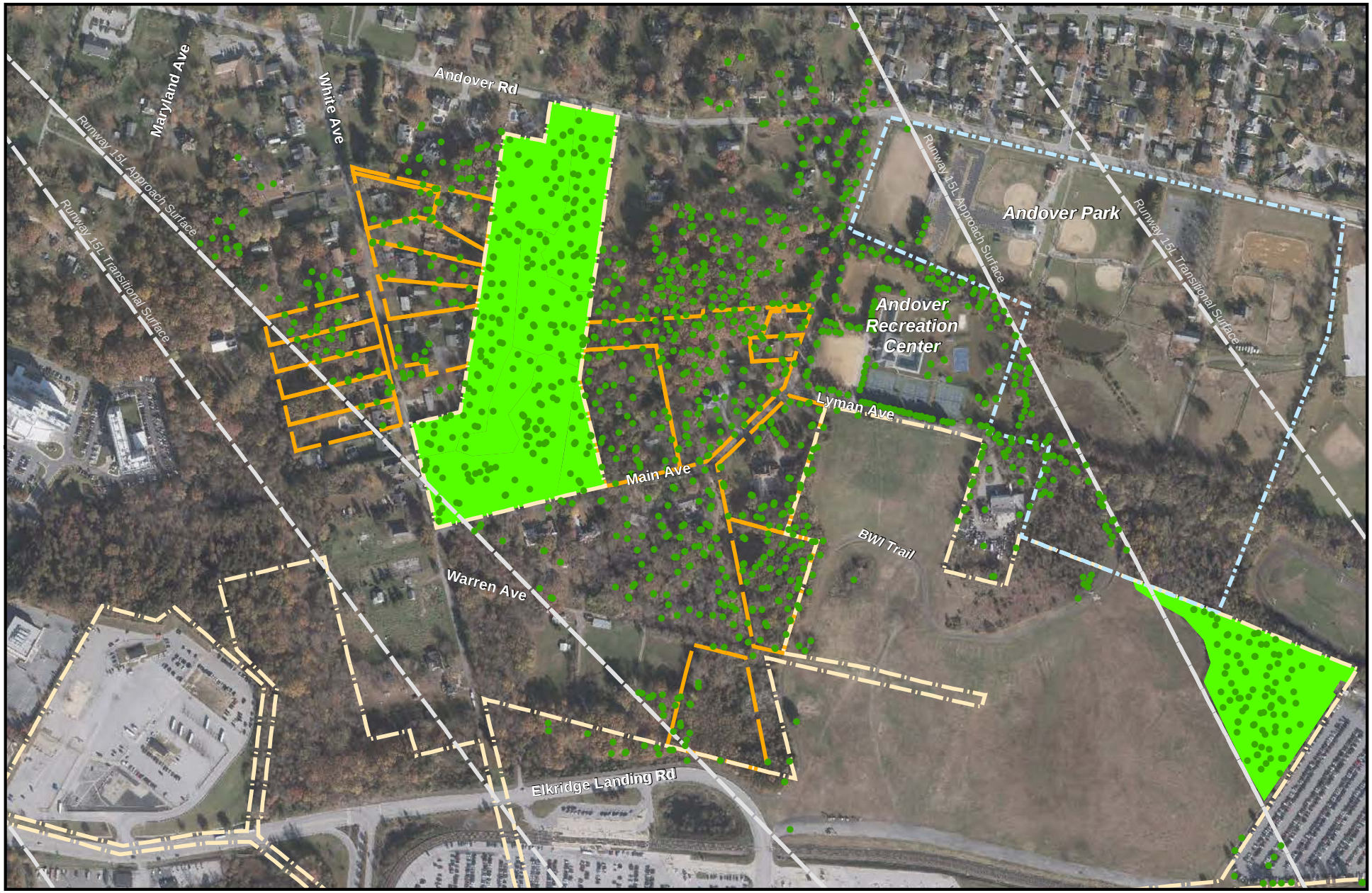
Impacts to wetlands, wetland buffers, and floodplains are discussed in *Section 5.14, Water Resources*. No critical habitat supporting either state- or federally-listed threatened or endangered species occurs within the areas for proposed obstruction removal; however, due to the historical presence of a population of federally-threatened and state-endangered swamp pink (*Helonias bullata*), MDNR WHS performed a survey for individuals and populations within the project area in November 2019; and a Biological Assessment was generated by MDOT MAA for the species in January 2020. The Biological Assessment includes the survey results and measures to minimize impacts to the species (See *Appendix H, Attachment 8*). The USFWS CBFO rendered a Not Likely to Adversely Affect determination for the swamp pink in February 2020 (See *Appendix H, Attachment 9*). The determination is contingent upon adhering to the following conservation methods in areas with viable habitat, specifically within the Stony Run WSSC:

Table 5.2.1
2015 ALP Alternative Impacts to Biological Resources

Project	LOD (acres)	Forest Clearing	Overlap with Part 77 Obstruction Removal	Individual Tree Clearing (On Airport)	Individual Tree Clearing (Off Airport)
Part 77 Obstruction Removal (10)	N/A	180.33 ac. (7,855,175 sf)	N/A	1,303 trees (948 overlap with forest clearing)	1,147 trees
Relocate Taxiways F and R (1)	111	0.00 ac. (0 sf)	5.06 ac. (220,414 sf)		
Taxiway V Relocation (17)	35	0.00 ac. (0 sf)	0.02 ac. (871 sf)		
VORTAC Critical Area Clearing	6.3	4.11 ac (178,901 sf)	2.17 ac. (94,656 sf)		
Relocate Fire Training Facility (P45)	24	7.60 ac. (331,056 sf)	9.52 ac. (414,691 sf)		
New Airline Maintenance Facility (P11)	72	27.34 ac. (1,190,930 sf)	25.59 ac. (1,114,700 sf)		
Relocate RTR Facility (21)	1.3	0.00 ac. (0 sf)	0.5 ac. (21,780)		
TOTAL		**219.38 ac.[1]**	**42.36 ac.**	**355 trees**	**1,147 trees**

Note: [1] The total tree clearing takes into account the overlapping of forest clearing from the Part 77 Obstruction Removal.

Source: JMT analysis, 2019.



LEGEND

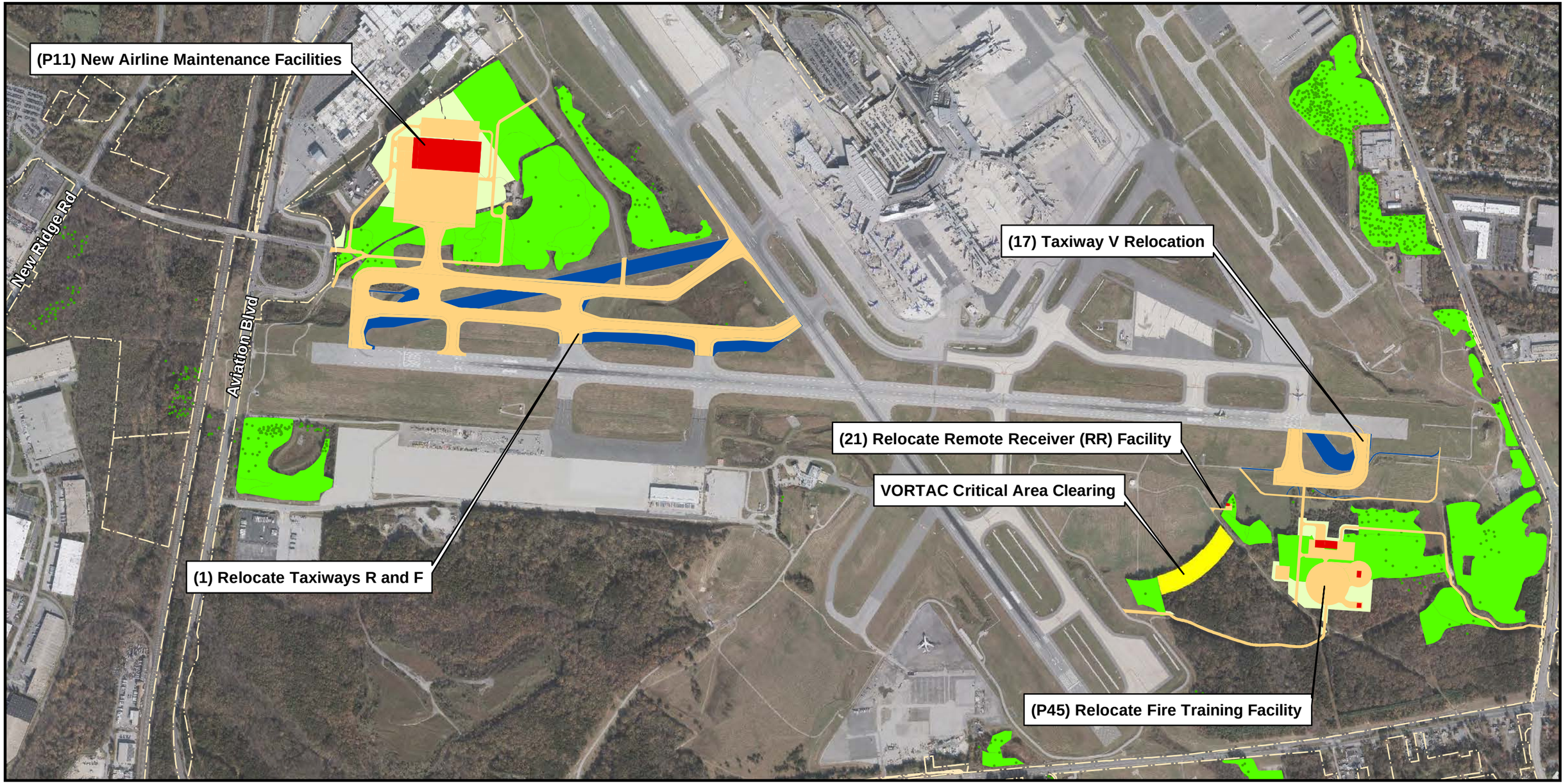
- Airport Property Boundary
- Obstruction Removal (2015 ALP Obstruction Points)
- Tree Obstruction Removal (2014 FMP Part 77 Conflict Areas)
- MAA Tree Topping Easement
- Andover Park Boundary

2015 ALP Alternative Impacts to Off-Airport Vegetation
Figure 5.2-1

N

0 125 250 500 Feet

Source: Aerial - MDOT MAA (2018)



LEGEND

- Airport Property Boundary
- Tree Obstruction Removal (2014 FMP Part 77 Conflict Areas)
- Obstruction Removal (2015 ALP Obstruction Points)
- Tree Removal for Phase I Improvements
- Tree Removal for VORTAC Critical Area
- Pavement Improvements
- Proposed Structures
- Demolition

Note: See Figures 5.14-1 and 5.14-3 for ALP Alternative Part 77 Obstruction Removal Impacts to Floodplains, and Wetlands and Streams, respectively.

2015 ALP Alternative Impacts to On-Airport Vegetation
Figure 5.2-2

N

0 500 1,000 2,000 Feet

Source: Aerial - MDOT MAA (2018)

a) Access paths will be explicitly designed in order to minimize wetland and buffer impacts to maximum extent practicable, making use of existing infrastructure and access roads in the area;

b) Tree obstructions will be cleared by hand, as the use of heavy machinery would significantly increase impacts to vegetation and soils;

c) Tree stumps will be left in place in order to avoid soil disturbances caused by grubbing;

d) The crown of each tree will be removed, but trunks will be left in place, eliminating disturbance that would be caused by full tree removal from the site.

During previous Part 77 clearing efforts within this area, coordination with WHS has been conducted to ensure that adverse impacts to swamp pink populations and the associated supporting habitat have been avoided. Specific measures taken include hand felling of individual trees and leaving the trees in place to return organic matter to the system. Additionally, field measurements for tree heights will be conducted prior to removal of obstructions to confirm the absolute need for removal. See *Appendix H, Attachment 8* for additional details on the avoidance measures proposed.

Impacts would occur to forests designated as either Potential FIDS Habitat or High Quality Potential FIDS Habitat by MDNR; however, impacts will be avoided and minimized in sensitive areas, such as the Wetlands of Special State Concern. Some fragmentation is unavoidable, but there is extensive FIDS habitat in the surrounding area that can support the avian species that may be present. Since there is no state regulation for the protection of FIDS habitat outside of the Chesapeake Bay Critical Area, no permits or mitigation for impact to FIDS habitat is anticipated.

Summary: The 2015 ALP Alternative would not cause long-term or permanent loss of state or federally-listed plant or wildlife species. The removal of several large tracts of trees on-airport would reduce wildlife attractants (habitat) on the Airport. For the tree removal off-airport, the property will be allowed to regenerate and/or be replanted with low-growing tree species thereby replacing the lost habitat with different, yet comparable, vegetation for unlisted plants and wildlife. As requested through consultation with the MDNR, appropriate mitigation would be applied to tree removal in the area designated as Wetlands of Special State Concern, as has been done in the past, yielding a determination of no adverse effect on this system.

In response to consultation with MDNR Environmental Review Program (MDNR ERP), MDOT MAA will adhere to time of year restrictions (March 1 through June 15) for work within Stony Run, Cabin Branch and Sawmill Creek, as stated in an email from MDNR ERP, dated October 7, 2016 (*Appendix H, Attachment 5*). MDOT MAA will also apply sediment and erosion control measures to upland areas during construction to protect anadromous finfish and other fish species.

Preliminary consultation with USFWS CBFO, via the IPaC Official Species List, indicated that there were no critical habitats or national wildlife refuges or fish hatcheries within the Study Area; however federally threatened swamp pink (*Helonias bullata*) should be considered, as known populations exist in the project area. FAA consultation with USFWS CBFO for swamp pink was completed.

A Biological Assessment was completed in January 2020. The USFWS CBFO rendered a Not Likely to Adversely Affect determination for the swamp pink in February 2020 (See *Appendix H, Attachment 9*).

5.2.4.2 Sponsor's Preferred Alternative

Table 5.2.2 summarizes the impacts to forest resources associated with the Sponsor's Preferred Alternative projects. Cumulatively, implementation of the Sponsor's Preferred Alternative would result in approximately 83.00 acres of forest clearing associated with clearing for project construction, 48.21 acres of which fall within Part 77 Obstruction Removal areas. Of the 1,303 individual on-airport tree obstructions, 75 obstructions overlap with the Part 77 obstruction removal areas, therefore the Sponsor's Preferred Alternative will result in the removal of 1,228 individual tree obstructions on airport property. With respect to impacts off-airport property, implementation of the Sponsor's Preferred Alternative will result in the removal of 1,102 individual tree obstructions in the residential area within the approach surface associated with Runway 15L, as illustrated in **Figure 5.2-3**.

Figure 5.2-4 illustrates the Sponsor's Preferred Alternative projects, in relation to Part 77 Obstruction Removal, that could impact vegetation on-airport property. See Figure 3.7-4 for an illustration of the Sponsor's Preferred Alternative vegetation removal, including all project related Part 77 Obstruction Removal areas on- and off-airport.

Table 5.2.2

Sponsor's Preferred Alternative Impacts to Biological Resources

Project	LOD (acres)	Forest Clearing	Overlap with Part 77 Obstruction Removal	Individual Tree Clearing (On Airport)	Individual Tree Clearing (Off Airport)
Part 77 Obstruction Removal (10)	N/A	48.21 ac[1] (2,100,028 sf)	N/A	1,303 trees (75 overlap with forest clearing)	1,102 trees
Relocate Taxiways F and R (1)	111	0.00 ac. (0 sf)	5.06 ac. (220,414 sf)		
Taxiway V Relocation (17)	35	0.00 ac. (0 sf)	0.02 ac. (871 sf)		
VORTAC Critical Area Clearing	6.3	4.11 ac. (178,901 sf)	2.17 ac. (94,656 sf)		
Relocate Fire Training Facility (P45)	31	5.99 ac. (260,924 sf)	16.55 ac. (0 sf)		
New Airline Maintenance Facility (P11)	78	24.69 ac. (1,075,496 sf)	23.91 ac. (1,041,520 sf)		
Relocate RTR Facility (21)	1.3	0.00 ac. (0 sf)	0.5 ac. (21,780)		
TOTAL		**83.00 ac.[2]**	**48.21 ac.**	**1,228 trees**	**1,102 trees**

Note:
[1] As a stand-alone project, the Sponsor's Preferred Alternative Part 77 Obstruction Removal only consists of selective harvesting of individual tree obstructions. However, 48.21 acres of tree clearing associated with other projects overlaps with Part 77 Obstruction Removal areas and therefore would be considered as Part 77 Obstruction Removal during development of those individual projects.
[2] The total tree clearing takes into account the overlapping of forest clearing from the Part 77 Obstruction Removal.

Source: JMT analysis, 2019.

LEGEND

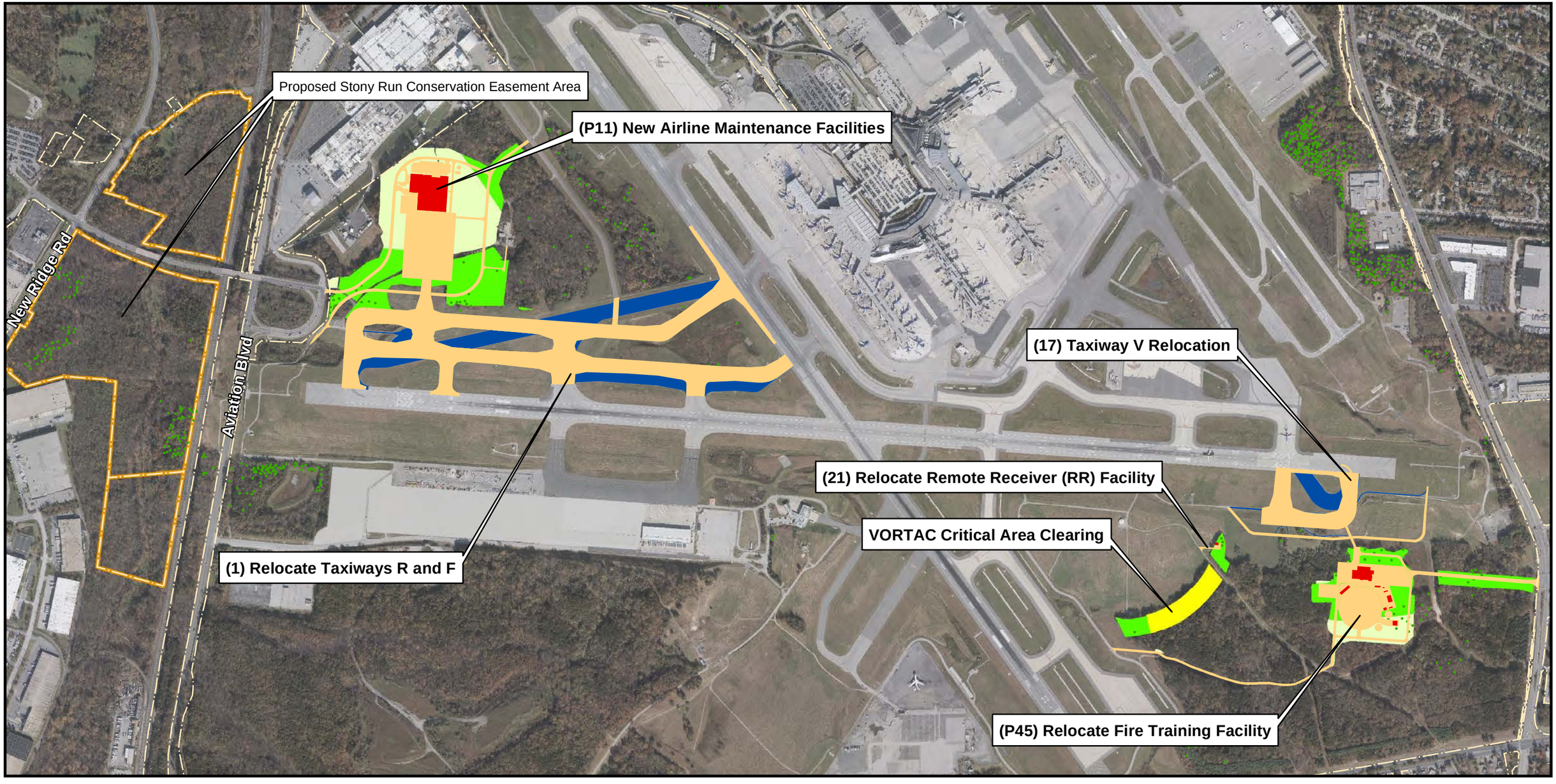
- Airport Property Boundary
- Obstruction Removal (2015 ALP Obstruction Points)
- MAA Tree Topping Easement
- Andover Park Boundary
- Trees to Remain Under Sponsor's Preferred Alternative (No longer considered to be obstructions per 2016 tree survey)

Sponsor's Preferred Alternative Impacts to Off-Airport Vegetation
Figure 5.2-3

N

0 125 250 500 Feet

Source: Aerial - MDOT MAA (2018)



LEGEND

- Airport Property Boundary
- Tree Obstruction Removal (2014 FMP Part 77 Conflict Areas)* (No Mitigation Required)
- Obstruction Removal (2015 ALP Obstruction Points) - (Selective Removal/Alteration)
- Tree Removal for Phase I Improvements
- Tree Removal for VORTAC Critical Area (No Mitigation Required)
- Proposed Stony Run Conservation Easement Area
- Pavement Improvements
- Proposed Structures
- Demolition

Note: * Sponsor's Preferred Alternative Tree Obstruction Removal Areas include Part 77 Conflict Areas where they overlap with project LODs.

See Figures 5.14-7 and 5.14-9 for Sponsor's Preferred Alternative Part 77 Obstruction Removal Impacts to Wetlands and Streams, and Floodplains, respectively.

Sponsor's Preferred Alternative Impacts to On-Airport Vegetation
Figure 5.2-4

N

0 500 1,000 2,000 Feet

Source: Aerial - MDOT MAA (2018)

The following Sponsor's Preferred Alternative projects are the same as the 2015 ALP Alternative projects: Relocate Taxiways F and R; Taxiway V Relocation; VORTAC Critical Area Clearing; and Relocate RTR Facility.

Impact to wetlands, wetland buffers, and floodplains are discussed in *Section 5.14, Water Resources.* No critical habitat supporting either state- or federally-listed threatened and endangered species occurs within the areas for proposed obstruction removal; however, due to the historical presence of a population of federally-threatened and state-endangered swamp pink (*Helonias bullata*), MDNR WHS performed a survey for individuals and populations within the project area in November 2019; and MDOT MAA generated a Biological Assessment for the species in January 2020. The Biological Assessment includes the survey results and measures to minimize impacts to the species (See *Appendix H, Attachment 8*). The USFWS CBFO rendered a Not Likely to Adversely Affect determination for the swamp pink in February 2020 (See *Appendix H, Attachment 9*). The determination is contingent upon adhering to the following conservation methods in areas with viable habitat, specifically within the Stony Run WSSC:

a) Access paths will be explicitly designed in order to minimize wetland and buffer impacts to maximum extent practicable, making use of existing infrastructure and access roads in the area;

b) Tree obstructions will be cleared by hand, as the use of heavy machinery would significantly increase impacts to vegetation and soils;

c) Tree stumps will be left in place in order to avoid soil disturbances caused by grubbing;

d) The crown of each tree will be removed, but trunks will be left in place, eliminating disturbance that would be caused by full tree removal from the site.

During previous Part 77 clearing efforts within this area, coordination with WHS has been conducted to ensure that adverse impacts to swamp pink populations and the associated supporting habitat have been avoided. Specific measures taken include hand felling of individual trees and leaving the trees in place to return organic matter to the system. Additionally, field measurements for tree heights will be conducted prior to removal of obstructions to confirm the absolute need for removal. See *Appendix H, Attachment 8* for additional details on the avoidance measures proposed.

Impacts would occur to forest designated as either Potential FIDS or High Quality Potential FIDS Habitat by MDNR; however, impacts will be avoided and minimized in sensitive areas, such as the Wetlands of Special State Concern. Some fragmentation is unavoidable, but there is extensive FIDS habitat in the surrounding area that can support the avian species that may be present. Since there is no state regulation for the protection of FIDS habitat outside the Chesapeake Bay Critical Area, no permits or mitigation for impact to FIDS habitat is anticipated.

Summary: As with the 2015 ALP Alternative there would be no long-term or permanent loss of unlisted plant or wildlife species. The removal of several large tracts of trees on-airport associated with projects would reduce wildlife attractants (habitat) on the Airport. For the tree removal off-airport, the property will

be allowed to regenerate and/or be replanted with low-growing tree species thereby replacing the lost habitat with different yet comparable vegetation for unlisted plants and wildlife. As requested through consultation with the MDNR, appropriate mitigation would be applied to tree removal in the area designated as Wetlands of Special State Concern, as has been done in the past, yielding a determination no adverse effect on this system.

FAA consultation with USFWS CBFO for swamp pink was completed. A Biological Assessment was prepared in January 2020, including the survey results, which indicated that the project "May Affect, but is Not Likely to Adversely Affect" the swamp pink. The USFWS CBFO rendered a Not Likely to Adversely Affect determination for the swamp pink in February 2020 (See *Appendix H, Attachment 9*).

Consultation with MDNR and USFWS was completed for the general proposed action and therefore the guidance provided by consulted agencies applies to this alternative as well.

Comparison of 2015 ALP Alternative and Sponsor's Preferred Alternative

Table 5.2.3 compares the potential impacts to biological resources for the 2015 ALP Alternative and the Sponsor's Preferred Alternative. The Sponsor's Preferred Alternative reduces total forest clearing by selective harvesting of individual tree obstructions.

5.2.4.3 No Action Alternative

Under the No Action Alternative, no impacts would occur to either forest stands or individual tree obstructions. New facilities would not be constructed and obstructions to navigable airspace would remain as potential hazards to aviation.

5.2.5 Mitigation

MDOT MAA calculated forest mitigation requirements by completing MDNR Forest Conservation Worksheets for individual projects. As the Forest Conservation Act applies to any project over 40,000 square feet (regardless of whether forest resources are present), mitigation requirements were calculated for all projects and are presented in **Tables 5.2.4 and 5.2.5**, for the 2015 ALP Alternative and Sponsor's Preferred Alternative, respectively. See *Appendix H, Attachment 6* for the Forest Conservation mitigation worksheets for each project.

Table 5.2.3
Comparison of 2015 ALP Alternative and Sponsor's Preferred Alternative Impacts to Biological Resources

Project	Forest Clearing	Individual Tree Clearing (On Airport)	Individual Tree Clearing (Off Airport)
2015 ALP Alternative Total	219.38 ac.	355 trees	1,147 trees
Sponsor's Preferred Alternative Total	83.00 ac.	1,228 trees	1,102 trees

Source: JMT analysis, 2019.

Table 5.2.4
2015 ALP Alternative Forest Mitigation Requirements

Project	LOD (acres)	Forest Clearing	Mitigation Requirements
Relocate Taxiways F and R (1)	111	5.06 ac. (220,857 sf)	21.71 ac. (945,688 sf)
International Terminal Area Taxiway Fillets/Shoulders (3)	14.6	0	2.19 ac. (95,396 sf)
New Infill Pavement Near Taxiways T, P and 'Future P' (4)	11.6	0	1.74 ac. (75,794 sf)
Relocate Taxiways K and L (6)	7.9	0	1.19 ac. (51,836 sf)
Runway 28 Deicing Pad Expansion (8)	14.1	0	2.12 ac. (92,129 sf)
Part 77 Obstruction Removal (10)	N/A	180.33 ac. (7,855,175 sf)	N/A
Taxiway V Relocation (17)	35	0.02 ac. (871 sf)	5.27 ac. (229,561 sf)
VORTAC Critical Area Clearing	6.3	6.28 ac (273,557 sf)	3.77 ac. (164,134 sf)
Taxiway U3 (2)	5.1	0	0.77 ac. (33,541 sf)
Isolation/RON Apron (7)	36	0	5.4 ac. (235,224 sf)
Taxiway H Relocation (12)	8.8	0	1.32 ac. (57,499 sf)
Relocate Fire Training Facility (P45)	24	17.12 ac. (745,747 sf)	12.68 ac. (552,341 sf)
VSR Connector	1.9	0	0.29 ac. (12,415 sf)
Runway 15R Deicing Pad Expansion (18)	16.3	0	2.45 ac. (106,722 sf)
Second FBO (P7)	13.9	0	2.09 ac. (91,040 sf)
New Airline Maintenance Facility (P11)	76	52.93 ac. (2,305,631 sf)	39.83 ac. (1,734,995 sf)
Airport Maintenance Complex (P30)	17.7	0	2.66 ac. (115,870 sf)
Terminal Roadway Widening and Access Improvements (15)	2	0	0.3 ac. (13,068 sf)
Upper Level Roadway Widening at Concourse E (19)	8.1	0	1.22 ac. (53,143 sf)
Relocate RTR Facility (21)	1.3	0.5 ac. (21,780 sf)	0.58 ac. (25,265 sf)

Note: Forest Clearing includes overlaps with Part 77 obstruction removal areas.

Sources: Forest Conservation mitigation worksheets (*Appendix H, Attachment 6*), and JMT analysis, 2019.

Table 5.2.5

Sponsor's Preferred Alternative Forest Mitigation Requirements

Project	LOD (acres)	Forest Clearing	Mitigation Requirements
Relocate Taxiways F and R (1)	111	5.06 ac. (220,857 sf)	21.71 ac. (945,688 sf)
International Terminal Area Taxiway Fillets/Shoulders (3)	14.6	0	2.19 ac. (95,396 sf)
New Infill Pavement Near Taxiways T, P and 'Future P' (4)	11.6	0	1.74 ac. (75,794 sf)
Relocate Taxiways K and L (6)	7.9	0	1.19 ac. (51,836 sf)
Runway 28 Deicing Pad Expansion (8)	16.6	0	2.49 ac. (108,464 sf)
Part 77 Obstruction Removal (10)	N/A	48.21 ac. (2,100,028 sf)	N/A
Taxiway V Relocation (17)	35	0.02 ac. (871 sf)	5.27 ac. (229,561 sf)
VORTAC Critical Area Clearing	6.3	6.28 ac (273,557 sf)	3.77 ac. (164,134 sf)
Taxiway U3 (2)	10.8	0	1.62 ac. (70,567 sf)
Isolation/RON Apron (7)	37	0	5.54 ac. (241,322 sf)
Taxiway H Relocation (12)	7.1	0	1.07 ac. (46,609 sf)
Relocate Fire Training Facility (P45)	31	22.54 ac. (981,842 sf)	16.49 ac. (718,304 sf)
VSR Connector	1.9	0	0.29 ac. (12,415 sf)
Runway 15R Deicing Pad Expansion (18)	16.3	0	2.45 ac. (106,722 sf)
Second FBO (P7)	13.9	0	2.09 ac. (91,040 sf)
New Airline Maintenance Facility (P11)	78	48.60 ac. (2,117,016 sf)	39.45 ac. (1,718,442 sf)
Airport Maintenance Complex (P30)	17.7	0	2.66 ac. (115,870 sf)
Terminal Roadway Widening and Access Improvements (15)	2	0	0.3 ac. (13,068 sf)
Upper Level Roadway Widening at Concourse E (19)	8.1	0	1.22 ac. (53,143 sf)
Relocate RTR Facility (21)	1.3	0.5 ac. (21,780 sf)	0.58 ac. (25,265 sf)

Note: Forest Clearing includes overlaps with Part 77 obstruction removal areas.

Sources: Forest Conservation mitigation worksheets (*Appendix H, Attachment 6*), and JMT analysis, 2019.

No mitigation under Maryland's Forest Conservation Act is required for removal of forested areas or individual tree obstructions that occur on or off-airport property within FAR Part 77 primary, approach, departure, and transitional surfaces (COMAR 5-1602(b)(11)). Accordingly, for the Sponsor's Preferred Alternative, there is no mitigation required for approximately 48 acres of tree clearing on-airport property needed to meet Part 77 requirements (48.21 acres), as well as the 1,228 individual on-airport Part 77 obstructions and 1,102 individual off-airport Part 77 obstructions.

There are an additional approximately 35 acres of on-airport trees proposed to be cleared for the relocation of the fire training facility (6 acres), the construction of the airline maintenance facility (25 acres), and to allow the safe operation of the VORTAC (4 acres). Mitigation requirements will be met for these projects, as well as for any project with over 40,000 square feet of ground disturbance (regardless of whether forest resources are present) in accordance with the MDNR Forest Conservation Act.

MDOT MAA proposes to meet forest mitigation requirements for individual projects through placement of MDNR Forest Conservation Easements on MDOT MAA-owned forests within and surrounding the Stony Run WSSC as illustrated in **Figure 5.2-5**. Due to the high quality of these resources, MDNR Forest Service has granted three acres of credit for every one acre placed under easement. MDOT MAA also has additional forested parcels that could be placed under Forest Conservation Easements as necessary; however, only one acre of credit will be granted for every one acre placed under easement.

Once mitigation measures are taken into consideration and implemented, none of the proposed improvements would have significant impacts.

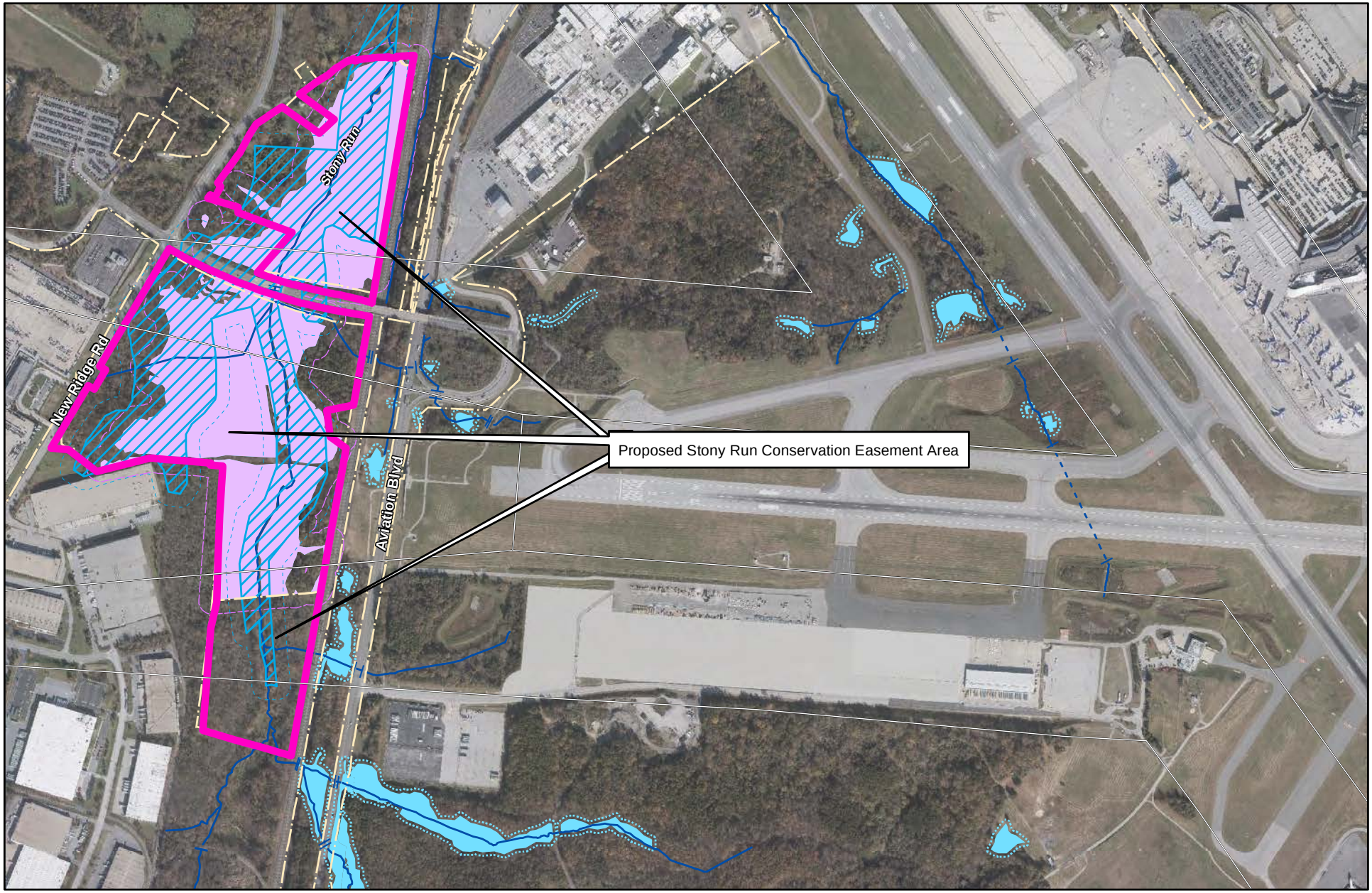
It should be noted that FIDS habitat is protected under Chesapeake Bay Critical Area regulations in Maryland; as no portions of the proposed projects are within designated Critical Area, no additional mitigation for impacts to FIDS habitat are required.

Prior to the removal or alteration of any tree on private property, MDOT MAA would negotiate individual easements, at appraised fair market value, with each impacted landowner. Additionally, as part of the easement process, all trees identified as obstructions would be surveyed to confirm the need for removal or alteration. MDOT MAA would work with individual landowners to mitigate where possible the impact of tree clearing (e.g., tree topping, replacement with low growth trees, replanting with grass, etc.).

5.2.6 Permitting

Forest Conservation Plans (FCPs) will be submitted to MDNR Forest Service for approval based on final design for all projects with over 40,000 square feet of disturbance in order for MDNR to issue grading permits.

Because off-airport impacts are limited to individual tree removals on private property, grading permits will not be required, and therefore, preparation of individual FCPs will not be necessary.



LEGEND

- Airport Property Boundary
- Part 77 (Primary, Approach and Transitional Surface Limits)
- Proposed Stony Run Conservation Easement Area
- Stream
- Culverted Stream
- Wetlands with 25' Buffers
- Wetlands of Special State Concern with 100' Buffers (MAA-delineated)
- Wetlands of Special State Concern with 100' Buffers (DNR)

Proposed Forest Conservation Easement
Figure 5.2-5

N

0 250 500 1,000 Feet

Source: Aerial - MDOT MAA (2018)

5.3 Climate

There is presently a broad scientific consensus that GHGs associated with human activities are contributing to changes in the earth's atmosphere. These GHGs, brought about principally by the combustion of fossil fuels, decomposition of waste materials, changes in land uses, and deforestation, are linked to an increase in the earth's average temperature by means of a phenomenon called the "greenhouse effect."

5.3.1 Laws and Regulations

Review of GHGs will consider requirements of the CAA and EO 13693, *Planning for Federal Sustainability in the Next Decade*.

5.3.2 Methodology

GHG emission inventories were prepared for the years 2022 and 2027 with and without the proposed improvements at BWI Marshall Airport. The proposed improvements considered as part of the Proposed Action serve to maintain efficient and safe operations while achieving a quality level of service. Without the proposed improvements, operations would continue to grow as there are no constraints to continued growth, i.e., the airfield, general aviation, terminal, landside, and support facilities can accommodate additional operations without improvements. Therefore, an identical number of flight operations, with the exception of run-up operations[4], are included in the No Action, 2015 ALP, and Sponsor's Preferred Alternatives aircraft emission model. However, without the proposed improvements, inefficiencies would become more apparent and the airport user experience would be of lower quality even though the number of operations will not increase As with the air quality analysis discussed in Section 5.1.2, the inventories were prepared only for the emission sources that would be affected by the improvements - aircraft and construction activity.

The GHGs inventoried were carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). As is customary for GHG emissions inventories, the results are reported in units of metric tons (MT) of carbon dioxide equivalents (CO_2e), by source, on an annual basis. The GHG emission results were converted to CO_2e values using the Global Warming Potential (GWP) values of 1 for CO_2, 25 for CH_4, and 298 for nitrous oxide (N_2O), based on a 100-year period.[5] GWP values are relative measures of how much heat a GHG traps in the atmosphere when compared to carbon dioxide (e.g., CH_4 is 25 times as potent a GHG than CO_2). For this purpose, estimates of CH_4 and N_2O emissions were multiplied by their respective GWP values (25 for CH_4 and 298 for N_2O) to determine the CO_2e.

A more detailed discussion of the methodology and assumptions used to prepare the GHG inventories is provided in *Appendix G, Attachment 2*.

5.3.3 Thresholds of Significance

There are no airport-related federal standards for emissions of GHGs and no FAA-established significance threshold for climate.

5.3.4 Impact Analysis

Potential impacts to climate related to airport operations and construction emissions of GHGs were identified and evaluated.

5.3.4.1 2015 ALP Alternative

Table 5.3.1 presents the estimated annual CO_2e airport operation emissions for future years 2022 and 2027 for the No Action and

2015 ALP Alternative. The level of CO_2e airport operation emissions would increase between 2022 and 2027, and between the No Action and Proposed Action Alternatives. This relatively small increase in GHG emissions in the Proposed Action is due to the additional run-up operations modeled at the new Airline Maintenance Facility.

Table 5.3.2 presents the construction CO_2e emissions for the project construction years. Emissions of CO_2e would increase due to construction activities during the years 2019-2022. However, this would only be for the short term and the projects would have no long-term impacts to CO_2e emissions.

Table 5.3.1
Airport Operation CO_2e Emissions (MT per year)

Year	Alternative	CO_2e
2022	No Action	307,893
	2015 ALP	308,094
	Difference (Project-Related)	***202***
2027	No Action	346,908
	2015 ALP	347,119
	Difference (Project-Related)	***211***

Note: MT = metric ton; CO_2e = carbon dioxide equivalent

Source: HNTB analysis, July2019.

Table 5.3.2
Construction Operations CO_2e Emissions (MT per year)

Year	CO_2e
2020	6,512
2021	11,917
2022	5,136

Note: MT = metric ton; CO_2e = carbon dioxide equivalent

Sources : KB Environmental Sciences, Inc., analysis March 2017, and HNTB analysis, July 2019. (See *Appendix G, Air Quality and Climate, Attachments 2 and 3*)

Because the 2015 ALP Alternative represents such a small amount of U.S. GHG emissions, and given the related uncertainties involving the assessment of such emissions regionally and globally, the incremental contribution of the 2015 ALP Alternative to U.S. and global GHG emissions cannot be adequately assessed given the current state of the science and assessment methodology.

5.3.4.2 Sponsor's Preferred Alternative

The CO_2e emissions analysis for the Sponsor's Preferred Alternative is identical to that described for the 2015 ALP Alternative. The relatively small increase in GHG emissions for aircraft operations is due to the additional run-up operations modeled at the proposed Airline Maintenance Facility.

Emissions of CO_2e would increase due to construction activities during the years 2019-2022. However, this would only be for the short term and the projects would have no long-term impacts to CO_2e emissions.

Because the Sponsor's Preferred Alternative represents such a small amount of U.S. GHG emissions, and given the related uncertainties involving the assessment of such emissions regionally and globally, the incremental contribution of the Sponsor's Preferred Alternative to U.S. and global GHG emissions cannot be adequately assessed given the current state of the science and assessment methodology.

5.3.4.3 No Action Alternative

As indicated in Table 5.3.1, there is minor increase in airport emissions between the No Action and 2015 ALP Alternative/Sponsor's Preferred Alternative for either future year due to the additional proposed maintenance

run-op operations. The proposed improvements would not be constructed under the No Action Alternative and therefore no construction related CO_2e emissions would occur.

5.4 Coastal Resources

Anne Arundel County, BWI Marshall Airport, and the Physical Development Study Area are within Maryland's coastal zone. As such, MDOT MAA is required to comply with the regulations set forth and administered by MDE and MDNR.

5.4.1 Laws and Regulations

Pursuant to the Coastal Zone Management Act (CZMA) of 1972, the National Oceanic and Atmospheric Administration (NOAA) approved the Maryland CZMP in 1978. Any federal activities that have the potential to affect any land or water use, or natural resources in Maryland's designated coastal zone must be conducted according to the enforceable policies of the CZMP. Maryland's CZMP is administered by the MDE.

5.4.2 Methodology

A federal coastal zone consistency determination is prepared by MDE to determine whether the Proposed Action is consistent with Maryland's CZMP.

5.4.3 Thresholds of Significance

There is no established threshold of significance for coastal resources. However, FAA Order 1050.1F provides factors to consider in determining whether the threshold of significance for coastal resource impacts would be exceeded, including:

- Inconsistency with state coastal zone management plan;
- Impacts a coastal barrier resource system unit or coral reef ecosystem;
- Causes risk to human safety or property; or
- Causes adverse impacts to the coastal environment that cannot be satisfactorily mitigated.

5.4.4 Impact Analysis

As part of the submission of the Draft EA and Draft Section 4(f) Determination in January 2018 for agency and public review, MDOT MAA via the Maryland State Clearinghouse review process submitted a request to the MDE Federal Consistency Coordinator seeking a Coastal Zone Consistency determination for the proposed improvements, pursuant to Section 307 of the CZMA. The MDE issued their consistency determination in February 2018 stating that the proposed improvements are consistent with the Maryland CZMP while noting the forest impact mitigation that will be required to meet the provisions of the FCA as well as the permitting and mitigation that will need to be obtained from the MDE Wetlands and Waterways Program, as discussed further in the Biological Resources and Water Resources sections of this Chapter, *Section 5.2.5* and *Section 5.14.5*, respectively.

As part of the submission of the Updated Draft EA and Draft Section 4(f) Determination for agency and public review, MDOT MAA via the Maryland State Clearinghouse review process will submit a request to the MDE Federal Consistency Coordinator seeking an updated Coastal Zone Consistency determination for the proposed improvements, pursuant to Section 307 of the CZMA.

5.4.4.1 2015 ALP Alternative

The 2015 ALP Alternative proposed improvements are within the Maryland Coastal Zone. MDOT MAA obtained a Coastal Zone Consistency Determination from MDE on February 9, 2018, see *Appendix N, Attachment 2*. An updated Coastal Consistency Determination was received for the Updated Draft EA and Draft Section 4(f) Determination on May 7, 2020, see *Appendix N, Attachment 4.*

5.4.4.2 Sponsor's Preferred Alternative

The Sponsor's Preferred Alternative proposed improvements are within the Maryland Coastal Zone. MDOT MAA obtained a Coastal Zone Consistency Determination from MDE on February 9, 2018, see *Appendix N, Attachment 2*. An updated Coastal Consistency Determination was received for the Updated Draft EA and Draft Section 4(f) Determination on May 7, 2020, see *Appendix N, Attachment 4.*

5.4.4.3 No Action Alternative

The No Action Alternative would result in no development of the proposed projects. There would be no impact to the Airport environment and therefore it would be consistent with Maryland's CZMP.

5.4.5 Mitigation

As detailed in MDE's Coastal Zone Consistency Determination, mitigation measures for coastal zone consistency are required for potential impacts to forests, wetlands, and floodplains. Impact analyses and discussion of mitigation for these resources are detailed in *Sections 5.2* and *5.14*, respectively.

5.5 Department of Transportation Act: Section 4(f) Resources

Section 4(f) resources within and adjacent to the Physical Development Study Area were identified in Chapter 4, *Section 4.6, Section 4(f) Resources,* and the potential for various types of "use" was considered.

5.5.1 Laws and Regulations

As discussed in Chapter 4, *Section 4.6*, Section 4(f) of the DOT Act of 1966 states that the "…Secretary of Transportation will not approve a 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 a 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 [unless] the project includes all possible planning to minimize harm resulting from the use."

5.5.2 Methodology

Direct and indirect impacts of the proposed projects on Section 4(f) resources were investigated. The potential constructive use, visual impact and temporary occupancy were considered for each of the 4(f) resources identified in Chapter 4, *Section 4.6, Section 4(f) Resources*.

5.5.3 Thresholds of Significance

FAA Order 1050.1F provides the FAA's significance threshold for Section 4(f) properties as the following: "A significant impact would occur when: *The action involves more than a minimal physical use of a Section 4(f) resource or constitutes a "constructive use" based on an FAA determination that the aviation project would substantially impair the Section 4(f) resource."*[6]

5.5.4 Impact Analysis

Potential direct and indirect impacts to Section 4(f) resources were identified and evaluated.

5.5.4.1 2015 ALP Alternative

The 2015 ALP Alternative includes a *de minimis* impact to Andover Park and where a proposed VSR will need to cross the BWI Trail. Two temporary occupancies to the trail are also possible during construction, as discussed in the following paragraphs.

Andover Park

Andover Park lies within the Part 77 surfaces for the Runway 15L end. As shown in **Figure 5.5-1**, vegetative obstruction removal is proposed within a portion of the park. The 2015 ALP Alternative would result in the removal of approximately 70 trees on Andover Park property in order to comply with FAA 14 CFR Part 77 regulations. The proposed vegetative removal is located along the edge of the park property that borders with Andover Recreation Center to the south, a privately-owned facility. The vegetation removal at this property would not alter the use of the park sports fields and picnic areas. The proposed vegetative obstruction removal along the southern edge of the property could result in minor visual changes to park users that venture beyond the commonly used area of the park but would not interfere with activities. The selective tree clearing is located away from the park sports fields and picnic areas. Forest stands would remain, and the minor visual changes would only be noticeable at a close distance from the clearing location.

Additionally, the main purpose of the park is for recreation, and the viewshed is not a significant attribute in terms of what makes the park a Section 4(f) property. According to the FAA Order 1050.1F Desk Reference, "Substantial impairment occurs only when the protected activities, features, or attributes of the Section 4(f) property that contribute to its significance or enjoyment are substantially diminished. This means that the value of the Section 4(f) property, in terms of its prior significance and enjoyment, is substantially reduced or lost."

A review of the project impacts and proposed tree removal shows that the impacts to the park would not adversely affect the activities, features, or attributes qualifying Andover Park for protection under Section 4(f).

A *de minimis* concurrence letter was sent to Anne Arundel County Department of Recreation and Parks (DRP) (the official with jurisdiction of Andover Park) on March 17, 2017, for their agreement that the proposed improvements would not adversely affect Andover Park. Concurrence from DRP was received on March 24, 2017.

BWI Trail

The BWI Trail runs along Aviation Boulevard, paralleling the Airport property line. The BWI Trail was built and is maintained through a MOU between MDOT MAA, Anne Arundel County DRP and the MDOT SHA. The BWI Trail crosses over many access roadways as it loops around the Airport campus.

A VSR is proposed off Aviation Boulevard to the relocated fire training facility (P45), south of the existing intersection with Cromwell Park Drive and across from the Maryland State Police Glen Burnie Barrack P. The VSR location was selected to utilize existing open space to minimize forest impacts and to avoid conflicts with the existing Runway 28 RPZ to the north. As shown in **Figure 5.5-2**, the VSR would intersect the BWI Trail and

LEGEND

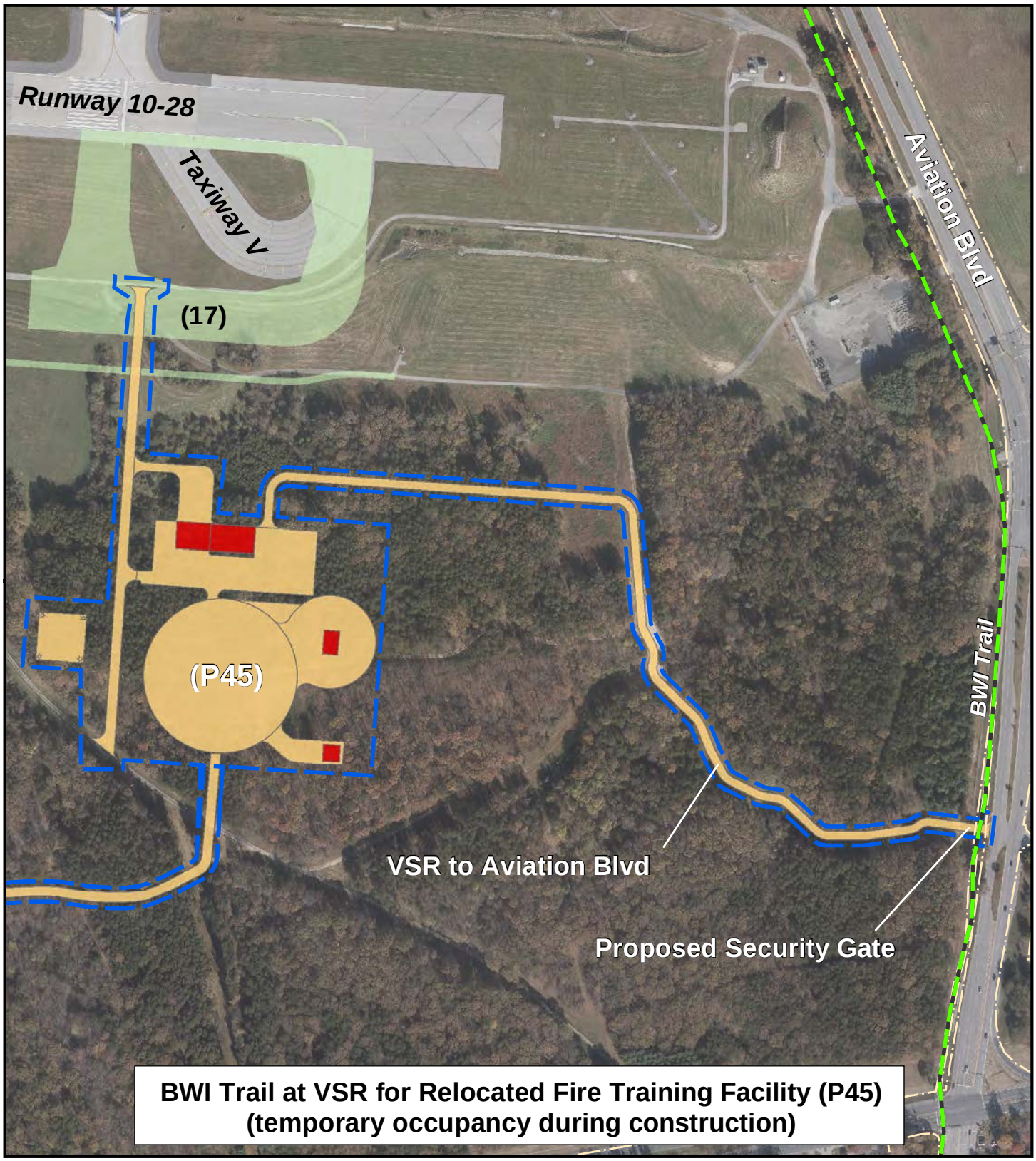
- Andover Park Boundary
- BWI Airport Property Boundary
- Andover Park Tree Obstruction
- BWI Trail

Impacts to Section 4(f) Resources - Andover Park
Figure 5.5-1

N

0 62.5 125 250 Feet

Source: Aerial - MDOT MAA (2018), Anne Arundel County GIS, MDOT MAA



BWI Trail at VSR for Relocated Fire Training Facility (P45) (temporary occupancy during construction)

LEGEND

- BWI Airport Property Boundary
- BWI Trail
- New Impervious
- Other EA Projects
- Limit of Disturbance
- Building

Impacts to Section 4(f) Resources
BWI Trail with 2015 ALP Alternative for Relocated Fire Training Facility
Figure 5.5-2

N

0 100 200 400 Feet

Source: Aerial - MDOT MAA (2018), ADCI, Anne Arundel County GIS, MDOT MAA

result in an added permanent crossing. This section of the BWI Trail is on MDOT MAA property. An access gate is proposed to the west of the trail and would not impact trail operations once constructed. Additionally, the proposed access roadway would carry minimal traffic. Construction activity while the VSR is built would result in a temporary occupancy of the BWI Trail. A *de minimis* concurrence letter was sent to Anne Arundel County DRP on August 8, 2018 due to the new permanent crossing. Concurrence that the proposed improvements would not adversely affect the BWI Trail was received from the DRP on August 20, 2018.

Additionally, the proposed Airline Maintenance Facility (P11) includes reconstruction of the VSR entrance where it already crosses the BWI Trail (at the intersection with Stoney Run Road) due to the roadway being realigned toward the new maintenance facility, as shown in **Figure 5.5-3**. The construction-related activity may result in a temporary impact to the trail depending upon construction methods. An updated *de minimis* concurrence letter was sent to Anne Arundel County DRP on December 20, 2018 to indicate the 2015 ALP Alternatives temporary impacts to the BWI Trail related to the Airline Maintenance Facility. Concurrence that the proposed improvements would not adversely affect the BWI Trail was received from the DRP on January 23, 2019.

The temporary impacts to the trail during construction would not constitute a "use" in accordance with the guidance provided in FAA Order 1050.1F Desk Reference. The 1050.1F Desk Reference states, "A temporary occupancy of a Section 4(f) property for project construction-related activities is usually so minimal that it does not constitute a use within the meaning of Section 4(f)."[7] Given the ambient aircraft noise and other nearby land uses (vehicular roadways, etc.), construction-related noise is not anticipated to be noticeable for a prolonged duration or to interfere with trail activities. No permanent adverse physical impacts are expected to the trail, and any temporary interference with Section 4(f) activities during construction would be mitigated with a signed trail detour to maintain Section 4(f) activities during construction.

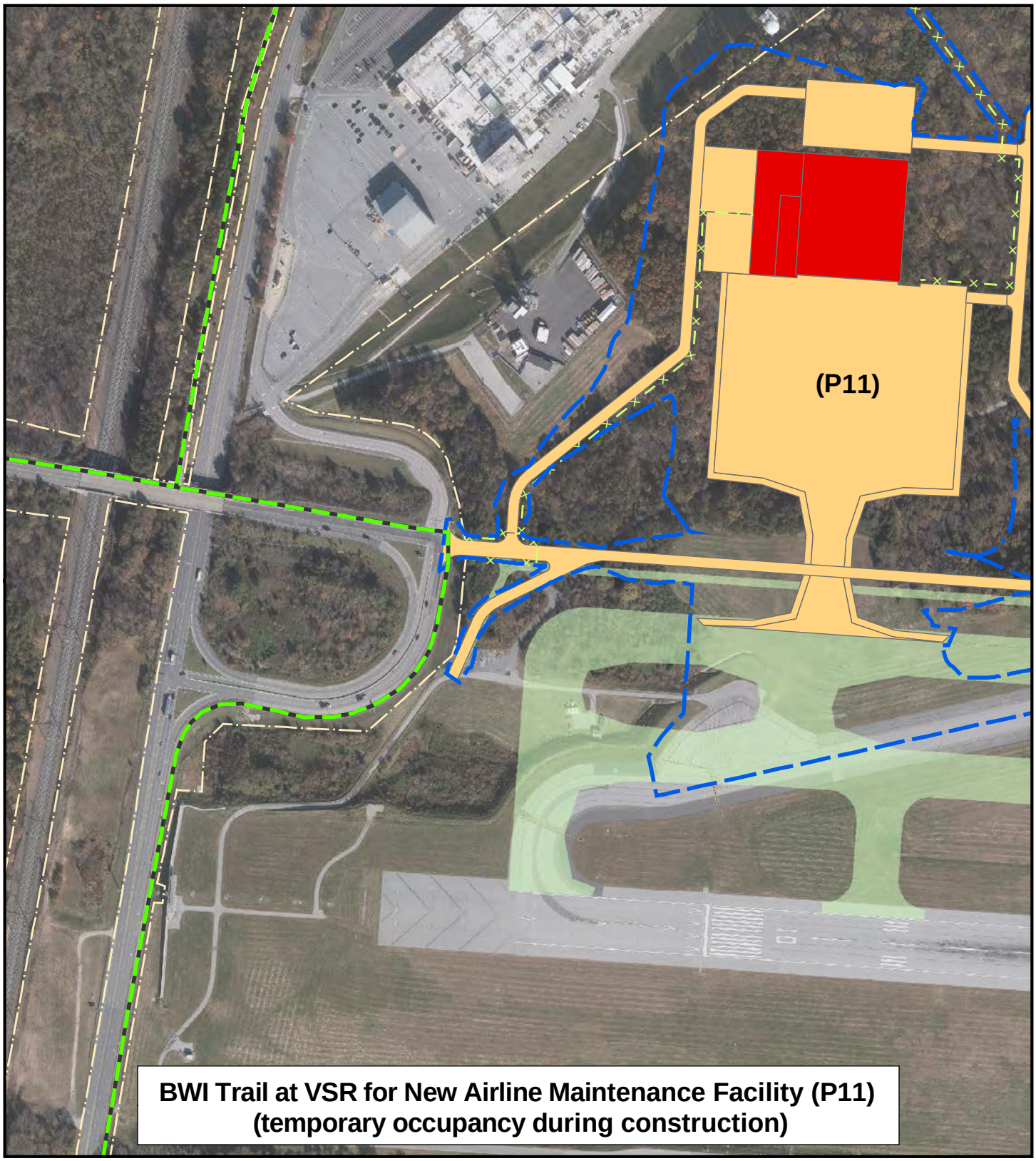
Visual Impacts

Proposed projects and vegetation removal may result in visual impacts to Section 4(f) resources. Lindale Middle School and Mane Event Equestrian, located north of the Airport off Andover Road, are not directly impacted by the 2015 ALP Alternative. However, proposed vegetative obstruction removal on bordering properties (Andover Park and the Airport) could result in minor visual impacts at the Section 4(f) properties. The Benson-Hammond House is located in the northeast corner of the airport. The closest proposed project to this resource is the Second FBO (P7). However, this project would not be visible from the Benson-Hammond House due to the surrounding vegetation which is not part of the proposed obstruction removal.

Potential visual impacts to the BWI Trail, Friendship Park and the Thomas A. Dixon, Jr. Observation Area resulting from vegetation removal or adjacent projects would be minimal and consistent with the Airport environment associated with these resources.

Noise Impacts

As detailed in *Appendix I, Attachment 1*, there would be no discernable change in noise exposure at Section 4(f) resources



LEGEND

- BWI Airport Property Boundary
- BWI Trail
- New Impervious
- Other EA Projects
- Limit of Disturbance
- Building
- Proposed Fence

Impacts to Section 4(f) Resources
BWI Trail with 2015 ALP Alternative for New Airline Maintenance Facility
Figure 5.5-3

N

0 100 200 400 Feet

Source: Aerial - MDOT MAA (2018), ADCI, Anne Arundel County GIS, MDOT MAA

identified within the Noise Impact Study Area between the 2027 No Action and 2027 Proposed Action Alternatives. Minor temporary noise impacts would result from construction activities, including tree removal.

The 2015 ALP Alternative would not have a significant impact on Section 4(f) resources. Refer to *Appendix I, Attachment 2,* for the *de minimis* impact determination for Andover Park and the BWI Trail.

Therefore, in accordance with guidance specified in 23 CFR §§ 774.3 and 774.17 and the FAA Order 1050.1F Desk Reference on *de minimis* impact determinations, after considering any measures to minimize harm and Anne Arundel County's concurrence that the proposed projects will not adversely affect either Andover Park or the BWI Trail, the FAA has made a *de minimis* impact determination.

Refer to *Appendix I, Attachment 3,* for correspondence between the MDOT MAA and DRP, including the concurrence letters.

5.5.4.2 Sponsor's Preferred Alternative

The Sponsor's Preferred Alternative would result in the same potential impacts to Section 4(f) resources as described for the 2015 ALP Alternative, in addition to temporary impacts from proposed utility connections under the BWI Trail associated with the Relocated Fire Training Facility and New Airline Maintenance Facility.

Andover Park

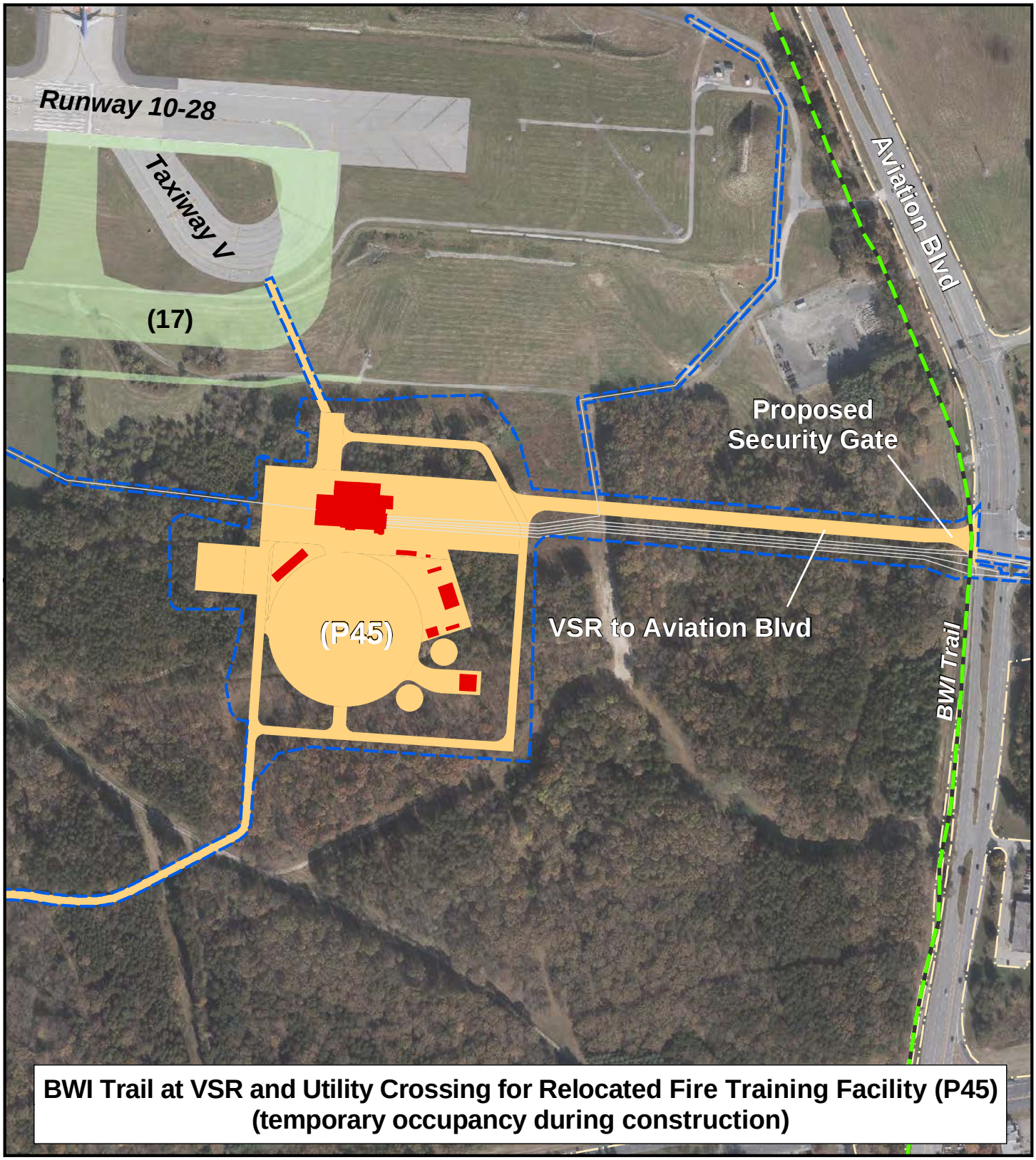
Figure 5.5-1 shows the vegetative obstruction removal that is proposed within the limits of Andover Park that is the same under 2015 ALP Alternative and the Sponsor's Preferred Alternative.

BWI Trail

Under the Sponsor's Preferred Alternative, the relocated fire training facility would be located further east, closer to Aviation Boulevard as shown on **Figure 5.5-4**. The proposed layout for the relocated facility would also have a different location for the VSR connection to Aviation Boulevard. The VSR location was selected to provide the most direct access route from Aviation Boulevard, to avoid conflicts with the existing Runway 28 RPZ to the north, and to avoid conflicts with future runway RPZs to the south. This connection would still require crossing of the BWI Trail, as with the 2015 ALP Alternative. The VSR would cross the BWI Trail and connect to Aviation Boulevard at the intersection of Cromwell Park Drive. As with the 2015 ALP Alternative, the proposed access roadway under the Sponsor's Preferred Alternative would carry minimal traffic.

The Sponsor's Preferred Alternative also includes proposed utility connections under the BWI Trail and Aviation Boulevard. Construction activity while the VSR is reconstructed and utility connections are placed would result in a temporary occupancy of the BWI Trail.

As with the 2015 ALP Alternative, the proposed Airline Maintenance Facility (P11) under the Sponsor's Preferred Alternative includes reconstruction of the VSR entrance where it already crosses the BWI Trail (at the intersection with Stoney Run Road) due to the roadway being realigned toward the new maintenance facility. Additionally, the Sponsor's Preferred Alternative proposed Airline Maintenance Facility (P11) includes a water line connection that would cross under



BWI Trail at VSR and Utility Crossing for Relocated Fire Training Facility (P45) (temporary occupancy during construction)

LEGEND

- BWI Airport Property Boundary
- BWI Trail
- New Impervious
- Other EA Projects
- Limit of Disturbance
- Building
- Utility Line

Impacts to Section 4(f) Resources
BWI Trail with Sponsors Preferred Alternative for Relocated Fire Training Facility
Figure 5.5-4

N

0 100 200 400 Feet

Source: Aerial - MDOT MAA (2018), ADCI, Anne Arundel County GIS, MDOT MAA

the BWI Trail at the location shown in **Figure 5.5-5**. The construction-related activity may result in a temporary impact to the trail depending upon construction methods.

As a result of the additional project planning for the relocated fire training facility and Airline Maintenance Facility, an updated *de minimis* concurrence letter was sent to Anne Arundel County DRP on December 20, 2018 and again on October 15, 2019 to indicate the Sponsor's Preferred Alternative impacts to the BWI Trail. Concurrence that the proposed improvements would not adversely affect the BWI Trail was received from the DRP on January 23, 2019 and November 22, 2019.

Visual Impacts

Potential visual impacts to Section 4(f) properties under the Sponsor's Preferred Alternative would be similar to the 2015 ALP Alternative. Vegetation obstruction removal under the Sponsor's Preferred Alternative differs from the 2015 ALP Alternative in that it proposes selective tree clearing on-airport property in environmentally sensitive areas to minimize impacts to wetlands, floodplains and streams.

Noise Impacts

As detailed in *Appendix I, Attachment 1*, there would be no discernable change in noise exposure at Section 4(f) resources identified within the Noise Impact Study Area between the 2027 No Action and 2027 Proposed Action Alternatives.

The Sponsor's Preferred Alternative would not have a significant impact on Section 4(f) resources. Refer to *Appendix I, Attachment 2,* for the *de minimis* impact determination for Andover Park and the BWI Trail.

Therefore, in accordance with guidance specified in 23 CFR §§ 774.3 and 774.17 and the FAA Order 1050.1F Desk Reference on *de minimis* impact determinations, after considering any measures to minimize harm and Anne Arundel County's concurrence that the proposed projects will not adversely affect either Andover Park or the BWI Trail, the FAA has made a *de minimis* impact determination.

Refer to *Appendix I, Attachment 3,* for correspondence between the MDOT MAA and DRP, including the concurrence letters.

5.5.4.3 No Action Alternative

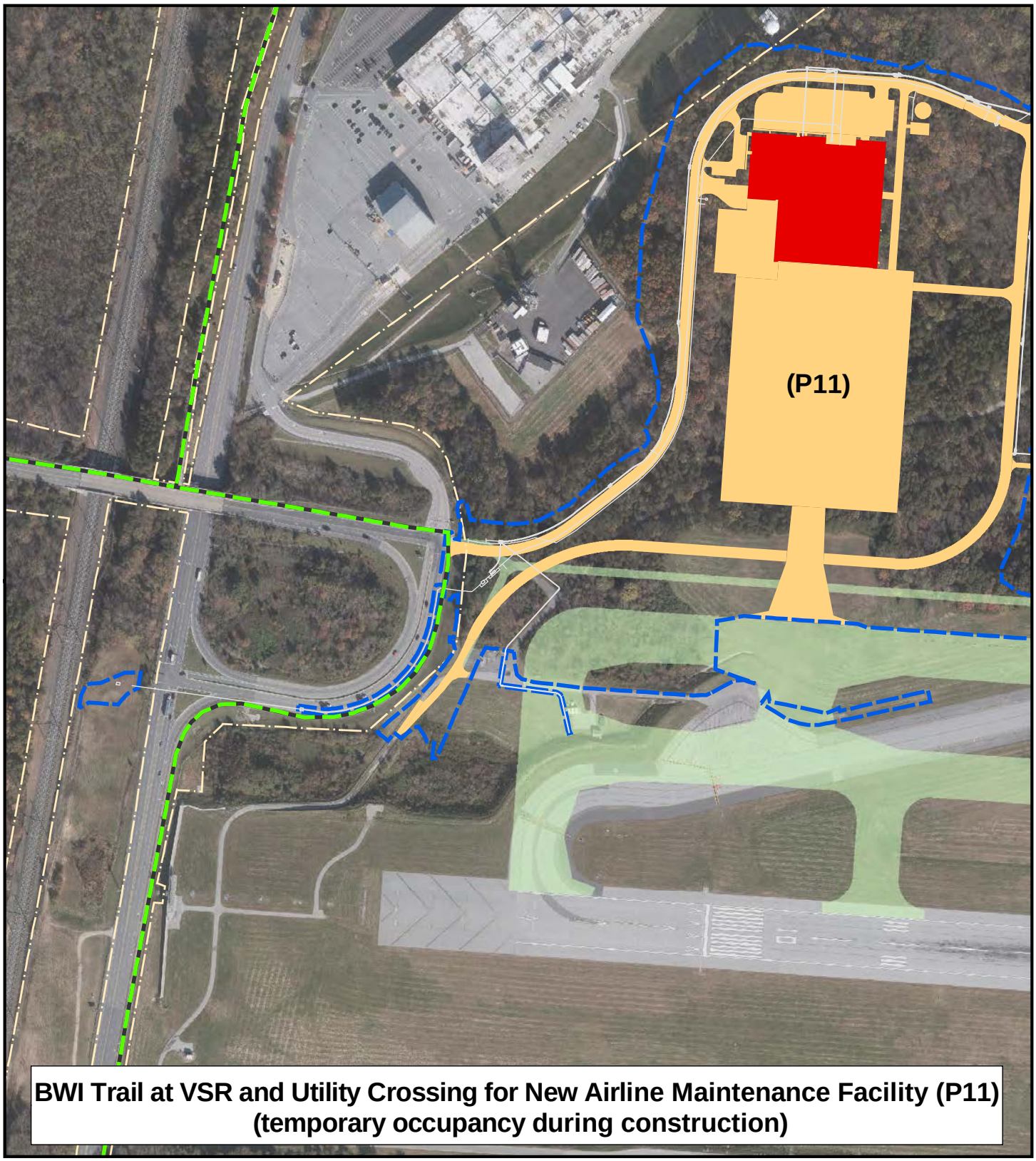
The No Action Alternative would have no physical or visual impacts to Section 4(f) resources.

5.5.5 Mitigation

Andover Park – Specific mitigation measures during and after removal of the trees will be determined between the MDOT MAA and the DRP. A field confirmation of trees identified as obstructions would be conducted to confirm the specific trees to be removed. Tree removal would be conducted in a manner that would minimize impacts, and would be coordinated thoroughly with the DRP to ensure that access is maintained to the park during the tree removal activities.

BWI Trail – A gate would be constructed west of the trail to limit access to the Fire Training Facility eliminating unnecessary vehicle traffic crossing the trail. Additionally, DRP has requested a stop sign be placed prior to crossing the trail in either direction so that trail users are granted the right of way.

During the temporary occupancy of the BWI Trail to construct the access roadway to the Fire Training Facility and to place



BWI Trail at VSR and Utility Crossing for New Airline Maintenance Facility (P11)
(temporary occupancy during construction)

LEGEND

- BWI Airport Property Boundary
- BWI Trail
- New Impervious
- Other EA Projects
- Limit of Disturbance
- Building
- Utility Line

Impacts to Section 4(f) Resource
BWI Trail with Sponsors Preferred Alternative for New Airline Maintenance Facility
Figure 5.5-5

N

0 100 200 400 Feet

Source: Aerial - MDOT MAA (2018), ADCI, Anne Arundel County GIS, MDOT MAA

utilities/reconstruct the service road entrance to the proposed Airline Maintenance Facility, alternate paths/detours would be designated for the BWI Trail. Additionally, the areas of BWI Trail that may be temporarily affected would be replaced in-kind and the land would be restored fully to its existing condition/use.

5.6 Farmlands

The USDA NRCS Web Soil Survey shows that approximately 18% of the Physical Development Study Area is considered to be "areas of prime farmland," and approximately 15% is considered to be "farmland of statewide importance." (See Figure 4.7-1), however, these areas are currently dedicated to non-agricultural use.

5.6.1 Laws and Regulations

As discussed in Chapter 4, *Section 4.7, Farmlands*, the FPPA regulates the conversion of important farmland to non-agricultural uses.

5.6.2 Methodology

The location of the proposed projects was compared to the locations of prime or unique farmland as shown on the NRCS Web Soil Survey (Figure 4.7-1). Locations with overlap were further reviewed to determine whether their current use includes agricultural activities.

5.6.3 Thresholds of Significance

As identified in FAA Order 1050.1F, the significance threshold for Farmlands relates to the score derived from completing the "Farmland Conversion Impact Rating" (Form AD-1006). A score ranging from 200 to 260 points would be considered a significant impact. Additional factors to consider when evaluating impacts pursuant to FAA's Order 1050.1F Exhibit 4-1 includes a project's intent to "Convert important farmlands to non-agricultural uses."[8]

5.6.4 Impact Analysis

Potential impacts to areas of prime or unique farmland were identified and evaluated. Form AD-1006 was not prepared as there are no agricultural uses located within the Physical Development Study Area.

5.6.4.1 2015 ALP Alternative

Portions of several of the proposed improvements are located on soils considered prime farmland or of statewide importance. While portions of the limit of disturbance are located on these soils, the areas are not currently used for agricultural purposes and are committed to non-agricultural use; therefore, the 2015 ALP Alternative would not result in the conversion of any lands from agricultural to non-agricultural uses. There would be no conversion of existing farmland or other agricultural uses to non-agricultural uses; therefore, the 2015 ALP Alternative would not have a significant impact on farmland. No mitigation would be required.

5.6.4.2 Sponsor's Preferred Alternative

The Sponsor's Preferred Alternative would result in the same impacts to farmlands as described under the 2015 ALP Alternative. The Sponsor's Preferred Alternative would not have a significant impact on farmland and no mitigation would be required.

5.6.4.3 No Action Alternative

The No Action Alternative would result in no development of the proposed projects, and therefore would not result in any impacts to farmland soils or existing agricultural uses.

5.7 Hazardous Materials, Pollution Prevention and Solid Waste

This section discusses the analysis and presents the findings for the potential hazardous materials sites identified in Chapter 4, *Section 4.8, Hazardous Materials, Pollution Prevention, and Solid Waste* in relation to the proposed projects at BWI Marshall Airport. A discussion of the potential for the proposed improvements at the airport to generate hazardous materials and/or solid waste is also presented.

5.7.1 Laws and Regulations

The laws and regulations pertaining to hazardous materials, pollution prevention and solid waste are discussed in Chapter 4, *Section 4.8, Hazardous Materials, Pollution Prevention, and Solid Waste.*

5.7.2 Methodology

An electronic database search of agency records was performed to identify sites or facilities that utilize or store hazardous and other regulated materials. The search included sites that are known or have the potential to contain environmental contamination on and near BWI Marshall Airport. The search radius was two miles from the center point of the airport property.

5.7.3 Thresholds of Significance

The FAA has not established significance thresholds for hazardous materials, solid waste or pollution prevention. Instead, the FAA has identified factors to consider when evaluating impacts. These factors include assessing whether a project has the potential to:

- Violate applicable Federal, state, tribal or local laws or regulations regarding hazardous materials and/or solid waste management;
- Involve a contaminated site (including, but not limited to, a site listed on the NPL);
- Produce an appreciably different quantity or type of hazardous waste;
- Generate an appreciably different quantity or type of solid waste or use a different method of collection or disposal; or
- Adversely affect human health and the environment.

5.7.4 Impact Analysis

Potential impacts of the alternatives on hazardous materials and hazardous waste were identified and evaluated.

5.7.4.1 2015 ALP Alternative

As discussed in *4.8, Hazardous Materials, Pollution Prevention, and Solid Waste*, several sites on, or near the airport were identified that are known, or have the potential, to involve hazardous materials, hazardous waste, environmental contamination and/or other regulated substances. These sites could have an effect on the proposed improvements at BWI Marshall Airport. **Figure 5.7-1** illustrates each of the potential sites in relation to the proposed improvement projects at BWI Marshall Airport.[9] Potential conflicts with implementation of the proposed projects at the Airport include:

- Four historic USTs and nine currently active USTs (Site Nos. 2 and 5) are within the vicinity of pavement/roadway improvements and building demolition.

LEGEND

- Airport Property Boundary
- Pavement Improvements
- Proposed Structures
- Demolition
- Property Acquisition for NEPA Review
- Pole/Sign/Obstruction Light (To Be Relocated or Removed)
- Tree Obstruction Removal (2014 FMP Part 77 Conflict Areas)
- Obstruction Removal (2015 ALP Obstruction Points)
- Tree Removal for Phase I Improvements
- Tree Removal for VORTAC Critical Area
- Potential Hazardous Materials Site

Potential Hazardous Material Sites Near Proposed Improvements
Figure 5.7-1

N

0 750 1,500 3,000 Feet

Source: Aerial - MDOT MAA (2018), KBE

- A large quantity generator (LQG), with no violations reported, is within the vicinity of the roadway improvements (Site No. 6).
- A site with a release and cleanup and a historic UST (removed from the ground) is also within the vicinity of roadway improvements (Site No. 8).
- A site found in the Historical Leaking Underground Storage Tanks (LUST) database that is noted as a site for sampling of monitoring wells only (Site No. 11) is within the vicinity of the building demolition that would occur with implementation of the proposed improvements.
- Two currently active USTs, one historic UST and one release and cleanup is reported to be within the vicinity of planned tree removal (Site Nos. 21 and 24).
- A site with a release and cleanup reported (Site No. 22) is within the vicinity of pavement improvements and proposed structures.
- Sites with currently active and historic USTs, and releases/cleanups to the soil (Site Nos. 28, 29, 30, 33, 34, 35, and 37) are within the vicinity of tree obstruction removal.
- A surface spill (Site No. 36) is within the vicinity of tree obstruction removal and proposed structures.

Based on these findings, appropriate precautions should be undertaken prior to and during the construction of the proposed improvement projects at BWI Marshall Airport. These may include, but are not limited to, the testing of soils and/or groundwater and the notification of appropriate agencies should hazardous materials or environmental contamination be encountered. During demolition activities, asbestos-containing materials may also be encountered and would require proper handling and disposal.

The proposed improvement projects are typical of international airports of the approximate size and function of BWI Marshall Airport. The generation of hazardous materials with the 2015 ALP Alternative would be limited mostly to solvents and their waste products. The proposed facilities may also involve the storage of fuel and other petroleum products (e.g., oil, grease, lubricants) in relatively small quantities.

Generation of Solid Waste

The solid wastes associated with construction of the proposed improvements would likely be confined to building demolition debris such as concrete, asphalt, wood, etc. These materials may be transported and disposed of in nearby landfills, repurposed or recycled to the extent feasible. Over the long-term, the proposed improvements are not expected to make a substantial change in the generation of solid waste.

No significant environmental impacts related to hazardous materials and solid waste would be expected with the 2015 ALP Alternative and no mitigation would be required.

5.7.4.2 Sponsor's Preferred Alternative

The Sponsor's Preferred Alternative would result in the same impacts to hazardous materials and solid waste as described under the 2015 ALP Alternative. As detailed in the 2015 ALP Alternative, appropriate

precautions would be undertaken prior to and during the construction of the Sponsor's Preferred Alternative improvements. Therefore, no significant environmental impacts related to hazardous materials and solid waste would be expected with the Sponsor's Preferred Alternative and no mitigation would be required.

5.7.4.3 No Action Alternative

Under the No Action Alternative, there would be no proposed development and therefore no potential for impacts to hazardous materials or solid waste.

5.7.5 Mitigation and Pollution Prevention

The design and use of the proposed improvement projects will adhere to federal and state regulations as well as best practices pertaining to the use of hazardous materials, petroleum storage and waste disposal. This includes precautionary measures aimed at preventing and minimizing impacts to surface and ground waters, soil and air.

5.8 Historical, Architectural, Archaeological and Cultural Resources

Potential impacts to historic and archaeological resources were identified and evaluated as part of the EA and Section 4(f) Determination. The SHPO review of this document will serve to satisfy the requirements of the consultation required under Section 106 of the NHPA. The outcome of this consultation is included in this EA and Section 4(f) Determination document. The applicable background information and consultation with the SHPO (MHT) is contained in Appendix J. This section includes a description of construction impacts and measures to be taken to minimize potential adverse impacts.

Tribal consultation was conducted with Indian tribes that may be affected by the proposed project. ***Appendix M***, ***Public and Agency Involvement*** contains the coordination letters that were sent as well as the response received from the Delaware Tribe Historic Preservation Representatives. The Delaware Tribe was the only respondent. The Tribe indicated that they have no objections to the proposed projects but would like to be notified should a concentration of artifacts be unearthed during construction.

5.8.1 Laws and Regulations

Standards for evaluating potential effects on historic resources are derived from the National Historic Preservation Act of 1966, as amended. These regulations define "effect" as "alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the National register" (36 CFR 800.16). An "adverse effect" occurs "when an undertaking may alter, directly or indirectly, any of the characteristics of the historic property that qualify it for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association" (36 CFR 800.10). Federal regulations also require that special attention be given to the effects of an undertaking on a National Historic Landmark (36 CFR 800.10).

5.8.2 Methodology

The second volume of the 1996 HPP created for BWI Marshall Airport provides guidance for the impact evaluation on archaeological and historic resources. In the context of significant archaeological sites within BWI

Marshall Airport, an adverse effect is defined as an action that "directly destroys or damages all or a portion of a significant site, results in the neglect of the site, which in turn results in the erosion or deterioration of all or portions of the site, and results in the transfer, lease or sale of the site area to a private interest."[10] Once an impact occurs to an archaeological site, the effect is irreversible and permanent. Any effects to archaeological resources are assumed to have impacts only on the immediate resource and not a broader area.

If an adverse effect occurs, the FAA, MDOT MAA, and MHT may develop an agreement that the action would not be considered adverse providing:

1. the FAA and MDOT MAA agree to modify the action to avoid any adverse effect on the site;

2. the significance of the site is its potential to yield important archaeological and/or historical information, and this information can be preserved through implementing an approved plan of archaeological and/or historical investigations; and,

3. the action is limited to the transfer, lease, or sale of lands containing the site, and adequate restriction are included within the instrument used to transfer, lease, or sell the lands ensuring the preservation of the site.[11]

These conditions do not apply to sites significant for their potential for public interpretation, or when the site has or may have human remains or cultural items as defined in the Native American Graves Protection and Repatriation Act (NAGPRA). In the context of the Benson-Hammond House (AA-118), the single historic property which is listed on the NRHP within the APE for historic resources, "an adverse effect occurs when the action diminishes the integrity of this property's location, design, setting, materials, workmanship, and feeling."[12]

Potential effects to cultural resources also include indirect effects. Changes in the use, operation, or character of a resource, or a transfer of ownership might be either direct or indirect effects. Changes to the visual context of a resource is considered an indirect effect. In general, visual context is relevant only to above-ground historic resources.

If MDOT MAA and the FAA determine that the Proposed Action will have no adverse effect on a historic property, the finding is to be documented and submitted to the MHT for concurrence. If the MHT concurs, the action may proceed. If after 30 days neither comments nor concurrence has been obtained from the MHT, MDOT MAA and the FAA may proceed as if concurrence had been obtained.

If MDOT MAA, the FAA, and MHT agree to a conditional no adverse effect, MDOT MAA and the FAA write the agreement stipulating the conditions to be followed so the effect will not be considered adverse, and seek concurrence from MHT. If MHT concurs, once the agreement is filed, the action may proceed.

If MDOT MAA and the FAA determine that the action will have an adverse effect on a historic property, they will document the finding and submit the documentation to MHT for concurrence. It is then necessary to determine the alternatives that are available to minimize the adverse effect.

5.8.3 Thresholds of Significance

According to FAA Order 1050.1F, while a threshold of significance has not been established, a factor to be considered when evaluating potential environmental impacts to historical, architectural, archaeological, and cultural resources is when "The action would result in a finding of Adverse Effect through the Section 106 process. However, an adverse effect finding does not automatically trigger preparation of an EIS (i.e., a significant impact)."[13] Note that this factor is not intended to be a threshold. The NHPA regulations at 36 CFR §800.8(a) state that an Adverse Effect finding does not necessarily require an EIS under NEPA. The FAA makes the determination on the level of impact under NEPA and whether to prepare an EA or EIS. Advice from the ACHP and SHPO/THPO may assist the FAA in making this determination. Mitigation of adverse effects may be considered sufficient to keep impacts below levels of significance. For historic properties subject to Section 4(f) of the DOT Act, a significant impact would occur when the action involves more than a minimal physical use of a Section 4(f) resource or constitutes a "constructive use" based on an FAA determination that the aviation project would substantially impair the Section 4(f) resource..."[14]

Additionally, based on guidance within the HPP for BWI Marshall Airport, thresholds have been defined to determine the conditions under which an impact would be considered significant to historic and archaeological resources.

A negligible impact indicates that there would not be any noticeable changes to the historic or archaeological resource, or its visual context.

A minor adverse impact indicates that there would be visible changes to the resource or its visual context, but that these changes would not diminish the property's integrity.

A moderate adverse impact indicates that there would be a change in one or more of the resource's character-defining features, but these changes would not diminish the property's integrity to the extent that it would no longer be eligible.

A major adverse impact indicates that there would be changes to character-defining features such that it could compromise the integrity of the resource to the extent that it would no longer be eligible for listing in the NRHP.

5.8.4 Impact Analysis

Potential impacts to architectural and archaeological resources were identified and evaluated.

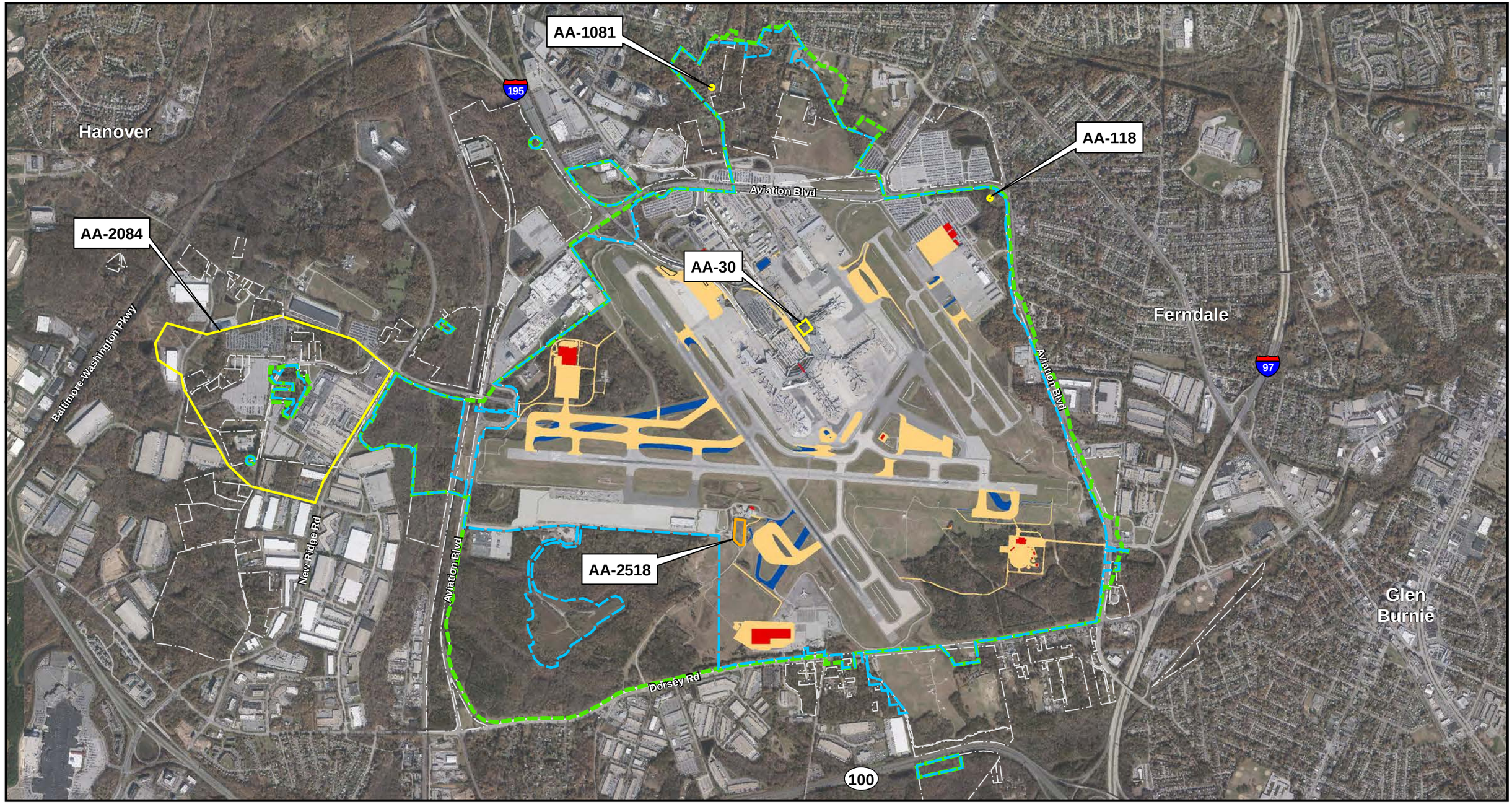
5.8.4.1 2015 ALP Alternative

Architectural Resources

One architectural resource within the APE-Direct and APE-Indirect has been demolished (AA-30), and three have been determined not eligible for the NRHP (AA-1081, AA-2084, and AA-2518), and thus there is no need to evaluate the impacts to these resources. Impacts were considered only for the Benson-Hammond House (AA-118), which has been listed on the NRHP. **Figure 5.8-1** indicates the location of the Benson-Hammond House in relation to the proposed improvements.

Benson-Hammond House (AA-118)

The nearest proposed work to the Benson-Hammond House is the construction of a series of three structures approximately 1,000 feet to the southwest of the house.



LEGEND

- Direct Area of Potential Effect (APE-Direct)
- Indirect Area of Potential Effect (APE-Indirect)
- Airport Property Boundary
- Maryland Inventory of Historic Properties (MIHP)
- Architectural Resource
- Pavement Improvements
- Proposed Structures
- Demolition

Architectural Resources Near Proposed Improvements
Figure 5.8-1

N

0 1,000 2,000 4,000 Feet

Source: Aerial - MDOT MAA (2018)

Since the historic property would not be directly affected by proposed construction, only the indirect impacts need be considered. The wooded area at the back of the house obstructs views to the Airport to the northwest, west, southwest, and south, where all of the proposed work would be taking place. The viewshed of the historic property would not be affected. Therefore, the 2015 ALP Alternative would have no effect on the historic property. MHT concurred with this determination of no effect on December 13, 2019 (See *Appendix J, Attachment 3*).

Archaeological Resources

Subsurface historical resources, or archaeological resources, within the APE-Direct include ten sites which have been determined not eligible for the NRHP.[15] Thus, while work would affect sites 18AN366, 18AN705, 18AN778, 18AN1150, 18AN1427, 18AN1591, 18AN1594, 18AN1595, 18AN1596, and 18AN1597, impacts to these sites would not be deemed significant given the amount of prior disturbance which has already affected the integrity of these sites and the fact that the these resources are not eligible for the NRHP. Two sites were eliminated from consideration following Phase I archaeological work in 2016: 18AN877, which was determined to be outside of the APE-Direct, and 18AN262, which was eliminated from consideration due to the removal of the project associated with this site from the Proposed Action.

MDOT MAA has maintained coordination with MHT throughout the EA and Section 4(f) Determination process. The archaeological report submitted in 2016 by MDOT MAA to MHT resulted in final recommendations for affected sites, summarized in **Table 5.8.1**. Following the 2016 submission, MHT comments were incorporated into the 2016 report submission, resulting in the *Phase I Archaeological Identification Report* which was finalized in March 2017. Additional project planning efforts in 2018 resulted in the need to update the Direct and Indirect APE to encompass areas for new utilities under Aviation Boulevard and a new stockpile site in the southwest quadrant of the airport. MDOT MAA requested concurrence from MHT for the updated Direct and Indirect APEs on January 8, 2019, and MHT provided their concurrence with the updated APEs on January 29, 2019 *(see Appendix J, Attachment 3)*.

Table 5.8.1
Archaeological Resources Impact Analysis

Site	*Disposition** or MHT Recommendation
18AN23*	*No ground disturbance*
18AN366	Not Eligible (portion within APE-Direct)
18AN705	Not Eligible / Partially Destroyed
18AN778	Not Eligible
18AN1011*	*No potential impact*
18AN1150	Not Eligible
18AN1427	Not Eligible
18AN1428*	*No ground disturbance*
18AN1488*	*No ground disturbance*
18AN1591	Not Eligible
18AN1592	Comply with Maryland cemetery law as needed
18AN1594	Not Eligible
18AN1595	Not Eligible
18AN1596	Not Eligible
18AN1597	Not Eligible

Note: *Site did not receive a MHT recommendation as part of the 2016 archaeological campaign.

Source: EAC/A Analysis 2019.

Potential impacts are considered in the paragraphs that follow for the four archaeological resources within the APE-Direct that have not received an MHT

determination: Sites 18AN23, 18AN1011, 18AN1428, and 18AN1488. These four sites were not investigated in the 2016 archaeological campaign because they were screened prior to fieldwork and it was determined that they did not warrant additional investigation for reasons discussed in the paragraphs below. No formal determination of eligibility was provided by MHT for these sites, however, recommendations of "not eligible" were made to MHT on Sites 18AN1011 and 18AN1428. No recommendation was made on Site 18AN23 as the proposed improvements were revised to avoid the site, or on 18AN1488 because the site was determined to be outside the APE-Direct. **Figure 5.8-2** indicates the locations of the archaeological sites in relation to the proposed improvements.

Site 18AN23 has been extensively disturbed along its eastern and western edges. The current plan for this site would include the cutting of a single tree to stump level. Because this action has only above-ground consequences, this action would have no impact on any remaining archaeological resources. MHT concurred July 24, 2019 that a Phase II evaluation of the site was not warranted and that the removal of the single tree to stump level would have no adverse effect on Site 18AN23 (see *Appendix J, Attachment 3*).

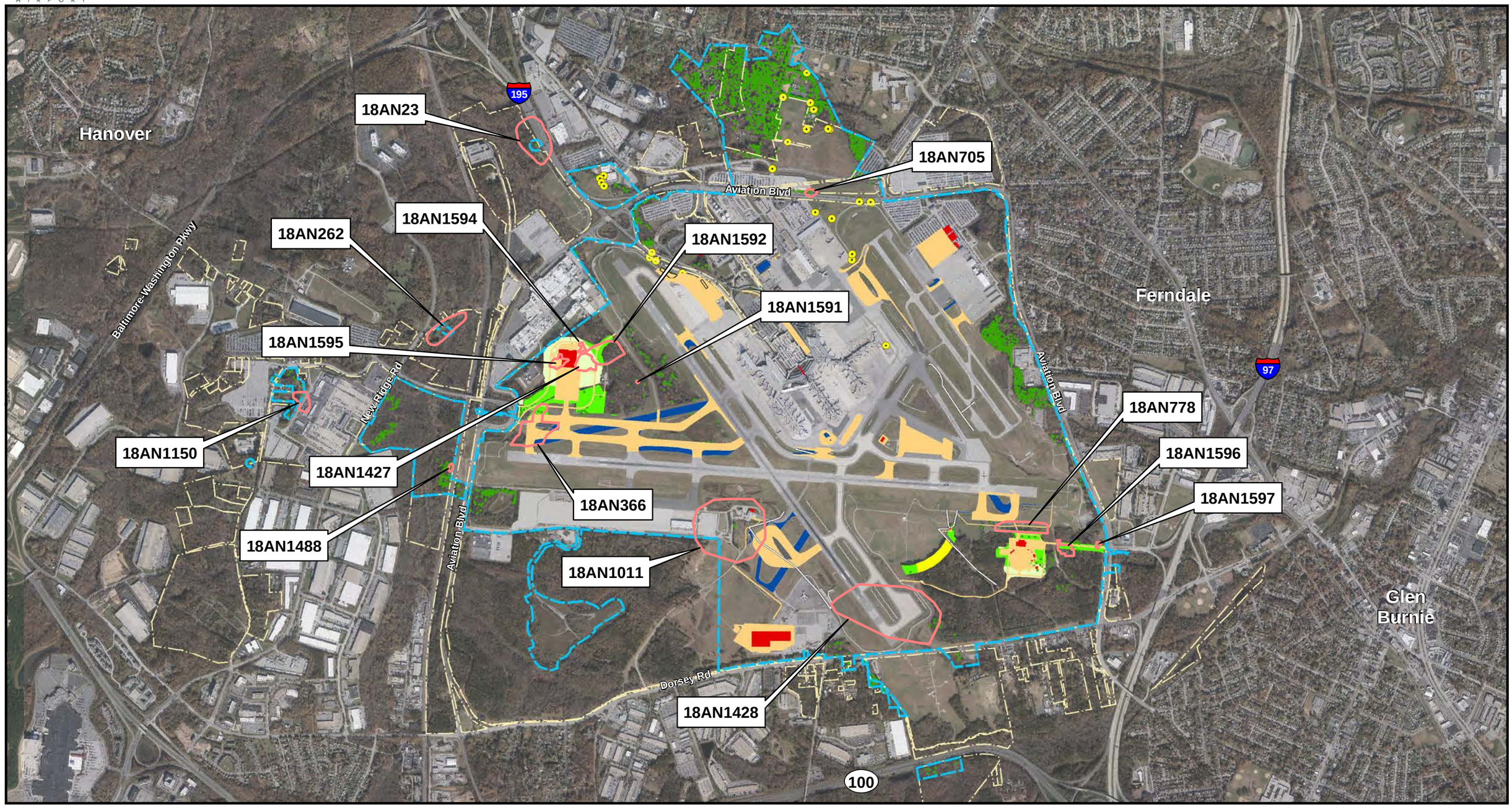
Site 18AN1011 is the archaeological component of Friendship Cemetery. Construction activities related to the installation of the ARFF in 1996 led to a recommendation that the portion of the site which had been excavated was not eligible for listing in the NRHP. However, additional burials outside of the fenced area suggest a "Potters Field" portion for Friendship Cemetery. Thus, only the portion impacted by the existing ARFF has been evaluated.

The boundaries of Site 18AN1011 encompass the area of two proposed expansion bays for the existing ARFF at the north end, proposed roadway improvements to accommodate an isolation/RON apron, isolation/RON apron construction along the eastern side, and approximately 800 feet of proposed ductbank along the eastern side (connected action of the relocated RTR facility project).

As previously discussed, the area to the north of the fence of Friendship Cemetery has already been extensively disturbed. This portion of the site was evaluated and determined not eligible for the NRHP.[16] Therefore, the proposed expansion bays for the ARFF would have no impact on Site 18AN1011.

The construction of the isolation/RON apron, as well as the ductbank for the RTR facility along the eastern perimeter of Site 18AN1011 would involve subsurface impacts, but the 1953 plat map of the cemetery does not indicate any burials in this area. The Potters Field burials are clearly indicated along the north-south axis. The proposed improvements to the vehicle roadway, also in this same area, would likely not extend below the surface. However, if the construction did involve subsurface efforts, the amount of disturbance documented in this area as well as the unlikelihood of unmarked burials in this area would have a negligible impact on Site 18AN1011.

Site 18AN1428 is located off the Runway 33L end. The removal of six trees to stump level is planned along the eastern perimeter of Site 18AN1428. This area was previously tested in 2009. Because there is no



LEGEND

- Direct Area of Potential Effect (APE-Direct)
- Airport Property Boundary
- Archaeological Resource
- Pavement Improvements
- Proposed Structures
- Demolition
- New Ductbank (Remote Receiver Facility)
- Pole/Sign/Obstruction Light (To Be Relocated or Removed)
- Obstruction Removal (2015 ALP Obstruction Points)
- Tree Obstruction Removal (2014 FMP Part 77 Conflict Areas)
- Tree Removal for Phase I Improvements
- Tree Removal for VORTAC Critical Area

Archaeological Resources Near Proposed Improvements
Figure 5.8-2

N

0 1,000 2,000 4,000 Feet

Source: Aerial - MDOT MAA (2018), EAC/A

subsurface disturbance planned, the work would have no impact on this archaeological resource.

Site 18AN1488 is located off the Runway 10 end. Tree removal is planned along the periphery of Site 18AN1488, including two trees which fall within the boundary of the site as determined in the 2014 investigation. The trees would be removed by cutting them to stump level. This action has only above-ground consequences and would have no impact on archaeological resources.

In summary, no archaeological or architectural resources would be adversely impacted by the 2015 ALP Alternative and therefore would have no significant impact.

5.8.4.2 Sponsor's Preferred Alternative

The Sponsor's Preferred Alternative projects would result in the same effect on architectural and archaeological sites as discussed under the 2015 ALP Alternative. The Relocated Fire Training Facility project under the Sponsor's Preferred Alternative is shifted further east than the 2015 ALP Alternative location. This could potentially include greater disturbance around Sites 18AN778, 18AN1596, and 18AN1597. However, these sites were determined not eligible for the NRHP and therefore would have no significant impact. As indicated in the 2015 ALP Alternative discussion, impacts to these sites are not deemed an adverse effect, given the amount of prior disturbance which has already affected the integrity of these sites.

The New Airline Maintenance Facility under the Sponsor's Preferred Alternative includes a water line connection south of Stoney Run Road, in an open area that is within 500 feet of two previously identified prehistoric sites (both located outside of the Direct APE). Site testing completed on January 29, 2019 found extensive 20th century disturbance in the area of the proposed water line connection, and no further archaeological work was recommended (See *Appendix J, Attachment 3* for the Archaeological Investigation Report for the Revised Direct APE).

5.8.4.3 No Action Alternative

The No Action Alternative does not involve construction, modification, or relocation of any new or existing facilities at BWI Marshall Airport nor affect aircraft operating at the Airport. There would be no impacts to historical, archaeological, or cultural resources attributable to this alternative.

5.8.5 Mitigation

No archaeological resources would be adversely affected by the 2015 ALP Alternative or Sponsor's Preferred Alternative; no archaeological mitigation would be necessary.

If unmarked burial sites are encountered in the vicinity of Site 18AN1011 or Site 18AN1592, or both cemetery sites, then staff would stop work and follow the procedures established in the BWI Marshall Airport HPP and required by MHT regulations.

5.9 Land Use

Potential impacts that the proposed improvements may have on land use as it relates to current or future land use plans, noise, socioeconomics, natural resources and aviation safety are identified in the following sections.

5.9.1 Laws and Regulations

State and local land use plans and regulations, such as land use plans,

comprehensive plans, and zoning laws are relevant to the evaluation of land use compatibility. Section 1506.2(b) of CEQ Regulations requires that NEPA documents discuss any inconsistency with approved state and/or local plan(s) and law(s) (whether or not Federally-sanctioned).

Advisory Circular 150/5200-33*, Hazardous Wildlife Attractants on or Near Airports,* is also relevant to the evaluation of land use impacts.

Other laws and regulations pertaining to land use are discussed in Chapter 4, *Section 4.10, Land Use.*

5.9.2 Methodology

Proposed development projects were reviewed to determine their consistency with existing and future land use plans. The potential for the alternative to create habitat or increase wildlife attractants was considered. Additionally, potential impacts in other resource categories were analyzed as they relate to land use, such as impacts related to aircraft noise and socioeconomic impacts.

5.9.3 Thresholds of Significance

There is no established threshold of significance for land use. While the proposed projects should be consistent with land use plans, FAA Order 1050.1F, Exhibit 4-1, states that the determination of significance is "normally dependent on the significance of other impact categories." Furthermore, an inconsistency with state and/or local plans by itself would not automatically result in a significant impact.

5.9.4 Impact Analysis

Potential impacts on land use as it relates land use plans, noise, socioeconomics, natural resources and wildlife hazards were identified and evaluated.

5.9.4.1 2015 ALP Alternative

The majority of the 2015 ALP Alternative projects are located within existing Airport property, with the exception of vegetation obstruction removal located off-airport property, and connections to existing utilities off-airport. The 2015 ALP Alternative is consistent with the Airport's 2015 ALP, as well as local land use plans.

Noise

The 2015 ALP Alternative would have minimal impacts on aircraft noise. A future noise analysis (2022 and 2027), as discussed in *Section 5.10, Noise and Noise-Compatible Land Use*, is based on a future fleet mix which is unaffected by the proposed projects under the 2015 ALP Alternative. However, the proposed projects do result in minor operational changes that alter the location of aircraft noise, related to taxiing and run-up operations at the New Airline Maintenance Facility.

Socioeconomic

The 2015 ALP Alternative would not disrupt communities, require relocation of residencies or businesses, or result in negative impacts to traffic on and around the Airport, as discussed in *Section 5.11*, *Socioeconomics, Environmental Justice, and Children's Health and Safety Risks.*

Natural Resources

The 2015 ALP Alternative would impact natural resource areas on the Airport, as discussed in *Section 5.2, Biological Resources* and *Section 5.14, Water Resources,* and *Section 5.5, DOT Section 4(f) Resources.*

Vegetation removal is proposed on private residential property and Andover Park north of the Airport. The vegetation removal would not result in any change of land use. All projects are consistent with existing and future land use around the Airport. Additionally, none of the residential properties impacted by obstruction removal are within environmental justice communities. Additionally, best management practices (BMPs) would be implemented as part of an Erosion and Sediment Control Plan to minimize construction impacts to natural resources.

Wildlife Hazards

Due to proximity to an airfield, the proposed improvements are subject to wildlife hazard restrictions. Additionally, the placement and type of stormwater management is restricted due to wildlife hazard considerations, discussed further in *Section 5.14, Water Resources*. The proposed improvements would not be located near or create a wildlife hazard as defined in FAA Advisory Circular (AC) 150/5200-33, "Wildlife Hazards On and Near Airports."

Under the 2015 ALP Alternative, vegetation obstructions to Part 77 surfaces would be removed. The removal of these obstructions close to the airfield would decrease wildlife habitat thus decreasing potential wildlife hazards. Wetlands are present in areas of proposed vegetation removal on the west side of the Airport north of Runway 10-28, and west of Runway 15R-33L, and east of Runway 15L-33R. To avoid creating wildlife hazards near the runways, the exposed wetlands would be eliminated by modifying the topography. See *Section 5.14, Water Resources* for discussion of wetland impacts and mitigation.

No significant impacts related to land use are expected with the 2015 ALP Alternative and no mitigation would be required.

5.9.4.2 Sponsor's Preferred Alternative

The Sponsor's Preferred Alternative, like the 2015 ALP Alternative, would not result in significant impacts to land use and no mitigation would be required.

The differences between the Sponsor's Preferred Alternative and 2015 ALP Alternative as it relates to land use, is the minimization of obstruction removal through selective tree clearing in environmentally sensitive areas. The selective tree clearing would minimize impacts to wetlands and prevent the creation of newly open waters associated with clear cutting in wetland areas. This would also limit the creation of new wildlife attractants to open waters.

No significant impacts related to land use are expected with the Sponsor's Alternative and no mitigation would be required.

5.9.4.3 No Action Alternative

The No Action Alternative would result in no development of the proposed projects, and therefore would not be consistent with the future plans for Airport development.

Wildlife Hazards

Under the No Action Alternative, vegetation obstructions to Part 77 surfaces would not be removed. The purpose of the vegetation removal is not directly linked to wildlife hazards, however, the removal of vegetation near the runways would help to decrease potential wildlife hazards and therefore the No Action Alternative may have a negative effect, although not a significant impact.

5.10 Natural Resources and Energy Supply

The potential impacts of the proposed improvements on the natural resources and energy supplies in the vicinity of the airport were evaluated.

5.10.1 Laws and Regulations

The Energy Independence and Security Act (EISA) of 2007, "requires Federal agencies to take actions to move the United States toward greater energy independence and security, to increase the production of clean renewable fuels, to protect consumers, to increase the efficiency of products, buildings, and vehicles, to promote research on and deploy greenhouse gas (GHG) capture and storage options, and to improve the energy performance of the Federal government."

EO 13693 outlines a means to "improve environmental performance and Federal sustainability" by assigning priorities to include, "reducing energy use and cost, then on finding renewable or alternative energy solutions."

5.10.2 Methodology

When analyzing the potential impacts to natural resources and energy supply the following was considered: impacts to utilities servicing the area; capacity of water resources to support projects; fuel consumption; impacts to consumable materials, especially scarce or unusual materials; and state or local regulations.

5.10.3 Thresholds of Significance

There is no established threshold of significance for natural resource and energy supply impacts. However, FAA Order 1050.1F identifies a factor to consider when evaluating potential impacts: "situations in which the proposed action or alternative(s) would have the potential to cause demand to exceed available or future supplies of these resources."

5.10.4 Impact Analysis

Potential impacts to natural resources and energy supply were identified and evaluated.

5.10.4.1 2015 ALP Alternative

The 2015 ALP Alternative would require additional energy use to provide water, heating, air conditioning, lighting, electricity, and telecommunications to proposed facilities, as well as airfield lighting of proposed projects. However, the anticipated increase in additional resources and energy consumption required by the 2015 ALP Alternative would not amount to a significant percentage of the total Airport use.

The proposed improvements would not create a substantial increase in demand for local resources and utilities or strain the capacity/supply of these resources/ utilities to the meet the additional demand. The proposed projects would not involve the use of any unusual or scarce resources nor cause a demand for the use of any unusual or scarce resources that are in short supply.

No significant impacts related to natural resources or energy supply are expected with the 2015 ALP Alternative and no mitigation would be required.

5.10.4.2 Sponsor's Preferred Alternative

The Sponsor's Preferred Alternative would result in similar impacts to natural resources and energy supply as described under the 2015 ALP Alternative. The Sponsor's Preferred Alternative also includes two new connections to Anne Arundel County utility

lines: a water line from the proposed Airline Maintenance Facility, under Aviation Blvd, to connect into an existing County water line; and a potential sanitary sewer connection from the Relocated Fire Training Facility, under Aviation Blvd, to connect into the County's sanitary system. The County has sufficient capacity/supply to provide utility connection for these proposed projects.

No significant impacts related to natural resources or energy supply are expected with the Sponsor's Preferred Alternative and no mitigation would be required.

5.10.4.3 No Action Alternative

Under the No Action Alternative, there would be no proposed development and therefore no potential for impacts to natural resources or energy supply.

5.11 Noise and Noise-Compatible Land Use

This section addresses the future noise environment around BWI Marshall Airport, and the methodology used to determine the future noise exposure contours for the 2015 ALP Alternative and the Sponsor's Preferred Alternative. The noise analysis is completed for the future conditions years 2022 and 2027.

The proposed improvements considered as part of the Proposed Action serve to maintain efficient and safe operations while achieving a quality level of service. Without the proposed improvements, operations would continue to grow as there are no constraints to continued growth, i.e., the airfield, general aviation, terminal, landside, and support facilities can accommodate additional operations without improvements. None of the proposed improvements would materially affect BWI Marshall Airport's ability to accommodate overall aircraft operations demand that would occur regardless of the improvements. Therefore, an identical number of flight operations, with the exception of run-up operations[17], are included in the No Action, 2015 ALP, and Sponsor's Preferred Alternative aircraft noise model. However, without the proposed improvements, inefficiencies would become more apparent and the airport user experience would be of lower quality even though the number of operations will not increase.

Both the 2015 ALP Alternative and the Sponsor's Preferred Alternative include a proposed Airline Maintenance Facility where aircraft engine maintenance run-up operations may occur. The noise introduced by the engine run-up activity, should it occur, would be expected to change the noise environment near the proposed Airline Maintenance Facility. As a result, the noise contour is projected to expand outwards around the area between Runway 10 and 15R. All other assumptions applied in the 2015 ALP Alternative and Sponsor's Preferred Alternatives are consistent with those applied in the No Action Alternative.

From a noise modeling perspective, the 2015 ALP Alternative and the Sponsor's Preferred Alternative are identical in terms of noise impacts because the variation between the alternatives does not influence aircraft arrival, departure or maintenance run-up operations. While the size of the proposed Airline Maintenance Facility apron varies between the 2015 ALP Alternative and Sponsor's Preferred Alternative, the assumed run-up location is along the east side of the apron which is identical between the 2015 ALP Alternative and Sponsor's Preferred Alternative. For simplicity, both alternatives are referred to as the Proposed Action in this section.

In October 2018, the FAA issued a Midfield Cargo Facility Improvements Project Written Re-Evaluation/ Record of Decision (WR/ROD). As a result, the operations expected as part of that project were incorporated into the 2022/2027 No Action and Proposed Action noise contours for this EA and Section 4(f) Determination.

5.11.1 Laws and Regulations

FAA Orders 1050.1F, "Environmental Impacts: Policies and Procedures" and 5050.4B, "National Environmental Policy Act Implementing Instructions for Airport Actions," as well as FAA 14 C.F.R. Part 150 "Airport Noise Compatibility Planning" are the guiding criteria for compatible land use evaluation.

5.11.2 Methodology

The noise contours for 2022 and 2027 were modeled using the fleet mixes developed as part this EA and Section (4) Determination. The aviation activity (including fleet mix) forecast was approved by FAA on November 18, 2019 (See *Appendix C, Attachments 1 and 2*). The Proposed Action and No Action Alternatives noise contours in 2022 and 2027 were modeled using AEDT version 2d, which was the noise model that was approved for use at the time the project was initiated. The DNL metric was used as required by FAA Order 1050.1F. The noise analysis results were tabulated to evaluate potential impacts to the following:

- Population impacted within the 65 DNL noise contour.
- Noise sensitive land uses within the 65+ DNL noise contour.
- General land use within the 65+ DNL noise contour

Details on data sources, assumptions, and methodologies used to develop the 2022 and 2027 noise contours are included in ***Appendix K-3, Future Scenarios Noise Analysis Technical Report.***

5.11.2.1 Fleet Mixes and Operations

The Proposed Action and No Action Alternative fleet mixes were assumed to be identical as projects included in this EA and Section 4(f) Determination are needed to meet current FAA design standards and enhance airfield safety and efficiency. They are not expected to increase operations nor change fleet mix as airports accommodate demand: they do not induce demand. On an Average Annual Day (AAD) basis, the total number of operations is projected to increase from 719.06 in the Existing Conditions (2018) to 743.20 in 2022 and 791.56 in 2027. Operations were categorized into Air Carrier, Air Taxi, General Aviation (GA), and Military.[18] **Table 5.11.1** summarizes the number of operations by operating categories. The only difference operationally between the Proposed Action and No Action Alternatives is the increase in run-up operations with the addition of the proposed Airline Maintenance Facility. In the No Action Alternative, the expected number of run-up operations are 4.4 per year. For the Proposed Action Alternative, 6.9 and 7.6 operations were forecast per day in 2022 and 2027, respectively. See *Appendix K-3, Section K-3.2.4* for details on the expected number of run-ups.

Consistent with the FAA 2018 TAF, the percentages of Air Taxi, GA and military operations are projected to decline in the Proposed Action and No Action Alternatives as compared to the Existing Conditions (2018). The percentage of Air Carrier operations is projected to increase.

Table 5.11.1
EA Future Fleet Mixes

Operating Category	2022		2027	
	Day	Night	Day	Night
Air Carrier	562.5	123.4	601.1	131.2
Air Taxi	21.1	1.3	22.7	1.4
General Aviation	28.8	3.5	29.1	3.5
Military	2.5	0.1	2.5	0.1
Total	615.0	128.2	655.4	136.2

Sources: Radar Data, FAA, and HNTB analysis, 2019.

5.11.2.2 Day/Night Split

The nighttime operations in the Proposed Action and No Action Alternatives fleet mixes are expected to increase slightly compared with the Existing Conditions (2018). Table K-3.3 in *Appendix K-3* provides the detailed day/night split applied in the Proposed Action and No Action Alternatives.

5.11.2.3 Stage Length

The modeled departure stage lengths in the Proposed Action and No Action Alternatives are similar to the Existing Conditions (2018) except for the increased percentages of the stage length 3 and 4 operations (flight distances between 1,001 nautical miles and 2,500 nautical miles) and decreased stage length 1 operations (less than 500 nautical miles). Table K-3.2 in *Appendix K-3* provides the departure stage length applied in the Proposed Action and No Action Alternatives.

5.11.2.4 Meteorological Conditions

AEDT 2d default meteorological conditions were applied to the Proposed Action Alternative, No Action Alternative, and the Existing Conditions. Table K-3.7 in *Appendix K-3* provides the meteorological conditions applied in the Proposed Action and No Action alternatives.

5.11.3 Thresholds of Significance

FAA Order 1050.1F defines the significance threshold for noise to be when "the action would increase noise by DNL 1.5 dB or more for a noise sensitive area that is exposed to noise at or above the DNL 65 dB noise exposure level, or that will be exposed at or above the DNL 65 dB level due to a DNL 1.5 dB or greater increase, when compared to the no action alternative for the same timeframe."

5.11.4 Impact Analysis (Noise)

The noise impact analysis was completed for noise sensitive areas within the 65+ dB DNL to evaluate whether the Proposed Action would cause a noise increase of 1.5 dB DNL or more compared with the No Action.

5.11.4.1 Proposed Action

The 2015 ALP Alternative and the Sponsor's Preferred Alternative would result in the same impact to noise, and therefore, the "Proposed Action Alternative" represents both these alternatives in the noise analysis. The detailed data sources, assumptions, and methodologies applied in developing the Proposed Action Alternative noise contours are included in *Section 5.11.2 Methodology*.

5.11.4.2 No Action

The detailed data sources, assumptions, and methodologies applied in developing the No Action Alternative noise contour are included in *Section 5.11.2 Methodology*.

5.11.4.3 Comparison of Proposed Action and No Action Alternatives

Compared with the No Action Alternative, the noise contours in the Proposed Action Alternative expand towards north of Runway 10 where the run-up operations at the proposed Airline Maintenance Facility are expected to occur, as shown in **Figures 5.11-1 and 5.11-2**. The areas within the 65+ DNL noise contour are expected to slightly increase by approximately 0.7%. **Table 5.11.2** provides the 65+ DNL areas of the No Action, and Proposed Action Alternatives in 2022 and 2027.

Table 5.11.2
65+ DNL Areas

Alternative	65+ DNL Area (acres)
2022 No Action	4,520.1
2027 No Action	4,561.4
2022 Proposed Action	4,552.1
2027 Proposed Action	4,595.4

Source: HNTB analysis, 2019.

5.11.4.4 Noise-Compatible Land Use

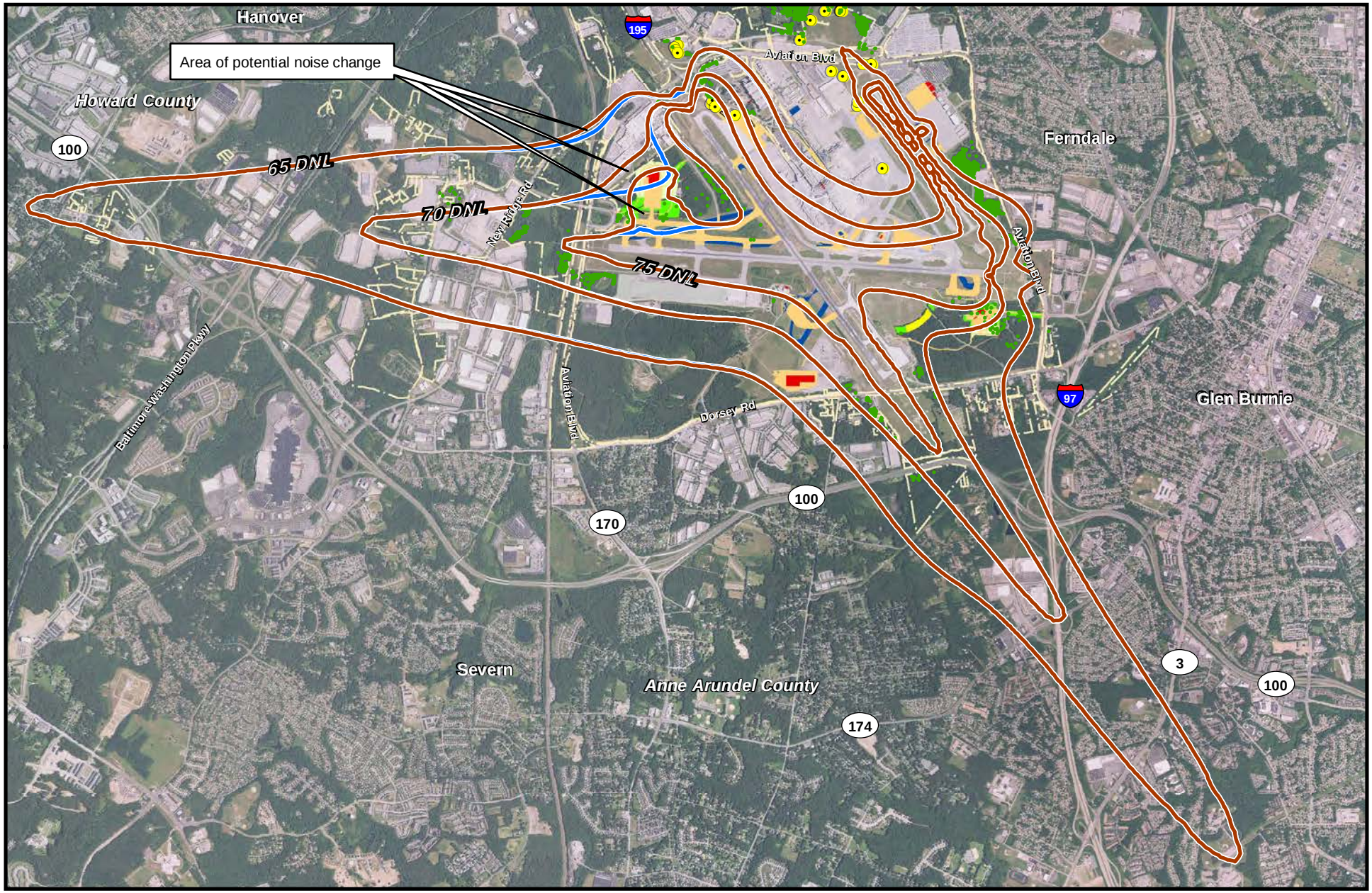
Tables 5.11.3 through 5.11.6 summarize land use type and noise sensitive sites, including population and housing counts, within the 2022 and 2027 noise contours for both alternatives. **Figures 5.11-3 through 5.11-6** illustrate the land use and noise sensitive sites within the 2022 No Action, 2022 Proposed Action, 2027 No Action, and 2027 Proposed Action Alternatives, respectively.

The figures show that there is little difference between the 65 DNL contours for the Proposed Action Alternatives when compared to the No Action Alternative.

The number of non-residential noise sensitive sites within the 65 DNL contour is identical between the 2022 No Action, 2022 Proposed Action, 2027 No Action, and 2027 Proposed Action Alternatives. There are five noise sensitive sites between the 65 DNL and 70 DNL contours in 2022 and 2027 (the same five sites located within the 2018 Existing Conditions contours):

- Open Door Baptist Church and Open Door Christian School;
- Metropolitan United Methodist Church;
- Qodesh Family Church (Lighthouse Chapel International);
- Glen Burnie Park Elementary School; and
- Rippling Woods Elementary School.

The Open Door Baptist Church and Christian School, and Qodesk Family Church are located west of the Airport on Ridge Road, and west of MD 295, respectively. Metropolitan United Methodist Church is located south of the Airport. Glen Burnie Park and Rippling Woods Elementary Schools are located southeast of the Airport. Glen Burnie was mitigated and sound insulated as part of MDOT MAA's School Soundproofing Program.[19, 20]



LEGEND

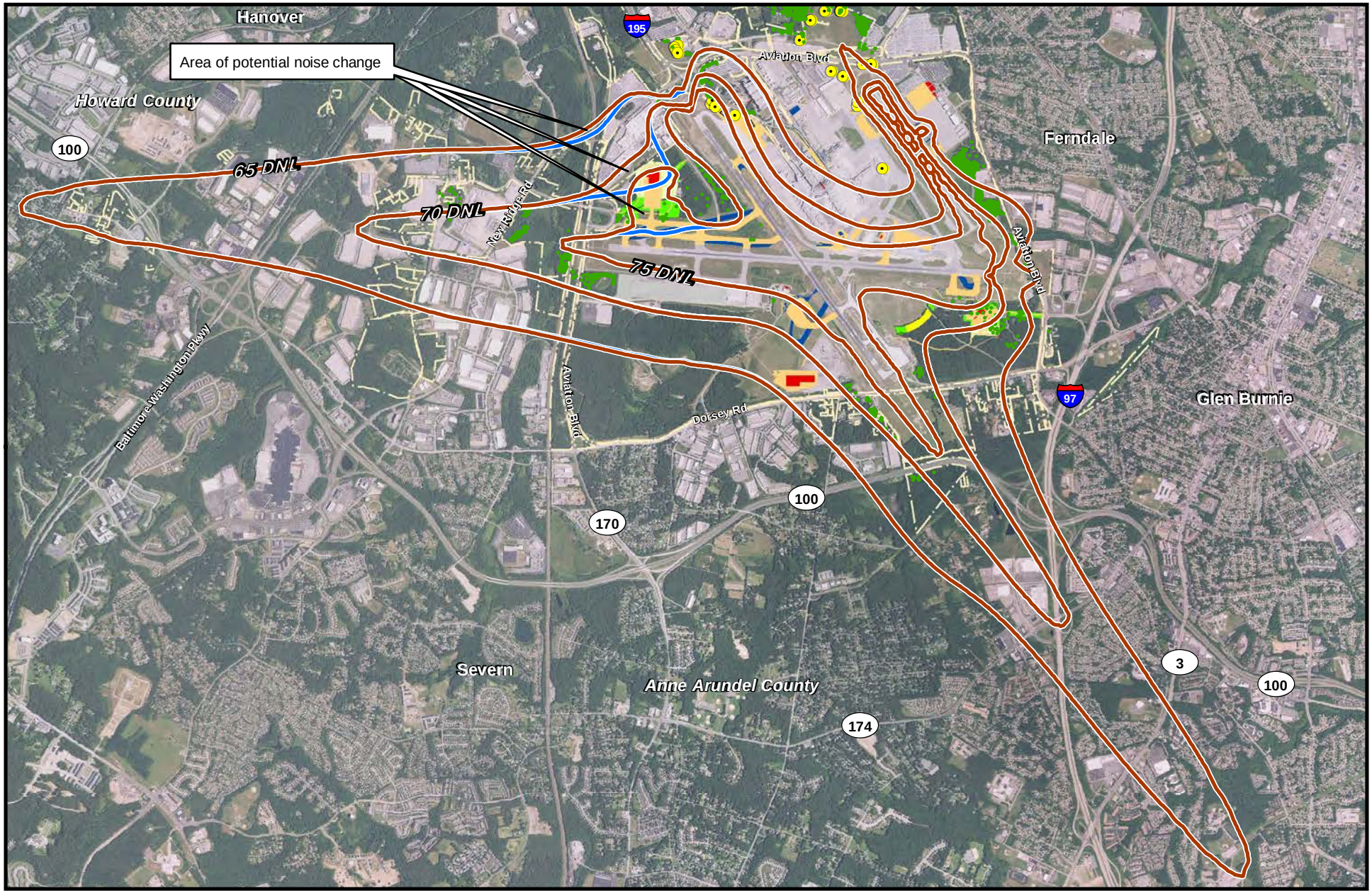
- Airport Property Boundary
- Pavement Improvements
- Proposed Structures
- Demolition
- Pole/Sign/Obstruction Light (To Be Relocated or Removed)
- Tree Obstruction Removal (2014 FMP Part 77 Conflict Areas)
- Obstruction Removal (2015 ALP Obstruction Points)
- Tree Removal for Phase I Improvements
- Tree Removal for VORTAC Critical Area
- 2022 No Action DNL Noise Contour
- 2022 Proposed Action DNL Noise Contour

Comparison of 2022 Proposed Action and No Action Noise Contours
Figure 5.11-1

0 1,000 2,000 4,000 Feet

N

Source: Aerial - MDOT MAA (2016)



LEGEND

- Airport Property Boundary
- Pavement Improvements
- Proposed Structures
- Demolition
- Pole/Sign/Obstruction Light (To Be Relocated or Removed)
- Tree Obstruction Removal (2014 FMP Part 77 Conflict Areas)
- Obstruction Removal (2015 ALP Obstruction Points)
- Tree Removal for Phase I Improvements
- Tree Removal for VORTAC Critical Area
- 2027 No Action DNL Noise Contour
- 2027 Proposed Action DNL Noise Contour

Comparison of 2027 Proposed Action and No Action Noise Contours

Figure 5.11-2

0 1,000 2,000 4,000 Feet

N

Source: Aerial - MDOT MAA (2016)

Table 5.11.3
2022 No Action Noise Exposure

Land Use Classification (acres)	65 to 70 DNL	70 to 75 DNL	Over 75 DNL	Total
BWI Airport	934	893	671	2,497
Commercial Use	292	79	0	370
Commercial Use Exempt	118	14	0	132
Manufacturing and Production	527	63	2	592
Mixed Use Residential	60	19	0	79
Mobile Home	0	1	0	1
Multi-Family Residential	38	0	0	38
Public Use	67	0	0	67
Recreational Open Space	31	0	0	31
Single Family Residential	172	10	0	183
Transient Lodging	0	0	0	0
Transportation	420	77	9	507
Undeveloped Residential	12	0	0	12
Vacant Undefined	12	0	0	12
Total	2,682	1,156	682	4,520
Number of Noise Sensitive Sites	**65 to 70 DNL**	**70 to 75 DNL**	**Over 75 DNL**	**Total**
Places of Worship	3	0	0	3
Schools	2	0	0	2
Historic	0	0	0	0
Hospitals and Nursing Homes	0	0	0	0
Population and Housing Units	**65 to 70 DNL**	**70 to 75 DNL**	**Over 75 DNL**	**Total**
Population	3,540	70	0	3,610
Housing Units	1,402	25	0	1,427

Notes:
(a) Totals may not add up due to rounding.
(b) Population and Housing Units are noise-sensitive sites. Population and housing units within the No Action contours were determined using 2010 U. S. Census Bureau block data. The population and housing units calculated within a contour were based on the assumption that residential populations within a block were evenly distributed by area. These population and housing unit counts are not associated with the acreage of residential land use types.

Sources: Anne Arundel County and Howard County Land Use, US Census Bureau 2010 Block data, and HNTB analysis, 2019.

Table 5.11.4
2022 Proposed Action Noise Exposure

Land Use Classification (acres)	65 to 70 DNL	70 to 75 DNL	Over 75 DNL	Total
BWI Airport	918	856	734	2,507
Commercial Use	296	79	0	375
Commercial Use Exempt	118	14	0	133
Manufacturing and Production	513	83	3	598
Mixed Use Residential	60	19	0	80
Mobile Home	0	1	0	1
Multi-Family Residential	38	0	0	38
Public Use	67	0	0	67
Recreational Open Space	31	0	0	31
Single Family Residential	173	10	0	183
Transient Lodging	0	0	0	0
Transportation	423	79	9	511
Undeveloped Residential	12	0	0	12
Vacant Undefined	17	0	0	17
Total	2,665	1,142	746	4,552
Number of Noise Sensitive Sites	**65 to 70 DNL**	**70 to 75 DNL**	**Over 75 DNL**	**Total**
Places of Worship	3	0	0	3
Schools	2	0	0	2
Historic	0	0	0	0
Hospitals and Nursing Homes	0	0	0	0
Population and Housing Units	**65 to 70 DNL**	**70 to 75 DNL**	**Over 75 DNL**	**Total**
Population	3,540	70	0	3,610
Housing Units	1,402	25	0	1,427

Notes:
(a) Totals may not add up due to rounding.
(b) Population and Housing Units are noise-sensitive sites.
(c) Analysis within the expanded contour area of the Proposed Action contour determined there are no housing units between the No Action and Proposed Action contours and therefore the population and housing units within the No Action contour and Proposed Action contour are the same.

Sources: Anne Arundel County and Howard County Land Use, US Census Bureau 2010 Block data, and HNTB analysis, 2019.

Table 5.11.5
2027 No Action Noise Exposure

Land Use Classification (acres)	65 to 70 DNL	70 to 75 DNL	Over 75 DNL	Total
BWI Airport	931	891	672	2,494
Commercial Use	291	83	0	374
Commercial Use Exempt	120	14	0	134
Manufacturing and Production	522	65	2	589
Mixed Use Residential	61	21	0	82
Mobile Home	0	1	0	1
Multi-Family Residential	42	0	0	42
Public Use	83	0	0	83
Recreational Open Space	32	0	0	32
Single Family Residential	184	10	0	194
Transient Lodging	0	0	0	0
Transportation	423	82	9	514
Undeveloped Residential	13	0	0	13
Vacant Undefined	11	0	0	11
Total	2,712	1,167	683	4,561
Number of Noise Sensitive Sites	**65 to 70 DNL**	**70 to 75 DNL**	**Over 75 DNL**	**Total**
Places of Worship	3	0	0	3
Schools	2	0	0	2
Historic	0	0	0	0
Hospitals and Nursing Homes	0	0	0	0
Population and Housing Units	**65 to 70 DNL**	**70 to 75 DNL**	**Over 75 DNL**	**Total**
Population	3,897	78	0	3,975
Housing Units	1,539	29	0	1,568

Notes:
(a) Totals may not add up due to rounding.
(b) Population and Housing Units are noise-sensitive sites. Population and housing units within the No Action contours were determined using 2010 U. S. Census Bureau block data. The population and housing units calculated within a contour were based on the assumption that residential populations within a block were evenly distributed by area. These population and housing unit counts are not associated with the acreage of residential land use types.

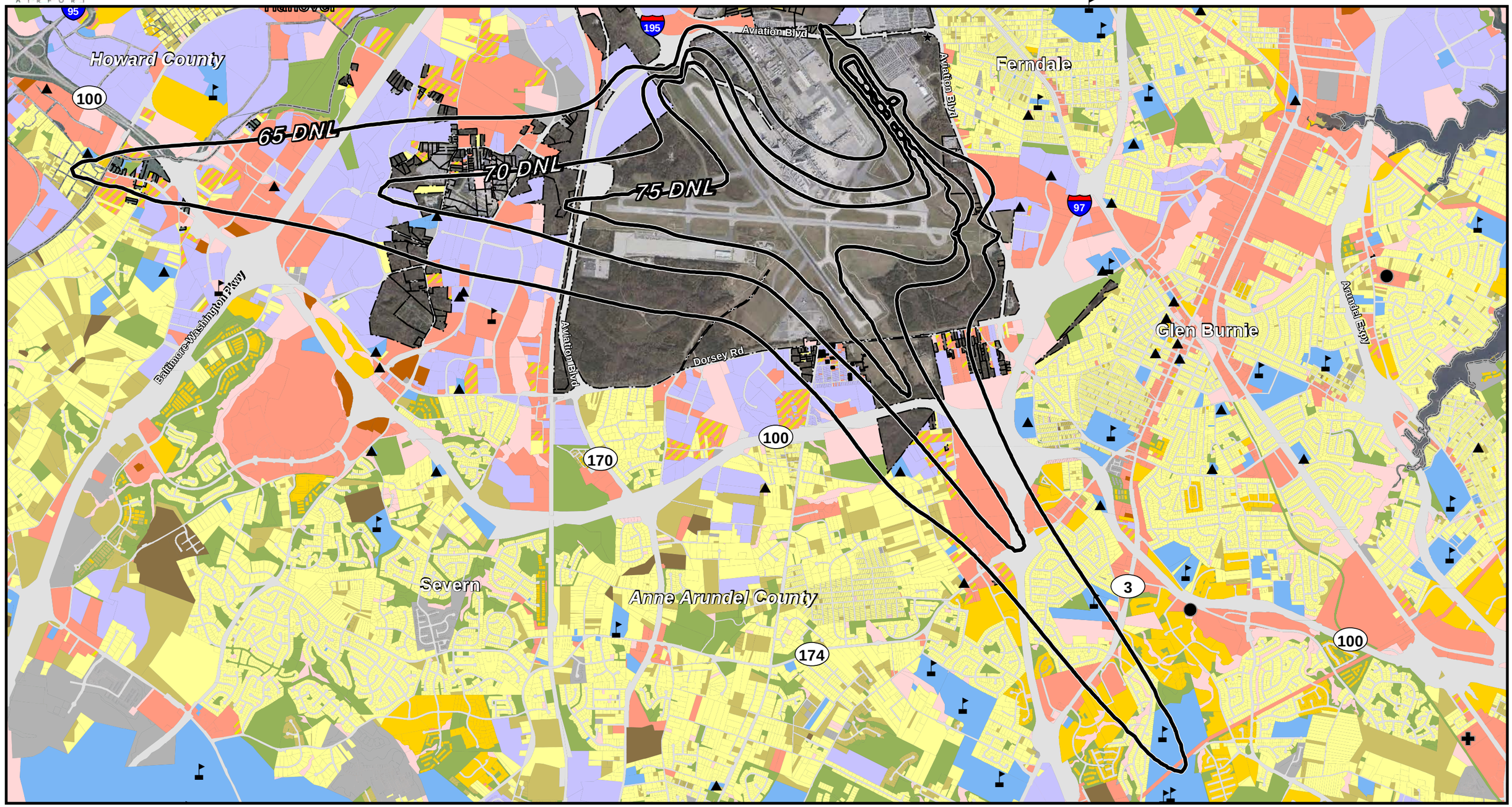
Sources: Anne Arundel County and Howard County Land Use, US Census Bureau 2010 Block 0 data, and HNTB analysis, 2019.

Table 5.11.6
2027 Proposed Action Noise Exposure

Land Use Classification (acres)	65 to 70 DNL	70 to 75 DNL	Over 75 DNL	Total
BWI Airport	914	854	737	2,505
Commercial Use	295	83	0	378
Commercial Use Exempt	120	15	0	135
Manufacturing and Production	508	86	3	596
Mixed Use Residential	61	21	0	82
Mobile Home	0	1	0	1
Multi-Family Residential	42	0	0	42
Public Use	83	0	0	83
Recreational Open Space	32	0	0	32
Single Family Residential	184	10	0	195
Transient Lodging	0	0	0	0
Transportation	425	84	9	519
Undeveloped Residential	13	0	.	13
Vacant Undefined	16	0	0	16
Total	2,694	1,153	749	4,595
Number of Noise Sensitive Sites	**65 to 70 DNL**	**70 to 75 DNL**	**Over 75 DNL**	**Total**
Places of Worship	3	0	0	3
Schools	2	0	0	2
Historic	0	0	0	0
Hospitals and Nursing Homes	0	0	0	0
Population and Housing Units	**65 to 70 DNL**	**70 to 75 DNL**	**Over 75 DNL**	**Total**
Population	3,897	78	0	3,975
Housing Units	1,539	29	0	1,568

Notes:
(a) Totals may not add up due to rounding.
(b) Population and Housing Units are noise-sensitive sites.
(c) Analysis within the expanded contour area of the Proposed Action contour determined there are no housing units between the No Action and Proposed Action contours and therefore the population and housing units within the No Action contour and Proposed Action contour are the same.

Sources: Anne Arundel County and Howard County Land Use, US Census Bureau 2010 Block data, and HNTB analysis, 2019.



LEGEND

- 2022 No Action DNL Noise Contour
- Hospital
- Nursing Home
- School
- Place of Worship
- Historic Resource

Existing Land Use

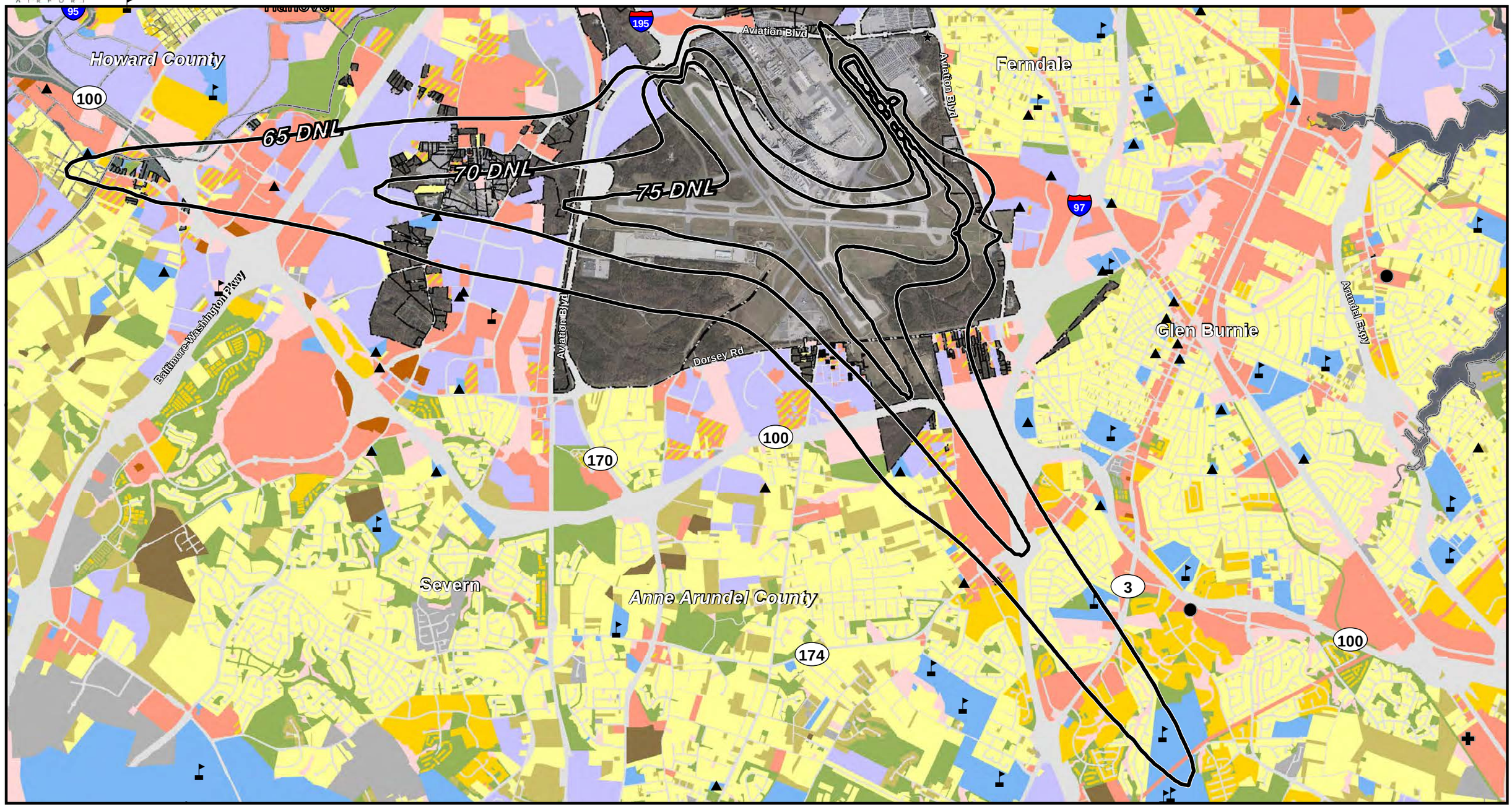
- Single Family
- Multi-Family Residential
- Mobile Home
- Transient Lodging
- Public Use
- Recreational Open Space
- Mixed Use
- Commercial Use
- Commercial Use Exempt
- Manufacturing and Production
- Transportation
- Vacant / Undefined
- Undeveloped Zoned Residential
- BWI Airport Property
- County Boundary

2022 No Action Noise Compatible Land Use
Figure 5.11-3

N

0 1,500 3,000 6,000 Feet

Source: Aerial - MDOT MAA (2018), National Park Service, Maryland Department of Planning, Google Earth



LEGEND

- 2027 No Action DNL Noise Contour
- Hospital
- Nursing Home
- School
- Place of Worship
- Historic Resource

Existing Land Use

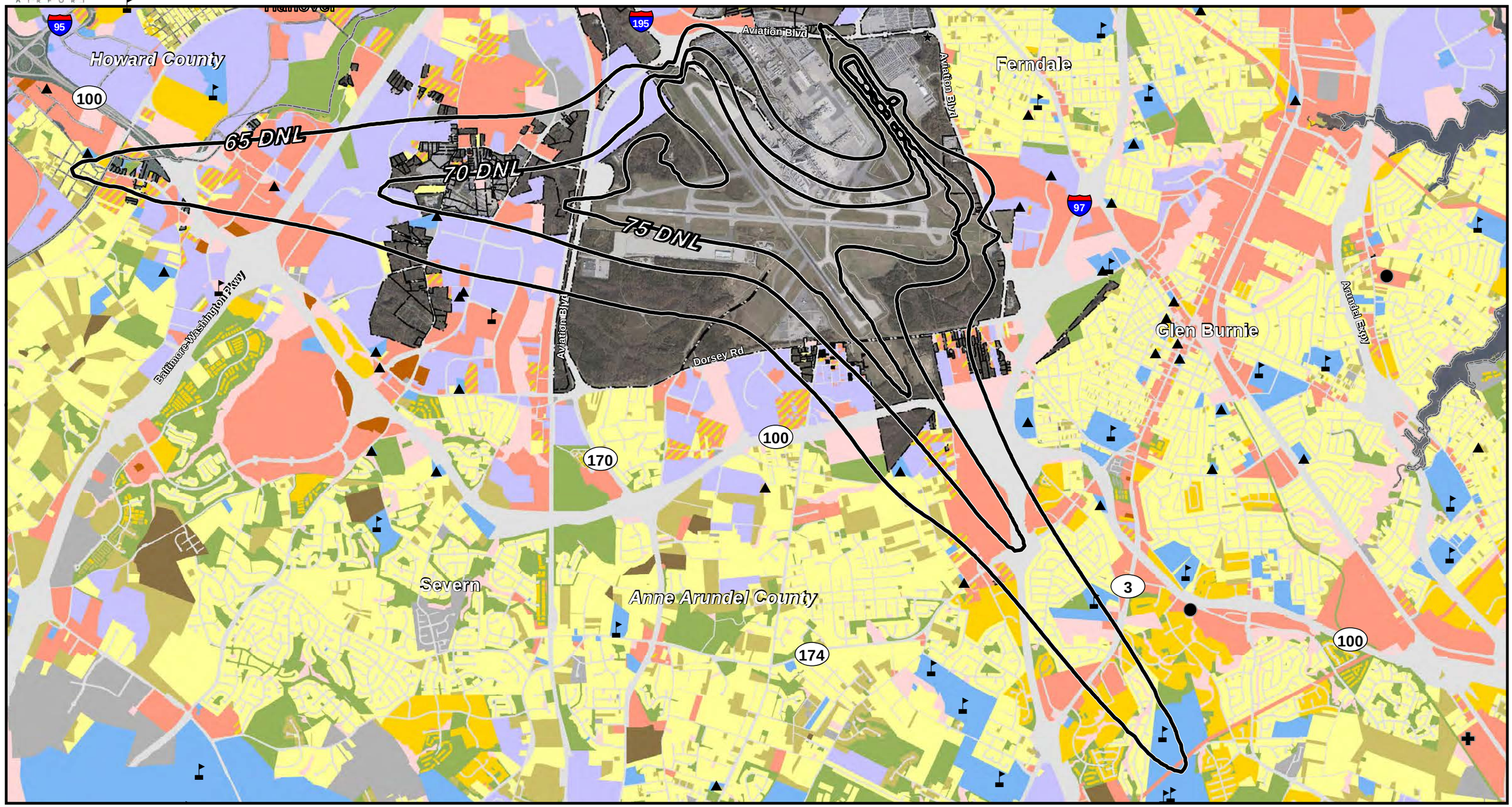
- Single Family
- Multi-Family Residential
- Mobile Home
- Transient Lodging
- Public Use
- Recreational Open Space
- Mixed Use
- Commercial Use
- Commercial Use Exempt
- Manufacturing and Production
- Transportation
- Vacant / Undefined
- Undeveloped Zoned Residential
- BWI Airport Property
- County Boundary

2027 No Action Noise Compatible Land Use
Figure 5.11-4

N

0 1,500 3,000 6,000 Feet

Source: Aerial - MDOT MAA (2018), National Park Service, Maryland Department of Planning, Google Earth



LEGEND

- 2022 Proposed Action DNL Noise Contour
- Hospital
- Nursing Home
- School
- Place of Worship
- Historic Resource

Existing Land Use

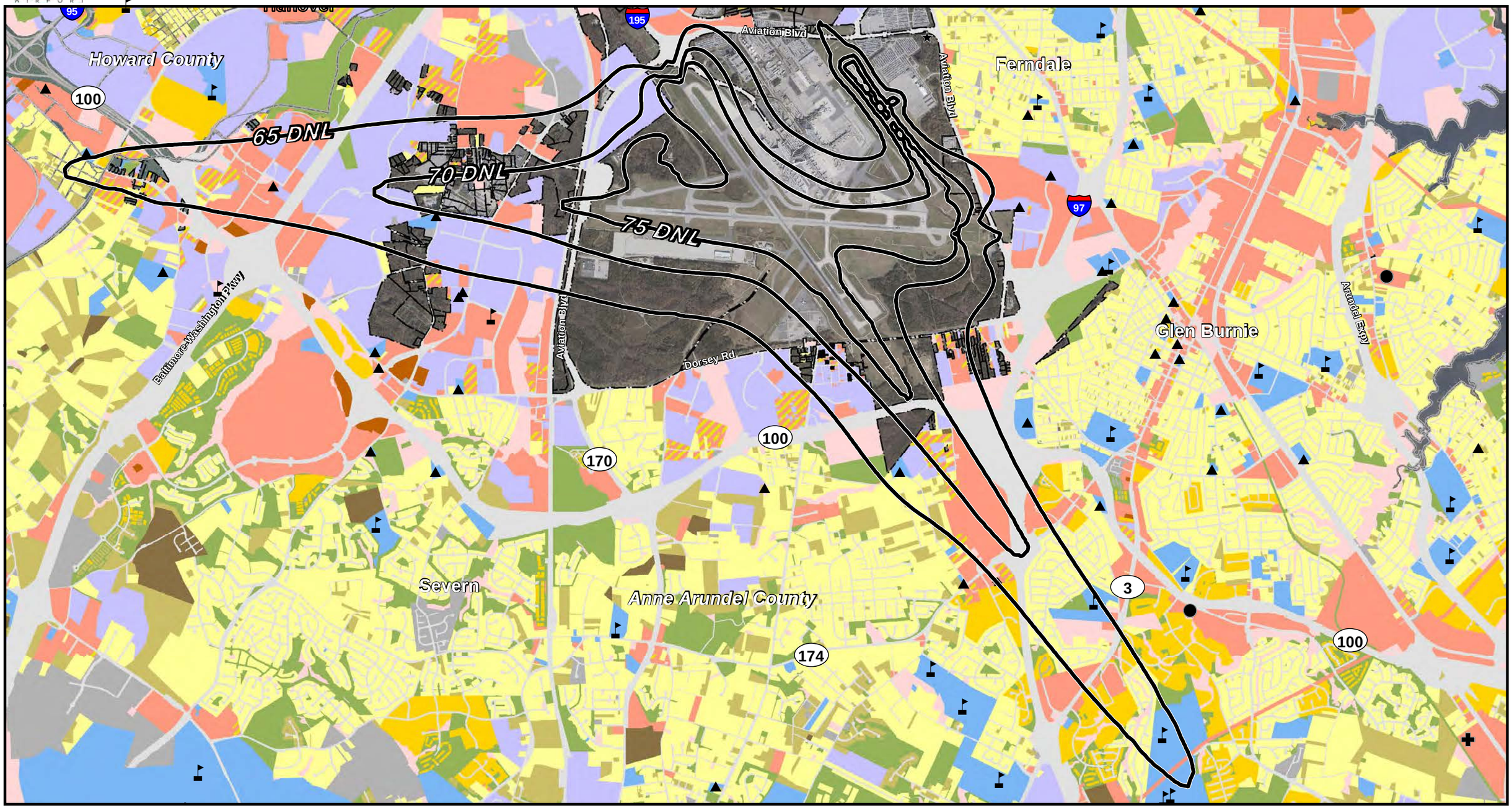
- Single Family
- Multi-Family Residential
- Mobile Home
- Transient Lodging
- Public Use
- Recreational Open Space
- Mixed Use
- Commercial Use
- Commercial Use Exempt
- Manufacturing and Production
- Transportation
- Vacant / Undefined
- Undeveloped Zoned Residential
- BWI Airport Property
- County Boundary

2022 Proposed Action Noise Compatible Land Use
Figure 5.11-5

N

0 1,500 3,000 6,000 Feet

Source: Aerial - MDOT MAA (2018), National Park Service, Maryland Department of Planning, Google Earth



LEGEND

- 2027 Proposed Action DNL Noise Contour
- Hospital
- Nursing Home
- School
- Place of Worship
- Historic Resource

Existing Land Use

- Single Family
- Multi-Family Residential
- Mobile Home
- Transient Lodging
- Public Use
- Recreational Open Space
- Mixed Use
- Commercial Use
- Commercial Use Exempt
- Manufacturing and Production
- Transportation
- Vacant / Undefined
- Undeveloped Zoned Residential
- BWI Airport Property
- County Boundary

2027 Proposed Action Noise Compatible Land Use
Figure 5.11-6

N

0 1,500 3,000 6,000 Feet

Source: Aerial - MDOT MAA (2018), National Park Service, Maryland Department of Planning, Google Earth

The residential area, population, and housing units within the 65 DNL contour are almost identical between the No Action and Proposed Action Alternatives. In 2022, the Proposed Action Alternative includes an additional 32.0 acres of land within the 65 DNL contour as compared to the No Action Alternative, with 0.5 acres of additional residential land use. In 2027, the Proposed Action Alternative includes an additional 34.0 acres of land within the 65 DNL contour as compared to the No Action Alternative, with 0.5 acres of additional residential land use.

It should be noted that population and the number of housing units within the noise contours were determined using 2010 U.S. Census Bureau block data. The data for each contour assumed that residential populations were evenly distributed throughout the area, which is not accurate when considering the small area (less than 1.0 acres) of residential land use added to the contours. Therefore, these limited areas of increased residential land use were reviewed to determine the presence of residential units in the expanded contours.

There are two small increases in land identified for residential use between the No Action and Proposed Action contours located west of the Airport.

One area is a small single-family residential parcel off Ridge Road. The residential structure on the parcel is over 350-feet south of (outside) the No Action and Proposed Action contours for both 2022 and 2027. This area was further analyzed to determine if residential units exists within the area of the expanded contour in 2022 or 2027. It was determined that the contour extends approximately ten feet to the south but does not introduce any housing units/structures.[21]

There are additional areas of single-family residential parcels at the western most end of the contours west of the MARC tracks off Old Dorsey Road. The contour extends between five to ten feet further west in the Proposed Action, as compared to the No Action in 2022 and 2027. However, no additional houses are introduced into the 65 DNL contour in 2022 or 2027.[22]

The additional analysis determined that no additional housing units or residents exist between the No Action and Proposed Action Alternatives (for 2022 and 2027), and therefore the threshold for significant noise impact was not exceeded for any of the alternatives considered, and no mitigation would be required.

5.12 Socioeconomics, Environmental Justice and Children's Environmental Health and Safety Risks

This section analyzes the potential for the alternatives to result in a socioeconomic, environmental justice or children's health and safety impact, or an impact to traffic on the roads serving the Airport and its surrounding communities. A traffic impact assessment of future conditions at the intersections surrounding the Airport was conducted as part of the EA and Section 4(f) Determination.

5.12.1 Laws and Regulations

The Uniform Relocation Assistance and Real Property Acquisition Policy Act of 1970 (URA) contains provisions that must be followed for the acquisition of real property.

EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations*, requires federal agencies to identify and

address the disproportionately high and adverse human health or environmental effects of their actions on minority and low-income populations with the goal of achieving environmental protection for all communities.

EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks,* directs federal agencies to identify and assess disproportionate impacts to children's environmental health and safety risks. EO 13045 states that, "'Environmental health risks and safety risks' mean risks to health or to safety that are attributable to products or substances that the child is likely to come in contact with or ingest (such as the air we breathe, the food we eat, the water we drink or use for recreation, the soil we live on, and the products we use or are exposed to)." Therefore, the assessment of potential air quality, hazardous materials and water quality impacts are pertinent to this category.

5.12.2 Methodology

Socioeconomic Impacts

The potential for the alternatives to result in the relocation of residences or businesses, division of established communities, disruption of orderly planned development, or changes in employment was evaluated. Additionally, any actions resulting from the alternatives that could result in high or adverse human health or environmental impacts that would disproportionately impact minority or low-income populations were also evaluated.

On-Airport Traffic Impacts

See *Appendix A, Attachments 1 and 2,* for detailed methodology of the on-airport traffic analysis.

5.12.3 Thresholds of Significance

For consideration in evaluating potential impacts to socioeconomics, environmental justice, and children's environmental health and safety risks, the FAA has not established significance thresholds, however, the FAA has identified factors to consider when evaluating the context and intensity of potential environmental impacts for:

Socioeconomics

- Inducing substantial economic growth in an area;
- Disrupting or dividing an established community;
- Causing extensive relocation of residential or community business;
- Causing disproportionately high and adverse effects on minority and/or low-income populations;
- Disrupting local traffic patterns, including reducing the level of service of roads; and
- Producing a substantial change in the community tax base.

Environmental Justice

"…a situation in which the proposed action or alternative(s) would have the potential to lead to a disproportionately high and adverse impact to an environmental justice population, i.e., a low income or minority population, due to:

- Significant impacts in other environmental impact categories; or
- Impacts on the physical or natural environment that affect an environmental justice population in a way that the FAA determines is unique to the environmental justice

population and significant to that population."

Children's Environmental Health and Safety Risks

"…situations in which the proposed action or alternative(s) would have the potential to lead to a disproportionate health or safety risk to children."

5.12.4 Impact Analysis (Socioeconomic and On-Airport Traffic)

The analyses that follow include consideration of socioeconomic (including environmental justice and children's health and safety risks), and on-airport traffic impacts.

5.12.4.1 2015 ALP Alternative

Socioeconomic Impacts

The 2015 ALP Alternative would not result in any major or disproportionate impacts to minority or low-income populations surrounding BWI Marshall Airport. Minor impacts would result from proposed vegetation obstruction removal on private residential properties north of the airport, within CT 7512. Of the 1,147 individual tree obstructions on private properties, 861 trees are located on residential property and 286 trees are located on private (non-residential) properties mostly within Andover Park and Andover Recreation Center. The 861 trees proposed to be removed on residential properties are on 51 separate properties all within CT 7512. The population within CT 7512 is only 9% minority and has a median household income ($97,284) which is slightly higher than that of the County ($94,502).[23] Therefore, the impacted properties are not considered to be part of environmental justice communities. Additionally, the 2015 ALP Alternative would not have the potential to lead to health or safety risks to children.

The 2015 ALP Alternative would not shift any business or economic activity or population movement or shifts in a community.

The 2015 ALP Alternative would not result in a significant impact to socioeconomics (including environmental justice and children's health and safety risks).

On-Airport Traffic Impacts

The 2015 ALP Alternative includes Terminal Roadway Widening and Access Improvements, and the Upper Level Roadway Widening at Concourse E. These improvements would help improve on-airport traffic congestion and serve the increased traffic and growth anticipated into the future with a quality level of service.

Terminal Roadway Widening

A traffic analysis study was completed to identify opportunities to improve inbound traffic operations at BWI Marshall Airport during peak demand periods (2016)[24]. The study assessed existing and future traffic conditions along the inbound roadways and lower level terminal roadways through analysis of traffic volumes, vehicle dwell times and field observations. A future traffic demand volume of 30 MAP was utilized in the traffic model analysis for five roadway widening alternatives and the No Build condition.

The study concluded that the alternatives would not provide significant improvements. Following this study, MDOT MAA Offices of Planning, Landside Operations, and Ground Transportation and Parking convened to further discuss a range of operational and capital improvements to address the in-bound terminal roadway and Lower Level

curb congestion. The recommended improvements were developed to achieve the following three goals:

1. Reduce traffic volume destined for the lower level curb;
2. Spread the traffic from the A/B bag claim area to less used, but adjacent curbside areas; and,
3. Reduce the vehicle dwell time at the Terminal A/B curb areas.

MDOT MAA-recommended operational improvements included: (1) Reclaim Curbside along Terminal A / Paint Column Numbers; and (2) Install Internal (Inside Terminal) Wayfinding VMS Signs. The recommended capital improvements included: (1) Restripe existing curb lane; (2) Install VMS for Management (optional); (3) Install VMS; and (4) Widen Terminal Approach Roadway – dedicated lane to upper level.

The 2015 ALP Alternative proposes "Terminal Roadway Widening and Access Improvements" for the inbound terminal approach roadway. This project aligns with the MDOT MAA Planning recommended capital improvement program. The proposed project would widen the right shoulder to provide a dedicated lane for traffic destined for the Upper Level Roadway. This improvement would provide unimpeded access from I-195 to the Upper Level Roadway. Vehicles destined for the departures (Upper Level) would no longer be delayed by the queuing upstream of the Lower Level Roadway.

International Terminal Roadway Widening

A traffic study was completed as part of the International Concourse Roadway Widening Study (JMT, 2016) to analyze the existing and future conditions roadways.[25] A future traffic demand volume of 30 MAP was utilized in the traffic model analysis. The study proposed "Alternative 2A Extended to Concourse E/F" as a solution to accommodate future International Concourse demand. As a result, the Upper Level modifications included in the study alternative are proposed as part of the 2015 ALP Alternative.

The 2015 ALP Alternative proposes widening of the Upper Level roadway near the International Terminal, separating traffic between the General Purpose Roadway and Authorized Vehicles Only Roadway. The Authorized Vehicles Only Roadway would continue to utilize the existing I-195 or Elm Road exit ramps. All traffic on the Upper Level General Purpose lanes would be required to utilize the new ramp to I-195.

The 2016 study showed that the proposed ramp capacity for the new ramp to I-195 can accommodate increased traffic growth anticipated in the future. The widening and separation of the Upper Level Roadways will better serve the increased traffic and growth anticipated for the International Concourse area.

5.12.4.2 Sponsor's Preferred Alternative

Socioeconomic Impacts

The Sponsor's Preferred Alternative would not result in impacts to minority or low-income populations surrounding BWI Marshall Airport. Like the 2015 ALP Alternative, minor impacts would result from proposed vegetation obstruction removal on private residential properties north of the airport, within CT 7512. Following additional field studies of the proposed off-airport obstruction removal, 46 trees previously marked as obstructions were identified to not

be obstructions. The Sponsor's Preferred Alternative includes saving these 46 trees and therefore minimizing the obstruction removal on private properties. Under the Sponsor's Preferred Alternative, a total of 818 trees are proposed to be removed on 51 residential properties within this CT 7512.

The Sponsor's Preferred Alternative projects would not result in the relocation of any residents or businesses and would have no direct impact on economic growth in the area. Additionally, the Sponsor's Preferred Alternative would not have the potential to lead to health or safety risks to children.

The Sponsor's Preferred Alternative would not result in a significant impact to socioeconomics (including environmental justice and children's health and safety risks).

On-Airport Traffic Impacts

The Sponsor's Preferred Alternative includes the same proposed on-airport roadway projects: Terminal Roadway Widening and Access Improvements, and the Upper Level Roadway Widening at Concourse E. As described under the 2015 ALP Alternative, the improvements would help improve traffic congestion and serve the increased traffic and growth anticipated into the future with a quality level of service.

5.12.4.3 No Action Alternative

Socioeconomic Impacts

Under the No Action Alternative, there would be no proposed development and therefore no potential for impacts related to socioeconomics, environmental justice or children's health and safety.

On-Airport Traffic Impacts

Terminal Roadway Widening

A traffic analysis study was completed to identify opportunities to improve inbound traffic operations at BWI Marshall Airport during peak demand periods. The study assessed existing and future traffic conditions along the inbound roadways and lower level terminal roadways through analysis of traffic volumes, vehicle dwell times and field observations.

A future traffic demand volume of 30 MAP was utilized in the traffic model analysis for the proposed alternatives and the No Build condition.

The future "no-build – 30 MAP" analysis indicated significant queuing until three intersections upstream (Scott Drive, Elm Road and MD 170) were blocked, and that queuing would not dissipate by 11:00 PM. Additionally, travel times between the inbound roadways and lower level terminal roadways would continue to increase under the future "no build – 30 MAP" condition.

Under the No Action alternative, the existing congestion and queuing concerns on the inbound roadways to the lower terminal roadways would continue to deteriorate into the future. No improvements would be constructed to help alleviate the congestion.

International Terminal Roadway Widening

A traffic study was completed as part of the International Concourse Roadway Widening Study (JMT, 2016) to analyze the existing and future conditions roadways.[26]

A future traffic demand volume of 30 MAP was utilized in the traffic model analysis. The model also included traffic generated by the proposed hotel site entrance and exit and a new exit from the employee parking lot. (The

proposed hotel project has been pushed outside the planning timeframe of this EA and Section 4(f) Determination.) The study analyzed the same two weave segments and four intersections analyzed in the existing condition. The study analyzed traffic during two peak hours (5:00 – 6:00 PM and 6:00 – 7:00 PM).

The future analysis for the "no action" condition showed a small increase in roadway density for weave segments with one weave segment operating at an LOS D during the 5:00 – 6:00 PM peak hour. The future analysis also showed a small increase in delay at three of the four study intersections during peak hours, however the intersections would continue to operate at the same LOS as in the existing condition (LOS B or better).

5.12.5 Impact Analysis (Off-Airport Traffic)

A traffic impact analysis was completed for the 2015 ALP Alternative, Sponsor's Preferred Alternative, and No Action Alternative for future conditions years 2022 and 2027. Both the 2015 ALP Alternative and the Sponsor's Preferred Alternative include the same four proposed facilities which could impact off-airport traffic. Therefore, from a traffic modeling perspective, the 2015 ALP Alternative and the Sponsor's Preferred Alternative are identical in terms of traffic impacts. Both alternatives are referred to as the Proposed Action Alternative in this section. Additionally, the No Action Alternative is described first to introduce the background development projects that are the foundation upon which the analysis is built.

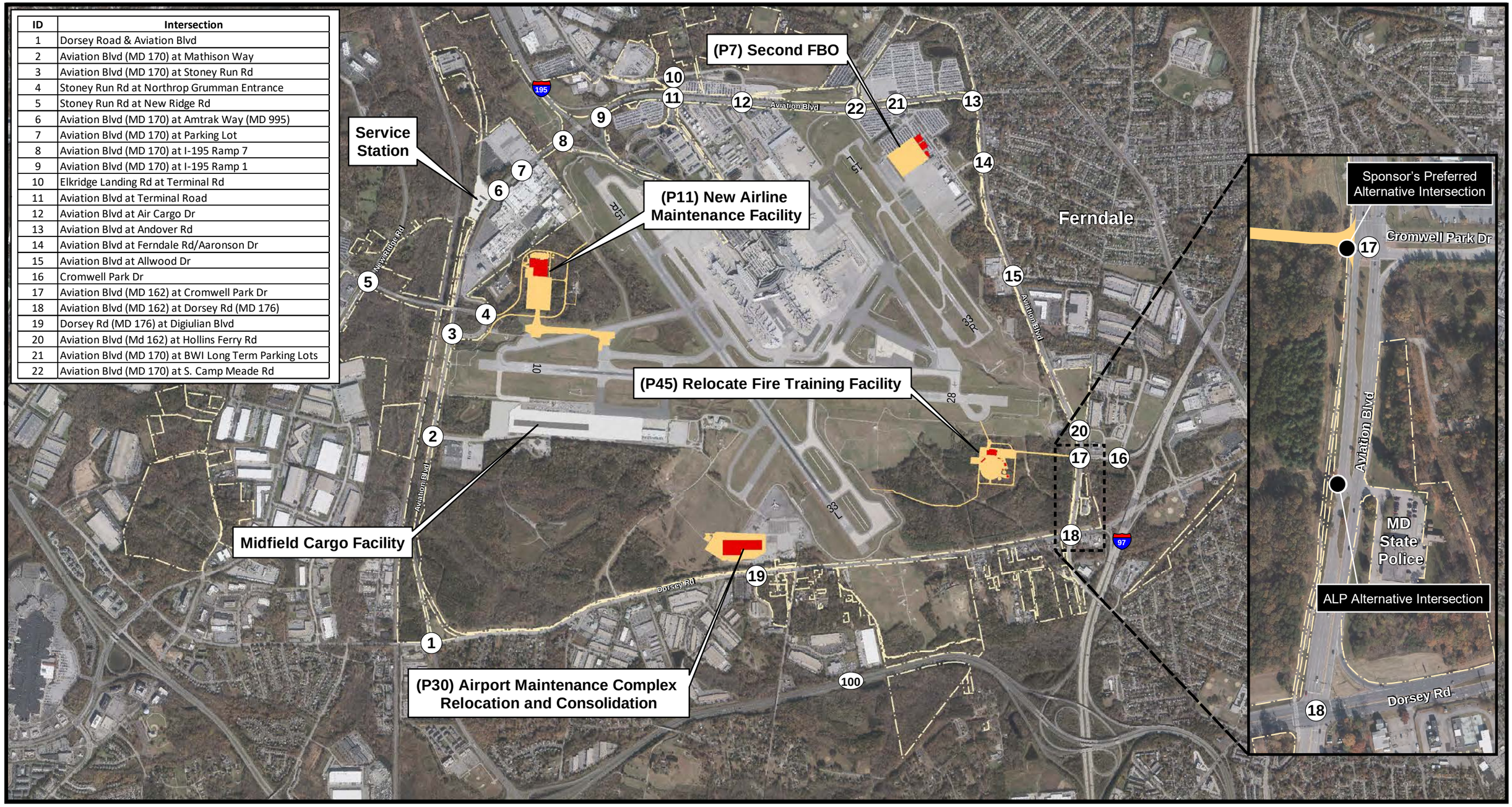
5.12.5.1 No Action Alternative

The No Action Alternative reflects the future baseline condition and assumes that the proposed projects at BWI Marshall Airport are not built. It was used as the base to compare the results of the Proposed Action Alternative and identify any impacts resulting from the land-use change.

A new vehicle service station is planned to be constructed adjacent to Intersection 6. The service station with independent utility was analyzed as a separate project and received a NEPA finding in May 2017. The service station is anticipated to open by 2020. The Midfield Cargo Facility Improvements are planned along Mathison Way with access at Intersection 2 (Aviation Blvd/MD 170 and Mathison Way). The Midfield Cargo Facility Improvements were evaluated in a separate NEPA review from this EA and Section 4(f) Determination. The facility improvements were open by late 2019. As such, both the service station and Midfield Cargo Facility Improvements were assumed to be part of the 2022 and 2027 analyses of the No Action Alternative. **Figure 5.12-1** illustrates the location of the service station and Midfield Cargo Facility Improvements in relation to the Proposed Action improvements.

Nine other additional approved, but not yet built, developments that generate trips into and out of the study area were also considered as part of the No Action Alternative. The service station, Midfield Cargo Facility Improvements, and approved development locations are shown on **Figure 5.12-2**. See *Appendix A, Attachment 3* for details on the development of No Action 2022 and 2027 volumes and trip generation for the approved developments.

ID	Intersection
1	Dorsey Road & Aviation Blvd
2	Aviation Blvd (MD 170) at Mathison Way
3	Aviation Blvd (MD 170) at Stoney Run Rd
4	Stoney Run Rd at Northrop Grumman Entrance
5	Stoney Run Rd at New Ridge Rd
6	Aviation Blvd (MD 170) at Amtrak Way (MD 995)
7	Aviation Blvd (MD 170) at Parking Lot
8	Aviation Blvd (MD 170) at I-195 Ramp 7
9	Aviation Blvd (MD 170) at I-195 Ramp 1
10	Elkridge Landing Rd at Terminal Rd
11	Aviation Blvd at Terminal Road
12	Aviation Blvd at Air Cargo Dr
13	Aviation Blvd at Andover Rd
14	Aviation Blvd at Ferndale Rd/Aaronson Dr
15	Aviation Blvd at Allwood Dr
16	Cromwell Park Dr
17	Aviation Blvd (MD 162) at Cromwell Park Dr
18	Aviation Blvd (MD 162) at Dorsey Rd (MD 176)
19	Dorsey Rd (MD 176) at Digiulian Blvd
20	Aviation Blvd (Md 162) at Hollins Ferry Rd
21	Aviation Blvd (MD 170) at BWI Long Term Parking Lots
22	Aviation Blvd (MD 170) at S. Camp Meade Rd



LEGEND

- Traffic Intersection
- Airport Property Boundary

No Action
- Pavement
- Structures

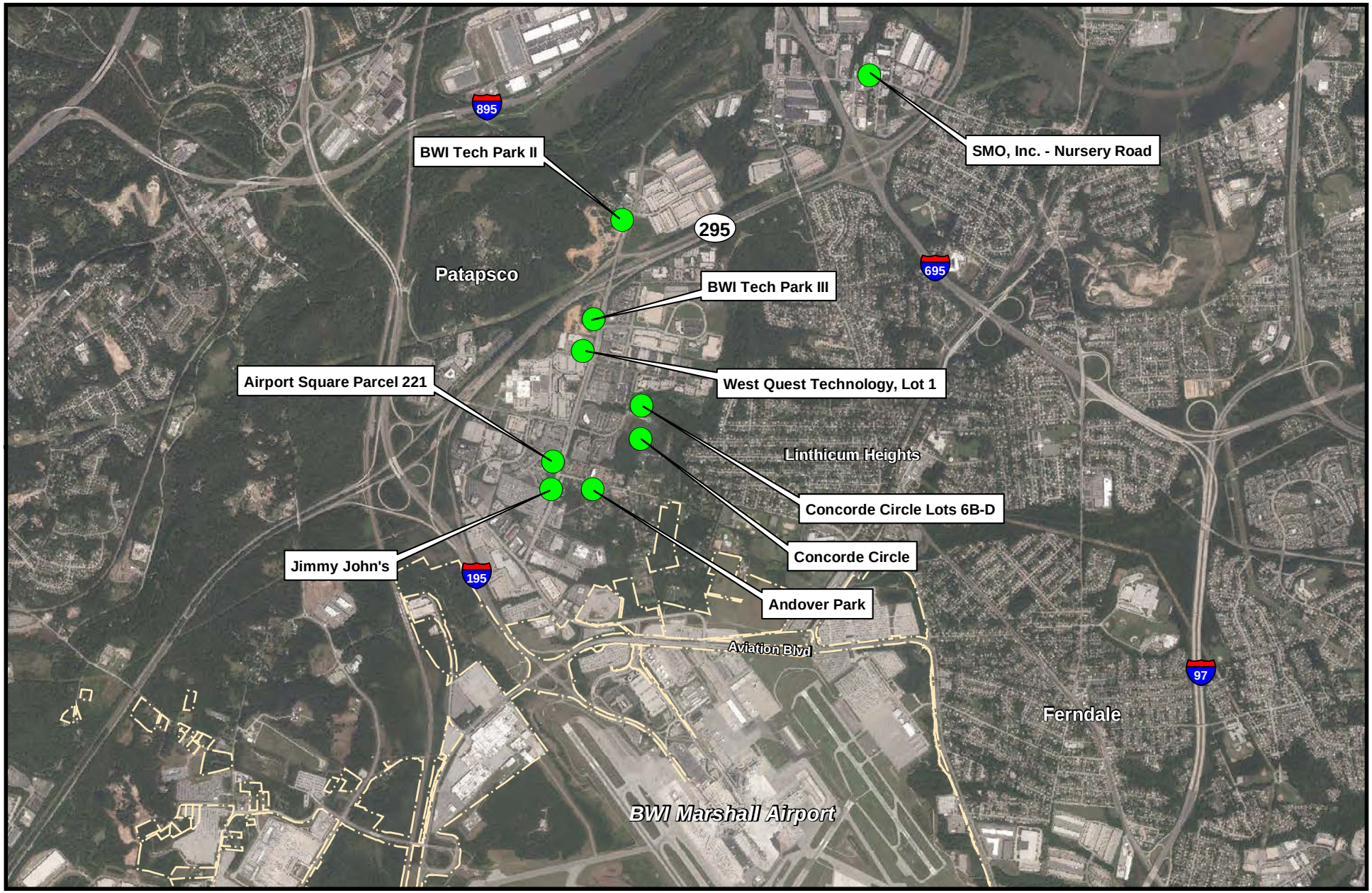
Proposed Action
- Pavement Improvements
- Proposed Structures
- Demolition

Traffic Intersections Near Proposed Improvements
Figure 5.12-1

N

0 1,000 2,000 4,000 Feet

Source: Aerial - MDOT MAA (2018)



LEGEND

- Airport Property Boundary
- Background Development

Background Developments
Figure 5.12-2

N

0 750 1,500 3,000 Feet

Source: Aerial - MDOT MAA (2016)

5.12.5.1.1 2022 No Action Alternative Operational Analysis

Delays and LOS

See Figure 4.13-2 for the traffic analysis intersection locations. The AM and PM peak hour delay and LOS for the 2022 No Action Condition indicate that minimal changes to intersection LOS are expected under the 2022 No Action Alternative as compared to the Existing Conditions. With the exception of Intersection 1, all other intersections are expected to operate at LOS D or better during both peak periods. Intersection 1 operates at LOS F and E in the AM and PM peak periods, respectively.

Queues

Queue lengths at the study intersections were analyzed. With the exception of Intersections 1, 4, 5 and 13, queues for turning movements are contained within the respective turn bays for the 2022 No Action Alternative.

CLV Analysis

The AM and PM peak hour critical lane volume (CLV), equivalent LOS and volume-to-capacity (V/C) were analyzed. All intersections operate at CLV LOS D or better during both peak periods, with the exception of Intersection 1 and 6 which degrade to LOS E in the AM and PM peak periods, respectively.

5.12.5.1.2 2027 No Action Alternative Operational Analysis

Delays and LOS

The AM and PM peak hour delay and LOS for the 2027 No Action Alternative indicate that Intersection 1 is expected to operate at LOS F during both peak periods. Three intersections operate at LOS E in the PM peak period: Intersection 5 (Stoney Run Rd at New Ridge Rd), Intersection 6 (Aviation Blvd/MD 170 at Amtrak Way/MD 995), and Intersection 12 (Aviation Blvd at Air Cargo Dr). All other intersections are expected to operate at LOS D or better during both peak periods.

Queues

Queue lengths at the study intersections were analyzed. With the exception of Intersections 1, 4, 5, 11 and 13, queues for turning movements are contained within the respective turn bays for the 2027 No Action Alternative.

CLV Analysis

The AM and PM peak hour CLV, equivalent LOS and V/C ratio were analyzed. All locations are expected to operate at LOS D or better during both peak periods, with the exception of two intersections which are expected to degrade to LOS E: Intersection 1 in the AM and PM peak periods, and Intersection 5 in the PM peak period.

5.12.5.2 Proposed Action Alternative

Figure 5.12-1 illustrates the following four proposed projects, as well as the two No Action Alternative projects (service station and Midfield Cargo Facility Improvements), that are analyzed for impacts to off-airport traffic intersections:

- Airline Maintenance Facility: East of Intersection 4.
- Second FBO: Along Aaronson Dr. This site is presently part of Long Term Parking Lot B.
- Fire Training Facility: West of Intersection 17.
- Airport Maintenance Facility: North of Intersection 19.

Table 5.12.1 summarizes the trip generation in the AM and PM peak hours for the new facilities. The AM and PM peak hours for the study area are 7:00 AM to 8:00 AM and 4:30 PM to 5:30 PM, respectively. See *Appendix A, Attachment 3* for details on the development of the Proposed Action alternative volumes and trip generation for the proposed projects.

Table 5.12.1
Trip Generation Summary

Facility	AM Peak Hour Trips		PM Peak Hour Trips	
	IN	OUT	IN	OUT
Airline Maintenance	10	85	10	10
Second FBO	11	10	13	13
Fire Training	1	1	1	1
Airport Maintenance	10	10	10	10
TOTAL	**32**	**106**	**34**	**34**

Source: HNTB analysis, 2018.

Trip generation for the Fire Training Facility in the AM and PM peak hours includes one additional trip. The access road for the Sponsor's Preferred Alternative intersects Aviation Boulevard at Intersection 17 (Aviation Blvd/MD 162 at Cromwell Park Dr), as shown on Figure 5.12-2. The access road for the 2015 ALP Alternative intersects Aviation Boulevard approximately 800 feet south of Intersection 17, west of the unsignalized entrance to the Maryland State Police complex, as shown on Figure 5.12-2. Due to the low trip generation for the Fire Training Facility, the shift in the access road for the Fire Training Facility along Aviation Boulevard between the 2015 ALP and Sponsor's Preferred Alternatives would result in the same traffic impacts as those analyzed at Intersection 17.

5.12.5.2.1 2022 Proposed Action Alternative Operational Analysis

Delays and LOS

The AM and PM peak hour delay and LOS for the 2022 Proposed Action Alternative include some minor changes in intersection delay but no expected changes to LOS during either peak period when comparing the analysis for 2022 No Action and 2022 Proposed Action Alternatives.

Queues

With the exception of Intersections 1, 4, 5, 11, and 13, queues for turning movements are contained within the respective turn bays for the 2022 Proposed Action Alternative. The expected queues for Intersection 4 are lower for the 2022 Proposed Action Alternative than for the 2022 No Action Alternative. This is due to the VSR added to the intersection as part of the New Airline Maintenance Facility and the corresponding change to the signal timing plan.

CLV Analysis

Like the 2022 No Action Alternative, the CLV analysis indicates that all intersections are expected to operate at LOS D or better during both peak periods under the 2022 Proposed Action Alternative, with the exception of Intersection 1 and 6 which degrade to LOS E in the AM and PM peak periods, respectively.

5.12.5.2.2 2027 Proposed Action Alternative Operational Analysis

Delays and LOS

Table 5.12.2 compares the results of the Synchro analysis for the 2027 No Action and Proposed Action Alternatives. The analysis indicates that Intersection 1 is expected to operate at LOS F during both peak periods under the 2027 Proposed Action Alternative. This is the same LOS as the 2027 No Action Alternative and there is minimal difference in overall intersection delay. Three intersections remain at LOS E in the PM peak period: Intersection 5, 6, and Intersection 12. In the AM Peak, the expected delay at Intersection 12 is slightly better (14.7 sec) compared to the No Action Alternative's delay (15.0 sec). This improvement is due to additional through vehicles along the mainline and their progression through the intersections. All other intersections are expected to operate at LOS D or better during both peak periods.

Queues

Table 5.12.3 compares the 95th percentile queue lengths for the 2027 AM and PM peaks respectively at locations where the queue lengths exceed the storage capacity for the 2027 No Action and Proposed Action Alternatives. Except for Intersections 1, 4, 5, 11 and 13, queues for turning movements are contained within the respective turn bays. The Proposed Action has no material impact on queue length/distance. There are only two turn bays (at Intersections 5 and 11) where the queue lengths increase by 25-30 feet, equivalent to one car length.

CLV Analysis

Table 5.12.4 compares the results of the CLV analysis for the 2027 No Action and Proposed Action Alternatives. With the exception of Intersection 3 and Intersection 10, there are no changes to LOS between the 2027 No Action and 2027 Proposed Action Alternatives. At Intersection 3, the AM peak CLV for the 2027 No Action Alternative is 1,296 which corresponds to an LOS equivalent of C. In the 2027 Proposed Action Alternative, the CLV is 1,309 which is at the LOS threshold of D. At Intersection 10, the AM peak CLV slightly increases from 1,132 (LOS B) in the 2027 No Action Alternative to 1,161 (LOS C) in the 2027 Proposed Action Alternative.

5.12.5.3 Conclusions and Findings

The traffic analysis indicates that the increase of traffic volumes in the Proposed Action Alternative would result in virtually no changes versus the No Action Alternative for either 2022 or 2027 conditions.

Four intersections would operate at LOS E or F during the AM and PM peak hours in the 2027 No Action Alternative. These intersections are along Aviation Blvd/MD 170 at Dorsey Rd/MD 176 – West, Amtrak Way/MD 995 and Air Cargo Dr, and Stoney Run Rd at New Ridge Rd. Intersection 1 (Aviation Blvd/MD 170 at Dorsey Rd/MD 176 – West) also operates at LOS E or F in the 2022 No Action Alternative. The resulting site traffic from the four proposed EA developments at BWI Marshall Airport would not further deteriorate traffic operations at the four intersections as shown in **Table 5.12.5.**

Table 5.12.2
2027 Synchro Analysis Comparison: No Action versus Proposed Action

	Intersection	Control	No Action		Proposed Action	
			AM Peak Delay/ LOS	PM Peak Delay/ LOS	AM Peak Delay/ LOS	PM Peak Delay/ LOS
1	Aviation Blvd at Dorsey Rd - West	S	96.6 / F	85.4 / F	96.6 / F	85.6 / F
2	Aviation Blvd at Mathison Way	S	14.5 / B	6.9 / A	14.5 / B	6.9 / A
3	Aviation Blvd at Stoney Run Rd	S	45.9 / D	26.5 / C	47.7 / D	26.7 / C
4	Stoney Run Rd at Northrop Grumman Entrance	S	20.5 / C	50.0 / D	19.7 / B	51.6 / D
5	Stoney Run Rd at New Ridge Rd	S	39.7 / D	56.0 / E	39.9 / D	56.3 / E
6	Aviation Blvd at Amtrak Way	S	18.0 / B	65.3 / E	18.2 / B	66.0 / E
7	Aviation Blvd at Northrop Grumman Gate 1A	S	10.4 / B	16.1 / B	10.5 / B	16.2 / B
8	Aviation Blvd at SB I-195 Ramps	S	5.3 / A	22.1 / C	5.6 / A	22.4 / C
9	Aviation Blvd at NB I-195 Ramps	S	6.9 / A	39.4 / D	6.8 / A	39.6 / D
10	Aviation Blvd at Terminal Rd	S	25.1 / C	13.4 / B	27.4 / C	13.4 / B
11	Terminal Rd at Elkridge Landing Rd	S	29 / C	20.1 / C	29.9 / C	20.1 / C
12	Aviation Blvd at Air Cargo Dr	S	15.0 / B	58.6 / E	14.7 / B	58.6 / E
13	Aviation Blvd at Andover Rd	S	15.9 / B	15.0 / B	16.2 / B	15.6 / B
14	Aviation Blvd at Aaronson Dr	U	9.6 / A	3.5 / A	10.9 / B	6.9 / A
15	Aviation Blvd at Allwood Dr	S	6.8 / A	3.6 / A	6.8 / A	3.6 / A
16	SB I-97 Ramps at Cromwell Park Dr	S	16.0 / B	25.9 / C	15.9 / B	25.8 / C
17	Aviation Blvd at Cromwell Park Dr	S	26.1 / C	31.5 / C	26.3 / C	31.6 / C
18	Aviation Blvd at Dorsey Rd - East	S	27.2 / C	31.2 / C	27.5 / C	31.5 / C
19	Dorsey Rd at Digiulian Blvd	U	0.7 / A	3.0 / A	0.9 / A	3.5 / A
20	Aviation Blvd at Hollins Ferry Rd	S	2.4 / A	1.5 / A	2.4 / A	1.5 / A
21	Aviation Blvd at BWI Long Term Parking Lots	S	5.9 / A	8.0 / A	6.1 / A	6.1 / A
22	Aviation Blvd at S. Camp Meade Rd	S	4.1 / A	7.5 / A	5.2 / A	7.6 / A

Note: S = signalized; U = unsignalized

Source: HNTB analysis (*Appendix A, Attachment 3*), 2018.

Table 5.12.3
2027 No Action and Proposed Action Alternative Turn Movement Queues Exceeding Storage Length

Intersection		Movement	Turn Bay Length (ft)	No Action Queue (ft)	Proposed Action Queue (ft)	Change in Queue Length (ft)
AM Peak Hour						
1	Aviation Blvd at Dorsey Rd - West	NBL	455	#831	#847	16
		NBR	250	292	294	2
		SBL	250	324	327	3
		SBR	175	203	217	14
		EBL	175	#810	#824	14
		EBR	225	66	66	n/a
		WBL	200	199	202	3
4	Stoney Run Rd at Northrop Grumman Entrance	SBR	85	17	0	n/a
5	Stoney Run Rd at New Ridge Rd	WBL	300	#588	#615	27
11	Aviation Blvd at Terminal Rd	EBL	445	#487	#514	27
13	Aviation Blvd at Andover Rd	SBL	175	204	205	1
PM Peak Hour						
1	Aviation Blvd at Dorsey Rd - West	NBL	455	318	318	n/a
		NBR	250	109	109	n/a
		SBL	250	#782	#782	0
		SBR	175	527	529	2
		EBL	175	#785	#787	2
		EBR	225	381	381	0
		WBL	200	270	271	1
4	Stoney Run Rd at Northrop Grumman Entrance	SBR	85	185	139	-46
5	Stoney Run Rd at New Ridge Rd	WBL	300	#822	#829	7
11	Aviation Blvd (MD 170) at Terminal Rd	EBL	445	212	213	n/a
13	Aviation Blvd at Andover Rd	SBL	175	231	233	2

Notes:
Queues that are within the turn bay storage length of the movement are excluded
m : Volume for the 95th percentile queue is metered by upstream signal
~ : Volume exceed capacity, queue is theoretically infinite
# : 95th percentile volume exceeds capacity, queue may be longer
- : Queues are within storage

Source: HNTB analysis (*Appendix A, Attachment 3*), 2018.

Table 5.12.4
2027 CLV Analysis Comparison: No Action versus Proposed Action

	Intersection	No Action		Proposed Action	
		AM Peak CLV / LOS	PM Peak CLV / LOS	AM Peak CLV / LOS	PM Peak CLV / LOS
1	Aviation Blvd at Dorsey Rd - West	1,550 / E	1,492 / E	1,552 / E	1,494 / E
2	Aviation Blvd at Mathison Way	1,100 / B	1,132 / B	1,101 / B	1,133 / B
3	Aviation Blvd at Stoney Run Rd	1,296 / C	1,252 / C	1,309 / D	1,254 / C
4	Stoney Run Rd at Northrop Grumman Entrance	770 / A	716 / A	787 / A	719 / A
5	Stoney Run Rd at New Ridge Rd	644 / A	826 / A	657 / A	829 / A
6	Aviation Blvd at Amtrak Way	1,163 / C	1,567 / E	1,172 / C	1,571 / E
7	Aviation Blvd at Northrop Grumman Gate 1A	1,157 / C	1,362 / D	1,166 / C	1,365 / D
8	Aviation Blvd at SB I-195 Ramps	906 / A	1,419 / D	938 / A	1,422 / D
9	Aviation Blvd at NB I-195 Ramps	873 / A	908 / A	893 / A	910 / A
10	Aviation Blvd at Terminal Rd	1,132 / B	756 / A	1,161 / C	757 / A
11	Terminal Rd at Elkridge Landing Rd	955 / A	730 / A	972 / A	732 / A
12	Aviation Blvd at Air Cargo Dr	855 / A	1,235 / C	861 / A	1,236 / C
13	Aviation Blvd at Andover Rd	996 / A	952 / A	1,000 / A	955 / A
14	Aviation Blvd at Aaronson Dr (unsignalized)	902 / A	774 / A	905 / A	776 / A
15	Aviation Blvd at Allwood Dr	445 / A	666 / A	448 / A	667 / A
16	SB I-97 Ramps at Cromwell Park Dr	924 / A	875 / A	929 / A	881 / A
17	Aviation Blvd at Cromwell Park Dr	876 / A	809 / A	881 / A	811 / A
18	Aviation Blvd at Dorsey Rd - East	658 / A	372 / A	660 / A	376 / A
19	Dorsey Rd at Digiulian Blvd (unsignalized)	834 / A	658 / A	855 / A	636 / A
20	Aviation Blvd at Hollins Ferry Rd	1,092 / B	701 / A	1,094 / B	705 / A
21	Aviation Blvd at BWI Long Term Parking Lots	1,550 / E	1,492 / E	1,552 / E	1,494 / E
22	Aviation Blvd **at** S. Camp Meade Rd	1,100 / B	1,132 / B	1,101 / B	1,133 / B

Note: * A CLV rating of 1,450 is at the LOS D – E threshold.

Source: HNTB analysis (*Appendix A, Attachment 3*), 2018.

Table 5.12.5
Summary of Intersections Operating at Undesirable LOS

Intersection		No Action				Proposed Action			
		Synchro (delay/LOS)		CLV (CLV/LOS)		Synchro (delay/LOS)		CLV (CLV/LOS)	
		AM	PM	AM	PM	AM	PM	AM	PM
2022 AM / PM Peak Hour									
1	Aviation Blvd at Dorsey Rd - West	85.4 F	72.6 E	1,473 E	1,418 D	85.4 F	72.9 E	1,476 E	1,379 D
2027 AM / PM Peak Hour									
1	Aviation Blvd at Dorsey Rd - West	96.6 F	85.4 F	1,550 E	1,492 E	96.6 F	85.6 F	1,552 E	1,494 E
5	Stoney Run Rd at New Ridge Rd	39.7 D	56.0 E	644 A	826 A	39.9 D	56.3 E	657 A	829 A
6	Aviation Blvd at Amtrak Way	18.0 B	65.3 E	1,163 C	1,567 E	18.2 B	66.0 E	1,172 C	1,571 E
12	Aviation Blvd at Air Cargo Dr	15.0 B	58.6 E	855 A	1,235 C	14.7 B	58.6 E	861 A	1,236 C

Note: * A CLV rating of 1,450 is at the LOS D – E threshold.

Source: HNTB analysis (*Appendix A, Attachment 3*), 2018.

5.12.6 Mitigation

To address the four intersections operating at LOS E or F during the 2027 No Action Alternative AM or PM peak hours, mitigations measures such as signal split optimization and restriping of an approach could be implemented. See *Appendix A, Attachment 3* for details on the potential mitigation at each intersection.

The improvements by intersection are recommended as follows:

- Intersection 1 (Aviation Blvd/MD 170 at Dorsey Rd/MD 176 – West): Recommend cycle length and signal split optimization, which would reduce delays at this intersection.
- Intersection 5 (Stoney Run Rd at New Ridge Rd): Recommend signal split optimization, which would reduce delays at this intersection.
- Intersection 6 (Aviation Blvd/MD 170 at Amtrak Way/MD 176): Recommend restriping of the eastbound approach from a left-only lane and a right-only lane to a left-only lane and shared left-right lane. With this restriping, the CLV analysis indicates that operations would result in an acceptable LOS.
- Intersection 12 (Aviation Blvd/MD 170 at Air Cargo Rd): Recommend signal split optimization, which would reduce delays at this intersection.

All other intersections operate within acceptable thresholds, meaning all intersections perform at an acceptable LOS D or better. The Synchro analysis indicates that as traffic volumes grow within the corridor, even under the No Action Alternative, signal optimization is necessary to reduce delays for some movements. This better manages traffic delays by shifting green time to those congested movements

with poor LOS. These signal timing improvements are considered as low-cost with no impact to the surrounding infrastructure, and as such are feasible to implement.

Authority to implement improvements to off-airport intersections falls to the roadway owner – either Anne Arundel County or the SHA. During design, MDOT MAA would consult with the County and SHA for proposed facilities that would add a new entrance or increase peak hour traffic at an existing entrance within County or SHA right of way. MDOT MAA must obtain a permit to add or modify an entrance within County or SHA right of way. If required, signal timing improvements would be implemented by the County or SHA.

5.13 Visual Effects

Visual effects consist of two categories: light emissions effects, and visual resource and visual character impacts. The potential impact of light emissions and visual impacts from the proposed improvements are assessed as they relate to light sensitive areas and visual resources near the Airport.

5.13.1 Laws and Regulations

There are no Federal regulations for airport related light emissions or visual effects.

5.13.2 Methodology

Light Emissions

The primary sources of light emissions from airports are the FAA required lighting for security, obstruction clearance, and navigation. An analysis of the impact of light emissions on the surrounding environment is required when proposed projects introduce new lighting that may affect residential or other sensitive land uses.

Visual Resources and Visual Character

Visual impacts deal more broadly with the extent that the development contrasts with the existing environment and whether the community's jurisdictional agencies consider this contrast objectionable. The potential for development to contrast with the surrounding environment is assessed, including potential consultation with jurisdictional agencies.

5.13.3 Thresholds of Significance

There is no established threshold of significance for visual effects. However, FAA Order 1050.1F provides factors to consider in determining whether the threshold of significance for visual effects would be exceeded.

Light Emissions

An action may be considered significant if light emissions would create significant annoyance or inference with normal activities; or if light emissions affect the visual character of an area (i.e. importance, uniqueness, aesthetic value).

Visual Resources and Visual Character

An action may be considered significant if it would affect the nature of the visual character of an area; contrast with visual resources or character in the study area; or block or obstruct the views of visual resources.

5.13.4 Impact Analysis

Potential impacts of light emissions and impacts on visual resources and visual character were identified and evaluated.

5.13.4.1 2015 ALP Alternative

Light Emissions

Proposed projects under the 2015 ALP Alternative would include new and relocated sources of light emissions, however it would not significantly change the light emissions from the Airport. Changes to taxiway and apron layouts would include adjustments to airfield lighting. New facilities, such as the Airport Maintenance Complex (P30), Relocated Fire Training Facility (P45), and the Airline Maintenance Facility (P11) would include new light emissions at the Airport. However, all proposed projects involving new light emissions are within Airport property and would be consistent with the existing visual character of the Airport environment and its immediate surrounding.

No significant impacts related to light emissions are expected with the 2015 ALP Alternative.

Visual Resources and Visual Character

The 2015 ALP Alternative would not affect the visual character of the Airport campus. However, for the obstruction removal project, there would be approximately 1,514 trees removed off the Runway 15L end, 384 trees on-Airport property and 1,147 trees off-Airport property in a predominantly residential area.

Residents off the Runway 15L end provided scoping comments in August 2016 with concerns about the proposed tree removal on their properties altering the visual buffer to adjacent properties and removing provided shade (See *Appendix M, Public and Agency Involvement*). Since the obstruction removal will be predominantly selective clearing in the residential area, rather than clearcut, forest stands will remain, but will be less dense. The existing visual vegetation barriers between residential properties and adjacent properties (including the Airport) would remain. Therefore, the nature of the visual character of the area would not be significantly affected. If the trees were to be clearcut within MDOT MAA's property west of the residential area in the approach to the Runway 15L end, then residents may consider this a visual impact as the screening of commercial development further west provided by the trees will be eliminated. MDOT MAA expects to selectively clear trees in this area as well. Additionally, prior to clearing on private property, the trees would be individually surveyed to confirm whether or not they are obstructions.

Similarly, the tree clearing along the southern boundary of Andover Park would not change the visual character of the park. The tree removal is located away from the sports fields and picnic areas and the forest stands would remain.

The 2015 ALP Alternative would not block or obstruct any views of visual resources. The view from the BWI Trail, a Section 4(f) resource, varies around the Airport. However, no significant impacts related to visual effects from the BWI Trail are expected. Refer to *Section 5.5, DOT Act Section 4(f) Resources* for additional discussion of the visual effect from the BWI Trail.

No significant impacts related to visual resources or visual character are expected with the 2015 ALP Alternative.

5.13.4.2 Sponsor's Preferred Alternative

Light Emissions

The Sponsor's Preferred Alternative would result in the same impacts to light emissions as described under the 2015 ALP Alternative. No significant impacts related to light emissions are expected with the Sponsor's Preferred Alternative.

Visual Resources and Visual Character

The only difference between the Sponsor's Preferred Alternative and 2015 ALP Alternative as it relates to visual resources and character, is the minimization of obstruction removal through selective tree clearing on-airport property under the Sponsor's Preferred Alternative. As a result, changes to visual resources may differ slightly from the 2015 ALP Alternative. No significant impacts to visual character and visual resources are expected with the Sponsor's Preferred Alternative.

5.13.4.3 No Action Alternative

Under the No Action Alternative, there would be no proposed development and therefore no potential for impacts to light emissions or visual resources and character.

5.13.5 Mitigation

Although there is no expected impact from either alternative lighting for the 2015 ALP Alternative or Sponsor's Preferred Alternative projects would be designed to comply with FAA and airport lighting standards in order to ensure there will be no negative impacts to runway operations or aircraft safety. The FAA promotes the following measures to mitigate any potential lighting impacts: shielding lighting fixtures with visors; angling fixtures toward the base of the mounting poles; directional lighting; or using minimal pole heights or reduced wattage bulbs.

5.14 Water Resources

Potential impacts from the proposed improvements on wetlands, streams, floodplains, water quality, and groundwater are assessed.

5.14.1 Laws and Regulations

Applicable laws and regulations for water resources are discussed in Chapter 4, *Section 4.15, Water Resources*.

5.14.2 Methodology

Wetlands, Streams, and Floodplains

Impacts are determined by calculating the square footage of nontidal wetlands and their buffers, square footage and linear footage for streams, and square footage for floodplains under the footprint of each alternative. For the purposes of this analysis, a worst-case scenario in which all impacts are considered permanent is presented; however, it is probable that during final design, implementation of avoidance and minimization measures, some of the impacts could become temporary or avoided altogether. When authorizing a project, USACE considers temporary and permanent impacts cumulatively.

Consultation with USACE and MDE is required to develop a conceptual mitigation plan for impacts and to obtain reasonable assurance that Section 404 permit requirements can be met.

Water Quality

To evaluate potential impacts on water quality, the change in impervious surface for each project was determined. Environmental Site Design (ESD) calculations were made to determine the extent of treatment required by project. Concepts for stormwater quality and quantity management are discussed.

Groundwater

Impacts to groundwater at airports are largely associated with fuel spills/leaks and the potential vertical migration or exfiltration of aircraft deicing fluids. Therefore, Alternatives were reviewed regarding their relative potential for fuel spills/leaks and capture of aircraft deicing fluids.

5.14.3 Thresholds of Significance

Wetlands and Streams (Waters of the U.S.)

Per FAA Order 1050.1F, a significant impact would occur to wetlands "when the action would:

- Adversely affect a wetland's function to protect the quality or quantity of municipal water supplies, including surface waters and sole source and other aquifers;
- Substantially alter the hydrology needed to sustain the affected wetland system's values and functions or those of a wetland to which it is connected;
- Substantially reduce the affected wetland's ability to retain floodwaters or storm runoff, thereby threatening public health, safety or welfare (the term welfare includes cultural, recreational, and scientific resources or property important to the public);
- Adversely affect the maintenance of natural systems supporting wildlife and fish habitat or economically important timber, food, or fiber resources of the affected or surrounding wetlands;
- Promote development of secondary activities or services that would cause the circumstances listed above to occur; or be inconsistent with applicable state wetland strategies.

Floodplains

In accordance with the FAA Order 1050.1F Desk Reference, "Floodplain impacts would be significant if: *The action would cause notable adverse impacts on natural and beneficial floodplain values.*"[27]

Surface Waters

FAA Order 1050.1F Desk Reference defines the threshold of significance for surface waters. A significant impact exists if an action would "exceed water quality standards established by Federal, state, local, and tribal regulatory agencies; or contaminate public drinking water supply such that public health may be adversely affected."

Groundwater

FAA Order 1050.1F Desk Reference defines the threshold of significance for groundwater. A significant impact exists if an action would "exceed groundwater quality standards established by Federal, state, local, and tribal regulatory agencies; or contaminate an aquifer used for public water supply such that public health may be adversely affected."

5.14.4 Impact Analysis

Potential impacts to wetlands, streams, floodplains, water quality and groundwater were identified and evaluated.

5.14.4.1 2015 ALP Alternative

Wetlands, Streams, and Floodplains

Table 5.14.1 summarizes the impacts to wetlands, wetland buffers, streams and the 100-year floodplain associated with the 2015 ALP Alternative projects. Six of the proposed improvement projects could potentially impact wetlands, wetland buffers, streams or 100-year floodplains. Cumulatively, implementation of all the 2015 ALP Alternatives would result in temporary or permanent impacts to 5.44 acres of nontidal wetlands, 6.28 acres of wetland buffers, 838 linear feet of streams, and 7.07 acres of 100-year floodplains.

Table 5.14.1
2015 ALP Alternative of Impacts to Water Resources

Project	LOD (acres)	Impacts/Encroachments			
		Wetlands	Wetland Buffers	Stream Channel	100-Year Floodplain[2]
Relocate Taxiways F and R (1)	111	0.22 ac. (9,418 sf)	0.38 ac. (16,514 sf)	825 lf	0.14 ac.
Part 77 Obstruction Removal (10)	N/A	4.87 ac. (212,083 sf)	4.25 ac. (185,015 sf)	0	6.93 ac.
Taxiway V Relocation (17)	35	0.23 ac. (9,905 sf)	0.97 ac. (42,323 sf)	0	0
Relocate Fire Training Facility (P45)	21	0.03 ac. (1,275 sf)	0.11 ac. (4,786 sf)	0	0
New Airline Maintenance Facility (P11)	76	0.13 ac. (5,671 sf)	0.68 ac. (29,820 sf)	13 lf	0
TOTAL		**5.44 ac.[1] (237,077 sf)**	**6.28 ac.[1] (273,672 sf)**	**838 lf**	**7.07 ac.**

Note: [1] The total impacts take into account the overlapping of impacts from individual projects and therefore the individual values do not sum to the total provided.
[2] Impacts to the 100-year floodplain include impacts within the MAA-delineated floodplains along Stony Run, Kitten Branch, and Signal Branch.

Sources: *Appendix D, Preliminary Engineering Project Quantities Table*, BWI NRI Map, and JMT analysis, 2018.

The 2015 ALP Alternative would not result in a significant impact to wetlands, streams, or floodplains. Mitigation would be provided for all permanent impacts to wetlands and streams, see *Section 5.14.5* for details. Run-off from all proposed projects ultimately drains into the floodplains associated with either Kitten Branch, Stony Run, Sawmill Creek or Cabin Branch. Stormwater management will be implemented in accordance with MDE's *Stormwater Management Guidelines for State and Federal Projects* to control run-off and ensure nearby wetlands, streams, and floodplains are not adversely impacted. While proposed projects are within and adjacent to the floodplains, resulting in a floodplain encroachment, the projects would not be considered significant impacts as there would be no impact to the natural and beneficial value of the floodplains. **Figures 5.14-1 through 5.14-5** depict the impacts to water resources as a result of the 2015 ALP Alternative projects.

The majority of the impacts are associated with clearing of forested areas currently in conflict with Part 77 surfaces, discussed in detail below.

Part 77 Obstruction Removal: Cutting down individual trees in emergent or scrub-shrub wetlands, wetland buffers, or floodplains is considered a temporary impact; however, conversion of a forested wetland to either an emergent or scrub/shrub wetland through removal of all trees is considered a permanent impact. Current obstructions to Part 77 surfaces include 35 individual trees in nontidal wetlands, 88 trees in wetland buffers, and 13 trees in 100-year floodplains (three along Stony Run and 10 along Kitten Branch). Of these individual tree obstructions, 17 occur within the Stony Run WSSC and 79 occur within the 100-foot buffer. Figure 5.14-3 illustrates the wetlands and streams in relation to Part 77 obstruction removal. Note that impacts to the Stony Run WSSC were calculated based on the MDOT MAA-delineated WSSC, as this delineation was completed more recently than the MDNR delineation which was completed prior to the construction of Stoney Run Road. Figure 5.14-1 illustrates the areas of 100-year floodplain within Part 77 obstruction clearing areas.

Additionally, many forested areas surrounding the airfield are shown to be existing conflicts with Part 77 transitional surfaces in MDOT MAA's 2014 Forest Maintenance Plan Update. Clearing of these forest areas would result in temporary or permanent impacts to 4.87 acres of non-tidal wetlands, 4.25 acres of wetland buffer, and 6.93 acres of 100-year floodplains. The tree clearing would encroach on the 6.93 acres of floodplain area; however, it would not be considered a significant impact as there would be no impact to the natural and beneficial value of the floodplain.

It should be noted that the parcel along Stoney Run Road, included for NEPA review, is partially located within the floodplain associated with Stony Run. However, this project does not include actual construction and therefore there would be no impacts to the floodplain.

Surface Waters

The 2015 ALP Alternative projects would result in an increase in stormwater runoff from the additional impervious surfaces proposed. Based on preliminary engineering design, the 2015 ALP Alternative projects would result in net increase of approximately 86.0 acres of impervious surface, as

LEGEND

- Airport Property Boundary
- 100-Year Floodplain
- Part 77 (Primary, Approach and Transitional Surface Limits)
- Tree Obstruction Removal (2014 FMP Part 77 Conflict Areas)
- Obstruction Removal (2015 ALP Obstruction Points)
- (1) Relocate Taxiways R and F Project Limits of Disturbance
- Stream
- Culverted Stream

Encroachments on Floodplains - 2015 ALP Alternative
Figure 5.14-1

N

0 400 800 1,600 Feet

Sources: Aerial - MDOT MAA (2018), BWI NRI Map, FEMA and 1996 MAA-delineated floodplains (Signal, Hawkins, and Clark Branch)

LEGEND

- New Impervious
- Impervious Removal
- Impervious Reconstructed
- Other EA Projects
- Limit of Disturbance
- Wetlands with 25' Buffers
- Stormwater Management Pond
- USACE Jurisdictional Pond
- Wetlands of Special State Concern with 100' Buffers (MAA-delineated)
- Wetlands of Special State Concern with 100' Buffers (MDNR data)
- Stream
- Culverted Stream

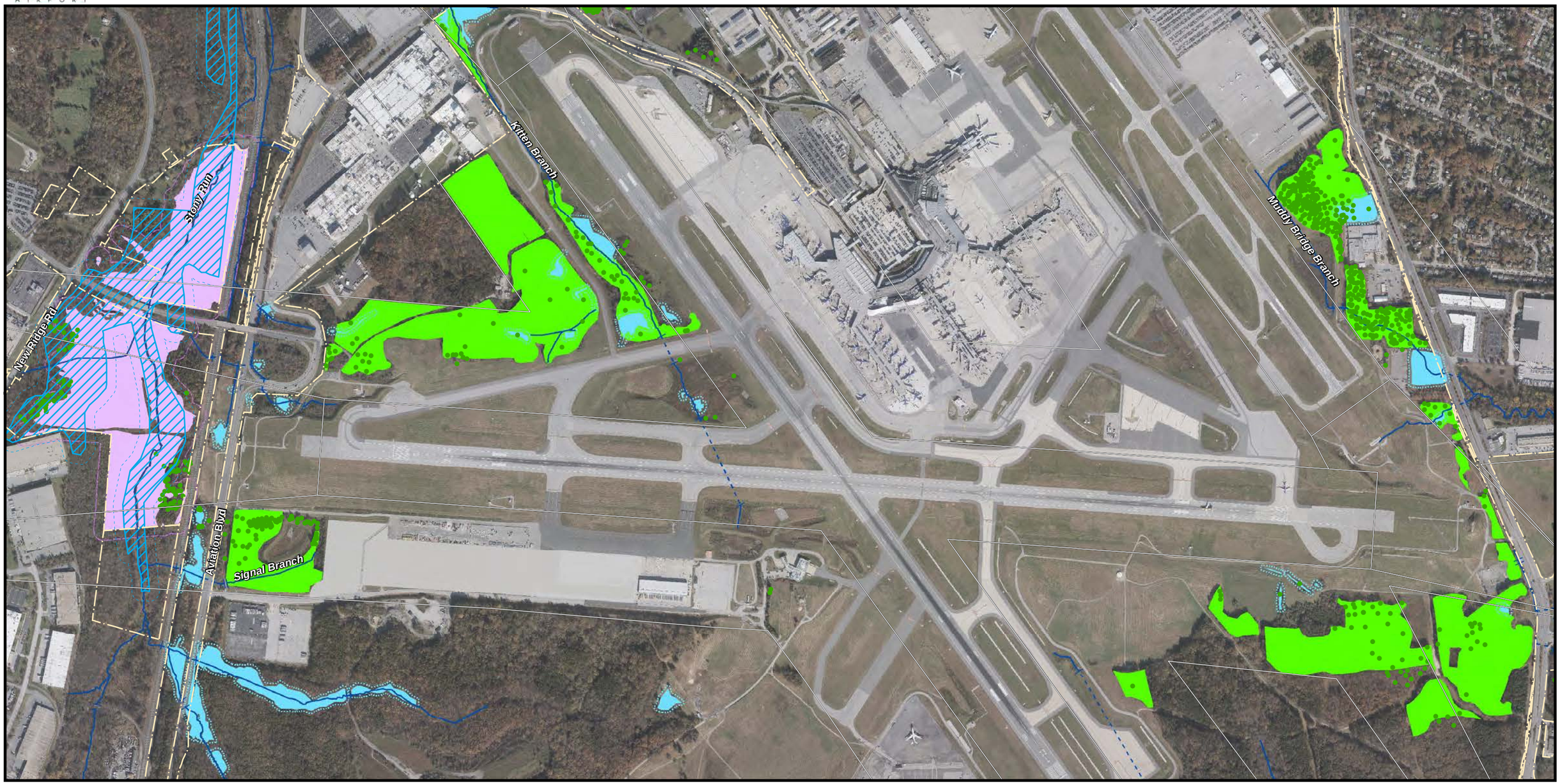
Impacts to Wetlands and Streams - Relocate Taxiways F & R
Figure 5.14-2

N

0 200 400 800 Feet

Sources: Aerial - MDOT MAA (2018), ADCI, BWI NRI Map

EA and Section 4(f) Determination for ALP Phase I Improvements at BWI Marshall Airport



LEGEND

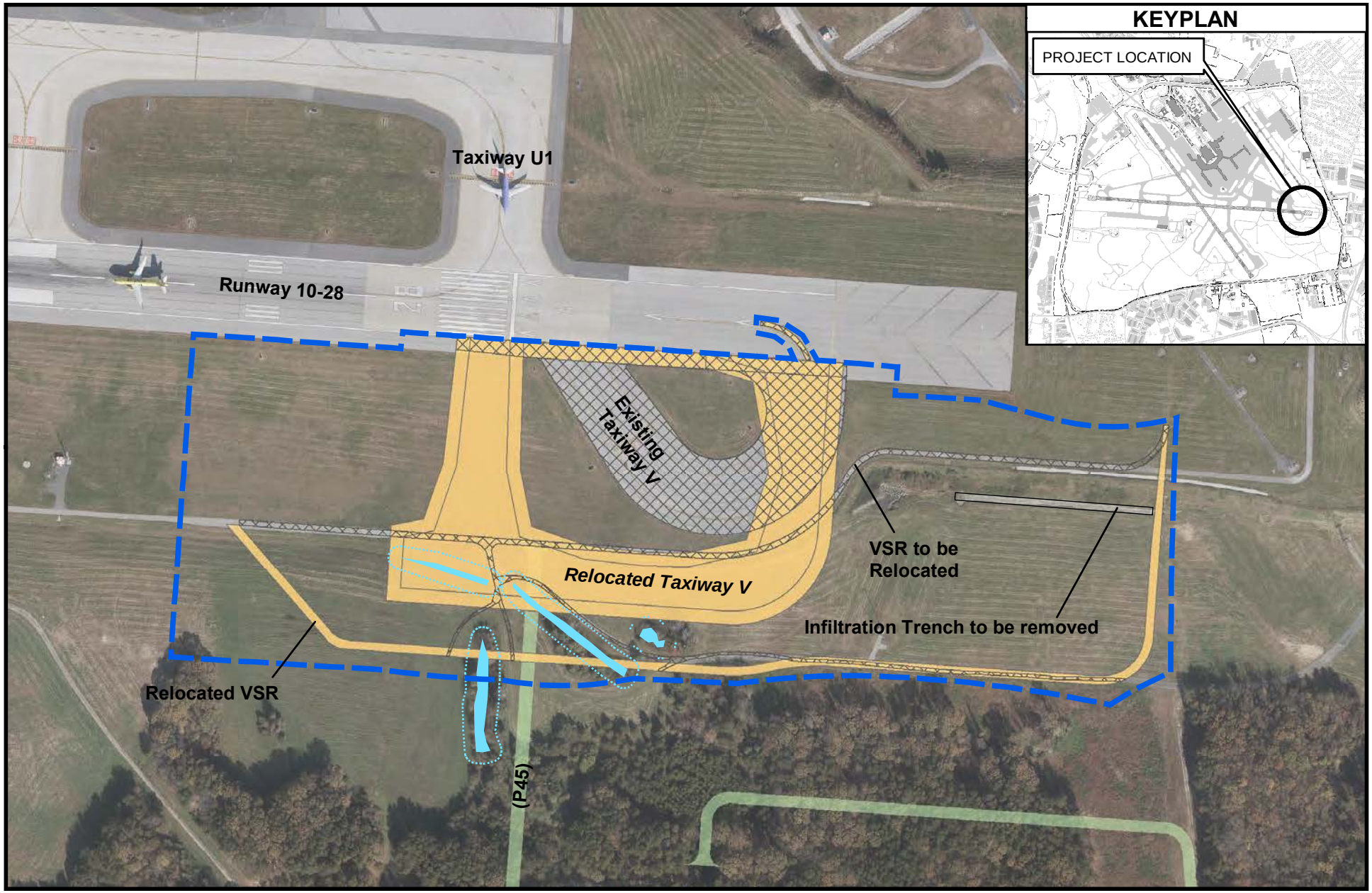
- Airport Property Boundary
- Part 77 (Primary, Approach and Transitional Surface Limits)
- Tree Obstruction Removal (2014 FMP Part 77 Conflict Areas)
- Obstruction Removal (2015 ALP Obstruction Points)
- Wetlands with 25' Buffers
- Wetlands of Special State Concern with 100' Buffers (MAA-delineated)
- Wetlands of Special State Concern with 100' Buffers (DNR)
- Stream
- Culverted Stream

2015 ALP Alternative Impacts to Wetlands and Streams
Part 77 Obstruction Removal
Figure 5.14-3

N

0 500 1,000 2,000 Feet

Sources: Aerial - MDOT MAA (2018), BWI NRI Map



LEGEND

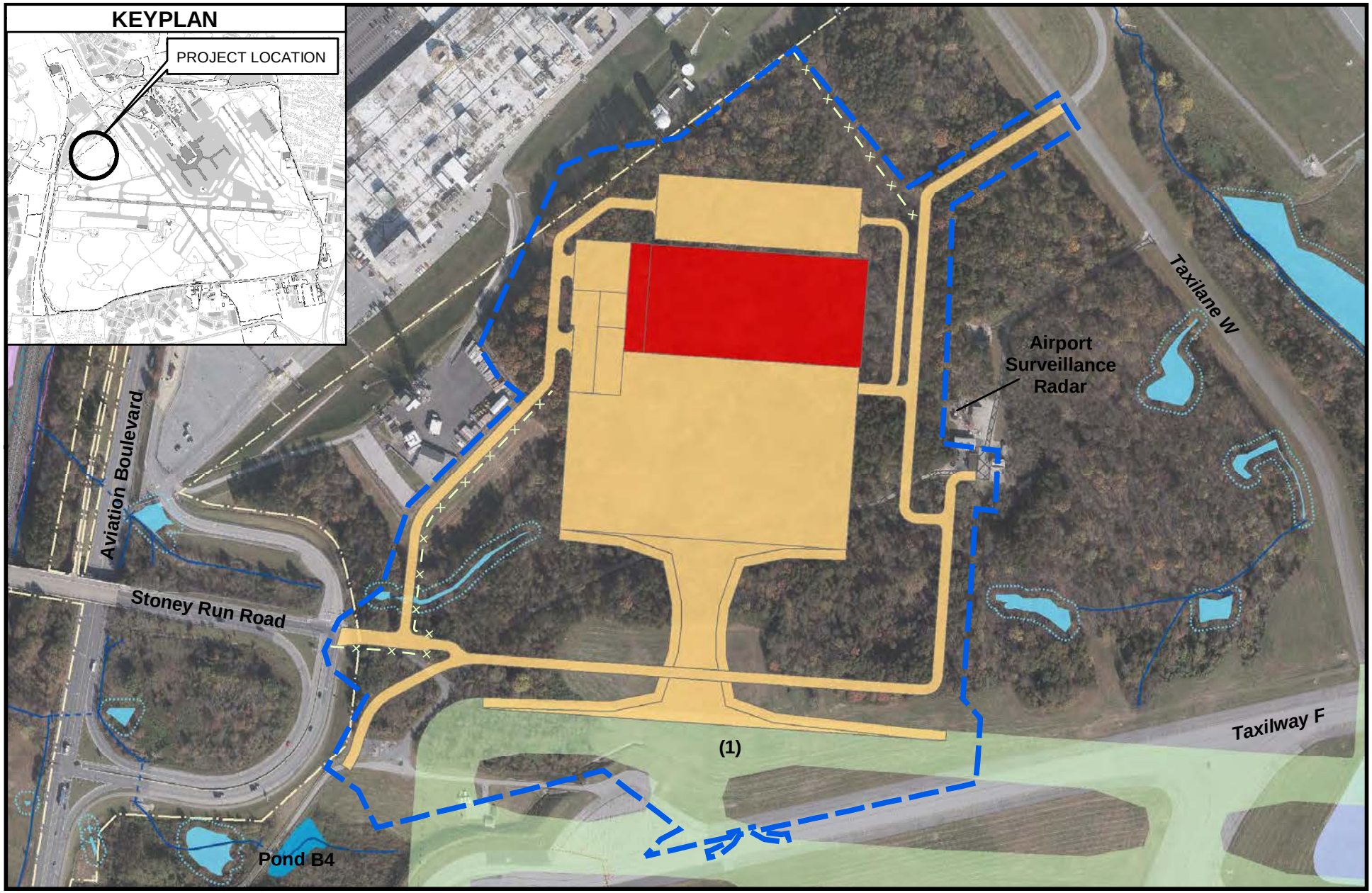
- New Impervious
- Impervious Removal
- Impervious Reconstructed
- Other EA Projects
- Limit of Disturbance
- Wetlands with 25' Buffers
- Taxiway Object Free Area
- Proposed Drainage

Impacts to Wetlands – Taxiway V Relocation
Figure 5.14-4

N

0 75 150 300 Feet

Sources: Aerial - MDOT MAA (2018), ADCI, BWI NRI Map



LEGEND

- New Impervious
- Impervious Removal
- Impervious Reconstructed
- Other EA Projects
- Limit of Disturbance
- Building
- Wetlands with 25' Buffers
- Stormwater Management Pond
- USACE Jurisdictional Pond
- Wetlands of Special State Concern with 100' Buffers (MAA-delineated)
- Stream
- Culverted Stream

2015 ALP Alternative Impacts to Wetlands and Streams
New Airline Maintenance Facility
Figure 5.14-5

N

0 100 200 400 Feet

Sources: Aerial - MDOT MAA (2016), ADCI, BWI NRI Map

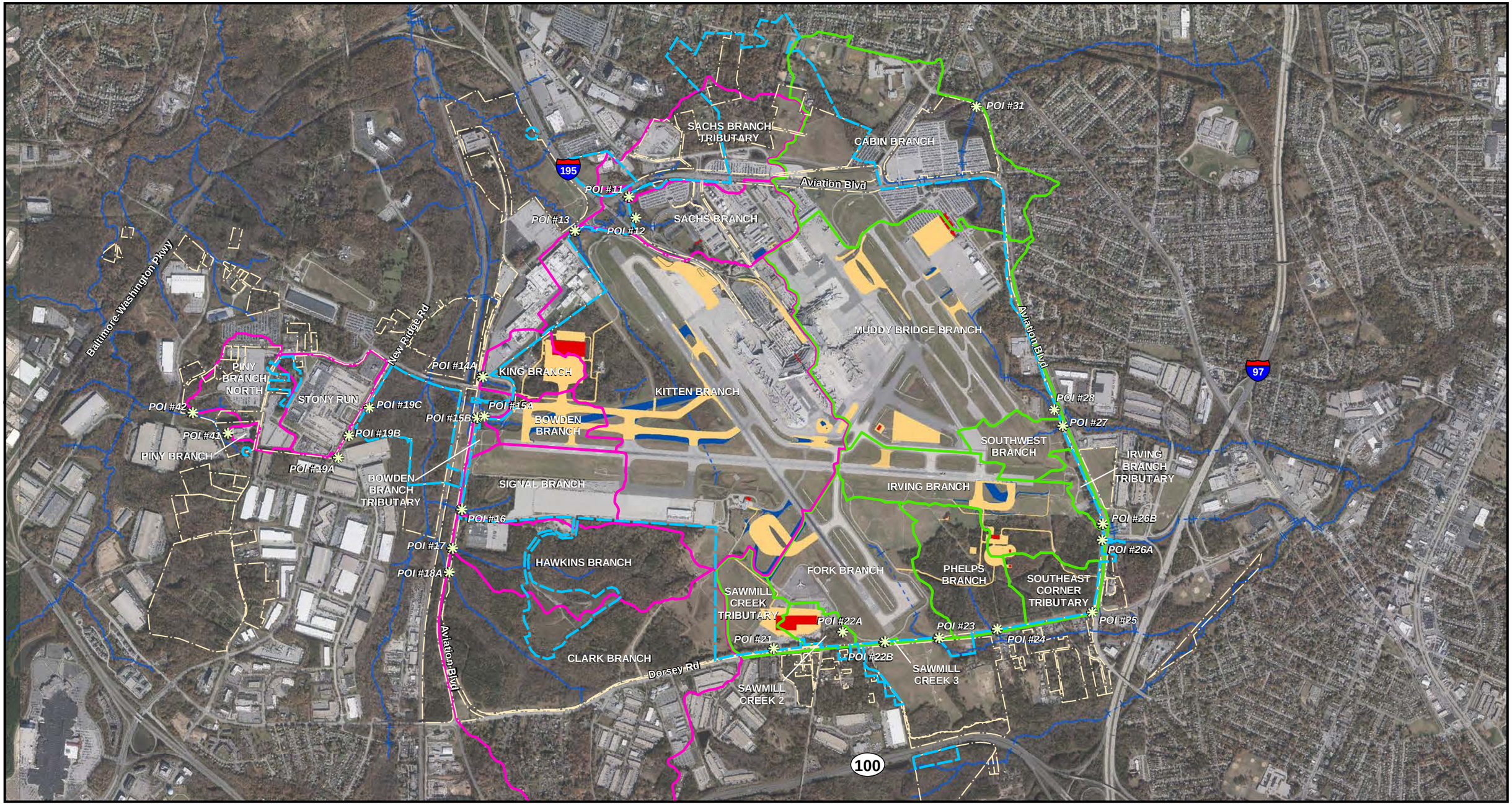
summarized by project in **Table 5.14.2.** Stormwater treatment would be required to provide water quality and quantity control. **Figure 5.14-6** shows the 2015 ALP Alternative projects with subwatersheds.

Table 5.14.2
Net Impervious Area – 2015 ALP Alternative

	Project	Watersheds Impacted	Net Increase in Impervious Area (Acres)
1	Relocate Taxiways R and F	Kitten, Bowden, King	17.36
2	Taxiway U3	Irving	1.61
3	International Terminal Area Taxiway Fillets/Shoulders	Muddy	3.51
4	New Infill Pavement Near Taxiways T, P and Future P	Kitten, Muddy	2.19
6	Relocate Taxiways K and L	Muddy	1.76
7	Isolation/RON Apron	Kitten, Fork	8.2
8	Runway 28 Deicing Pad Expansion	Muddy	1.14
12	Relocate Taxiway H	Kitten	0.08
14	New Sky Bridge C	Kitten	0.12
15	Terminal Roadway Widening and Access Improvements	Kitten	0.12
17	Taxiway V Relocation	Irving	3.72
18	Runway 15R Deicing Pad Expansion	Kitten	5.37
19	Upper Level Roadway Widening at Concourse E	Kitten	1.82
20	VSR Connector	Sawmill Trib	0.93
21	Relocate RTR Facility	Phelps	0.16
D-113	Building 113 Demolition	Sachs	0
P10	Existing ARFF Expansion Bays	Kitten	0.39
P11	Airline Maintenance Facility	Kitten, King, Bowden	26.36
P13	Runway Deicing Chemical Storage and Access Road	Sachs	0.12
P30	Airport Maintenance Complex	Sawmill Trib, Sawmill 2	0.41
P45	Relocated Fire Training Facility	Irving, SE Corner, Phelps, Fork	11.05
P7	Second FBO	Muddy	-0.41
Total			**86.01**[1]

Note: [1] Total represents the sum of net impervious of the standalone projects and does not take into account project overlap.

Sources: *Appendix D, Preliminary Engineering Project Quantities Table*, and HNTB analysis, 2017.



LEGEND

- Airport Property Boundary
- Physical Development Study Area
- Pavement Improvements
- Proposed Structures
- Demolition
- Point of Investigation
- Stream
- Culverted Stream
- Baltimore Harbor Subwatershed (MDE No. 02130903)
- Patapsco River Lower North Branch Subwatershed (MDE No. 02130906)

Subwatersheds with 2015 ALP Alternative
Figure 5.14-6

N

0 1,000 2,000 4,000 Feet

Sources: Aerial - MDOT MAA (2018), BWI NRI Map

One stormwater management pond would be impacted by the proposed relocation of Taxiways R and F (1). Pond B3 would be fully impacted and would be removed. The loss of water quality treatment provided by Pond B3 would be included in stormwater treatment requirements during project design. Discussion of stormwater treatment requirements is addressed in more detail in Section 5.14.5 and in *Appendix L, Attachment 1*. One jurisdictional pond would potentially be impacted by the relocation of Taxiways R and F (1). Pond B4 is outside the grading limits of this project. However, if design results in impacts to the pond, it is assumed the pond or equal capacity facility would be reconstructed in its place.

The following 2015 ALP Alternative projects impact existing infiltration trenches (ITs):

- Relocate Taxiways R and F (1)
  - Bowden IT
- New Infill Pavement Near Taxiways T, P and Future P (4)
  - Three (3) Kitten Branch ITs (IT64, IT65 and IT66)
- Relocated Airfield Lighting Vault (P14)
  - Muddy IT-5
- Taxiway V Relocation (17)
  - Irving Branch IT
- Relocate Taxiway H (12)
  - Kitten Branch INF-1B

Additionally, multiple non-rooftop disconnect (NRD) areas are impacted by proposed projects. The loss in treatment provided by ponds, infiltration trenches and/or NRD area because of the impacts would be accounted for in the stormwater designs.

Three projects make up over half of the increase in impervious area (55 total acres): (1) Relocated Taxiways R and F, (P45) Relocated Fire Training Facility, and (P11) the Airline Maintenance Facility. These projects will require larger stormwater facilities (i.e., dry detention ponds) to meet treatment requirements. See *Appendix L, Attachment 1* for details on stormwater treatment requirements by project, including the loss of water quality from impacts to existing practices.

Stormwater management will be implemented in accordance with MDE's *Stormwater Management Guidelines for State and Federal Projects* to control stormwater run-off. Stormwater management will ensure all water quality standards established by Federal, state, local, and tribal regulatory agencies are met, and that no public drinking water supply will be adversely affected. Therefore, the 2015 ALP Alternative would not result in a significant impact to surface water quality.

Groundwater

Stormwater runoff from the proposed project sites would be contained in the storm drain system and treated for water quality in stormwater management facilities (to be determined upon final design). There is potential for the proposed projects to include above-ground or underground storage tanks (ASTs or USTs), notably the Runway Deicing Chemical Storage and Access Road (P13) project, and the expansion of the Runway 28 and Runway 15R Deicing Pads [(8) and (18)]. However, all storage tanks would be designed to meet regulations for spill containment measures and therefore would not impact groundwater.

The 2015 ALP Alternative would not impact groundwater such that groundwater quality standards set forth by Federal, state, or local agencies would be exceeded or would have the potential to contaminate an aquifer used for public water supply. Therefore, the 2015 ALP Alternative would not result in a significant impact to groundwater.

5.14.4.2 Sponsor's Preferred Alternative

Wetlands, Streams, and Floodplains

Table 5.14.3 summarizes the impacts to wetlands, wetland buffers, streams and the 100-year floodplain associated with the Sponsor's Preferred Alternative projects. Cumulatively, implementation of the Sponsor's Preferred Alternative projects would result in temporary or permanent impacts to 0.57 acres of non-tidal wetlands, 1.99 acres of non-tidal wetland buffers, 1,003 linear feet of streams, and 0.33 acres of mapped 100-year floodplain.

The Sponsor's Preferred Alternative would not result in a significant impact to wetlands, streams, or floodplains. Mitigation would be provided for all permanent impacts to wetlands and streams, see *Section 5.14.5* for details. Run-off from all proposed projects ultimately drains into the floodplains associated with either Kitten Branch, Stony Run, Sawmill Creek or Cabin Branch. Stormwater management will be implemented in accordance with MDE's *Stormwater Management Guidelines for State and Federal Projects* to control run-off and ensure nearby wetlands, streams, and floodplains are not adversely impacted. While proposed projects are within and adjacent to the floodplains, resulting in a floodplain encroachment, the projects would not be considered significant impacts as there would be no impact to the natural and beneficial value of the floodplains. **Figures 5.14-7 through 5.14-9** depict the impacts to water resources as a result of the Sponsor's Preferred Alternative projects.

The following Sponsor's Preferred Alternative projects are the same as the 2015 ALP Alternative projects: Relocate Taxiways F and R, and Taxiway V Relocation. Additionally, the Sponsor's Preferred Alternative for the Relocated Fire Training Facility has no impacts to wetlands, wetland buffers, streams, or 100-year floodplains. This is due to a shift in project limits which no longer overlaps with the Taxiway V Relocation project.

The Sponsor's Preferred Alternative to Part 77 Obstruction Removal would significantly reduce impacts as compared to the 2015 ALP Alternative.

Part 77 Obstruction Removal: In forested areas currently designated as conflicts to Part 77 Surfaces, selective removal of trees would be performed in wetlands, wetland buffers and 100-year floodplains to minimize impacts in these sensitive areas under the Sponsor's Preferred Alternative. This approach, which is supported by MDE and USACE, would not result in change in wetland type; therefore, impacts would be considered temporary and compensatory mitigation would not likely be required. The tree removal within the floodplain area would not be considered a significant impact as there would be no impact to the natural and beneficial value of the floodplain.

It should be noted that the parcel along Stoney Run Road, included for NEPA review, is partially located within the floodplain associated with Stony Run. However, this project does not include actual construction and therefore there would be no impacts to the floodplain.

Table 5.14.3
Sponsor's Preferred Alternative of Impacts to Water Resources

Project	LOD (acres)	Impacts/Encroachments			
		Wetlands	Wetland Buffers	Stream Channel	100-Year Floodplain[1]
Relocate Taxiways F and R (1)	111	0.22 ac. (9,418 sf)	0.38 ac. (16,514 sf)	825 lf	0.14 ac
Part 77 Obstruction Removal (10)	N/A	35 trees	88 trees	0	13 trees
Taxiway V Relocation (17)	35	0.23 ac. (9,905 sf)	0.97 ac. (42,323 sf)	0	0
New Airline Maintenance Facility (P11)	78	0.13 ac. (5,671 sf)	0.64 ac. (29,820 sf)	178 lf	0.19 ac
TOTAL		**0.57 ac. (24,994 sf)**	**1.99 ac. (86,657 sf)**	**1,003 lf**	**13 Trees (0.33 ac)**

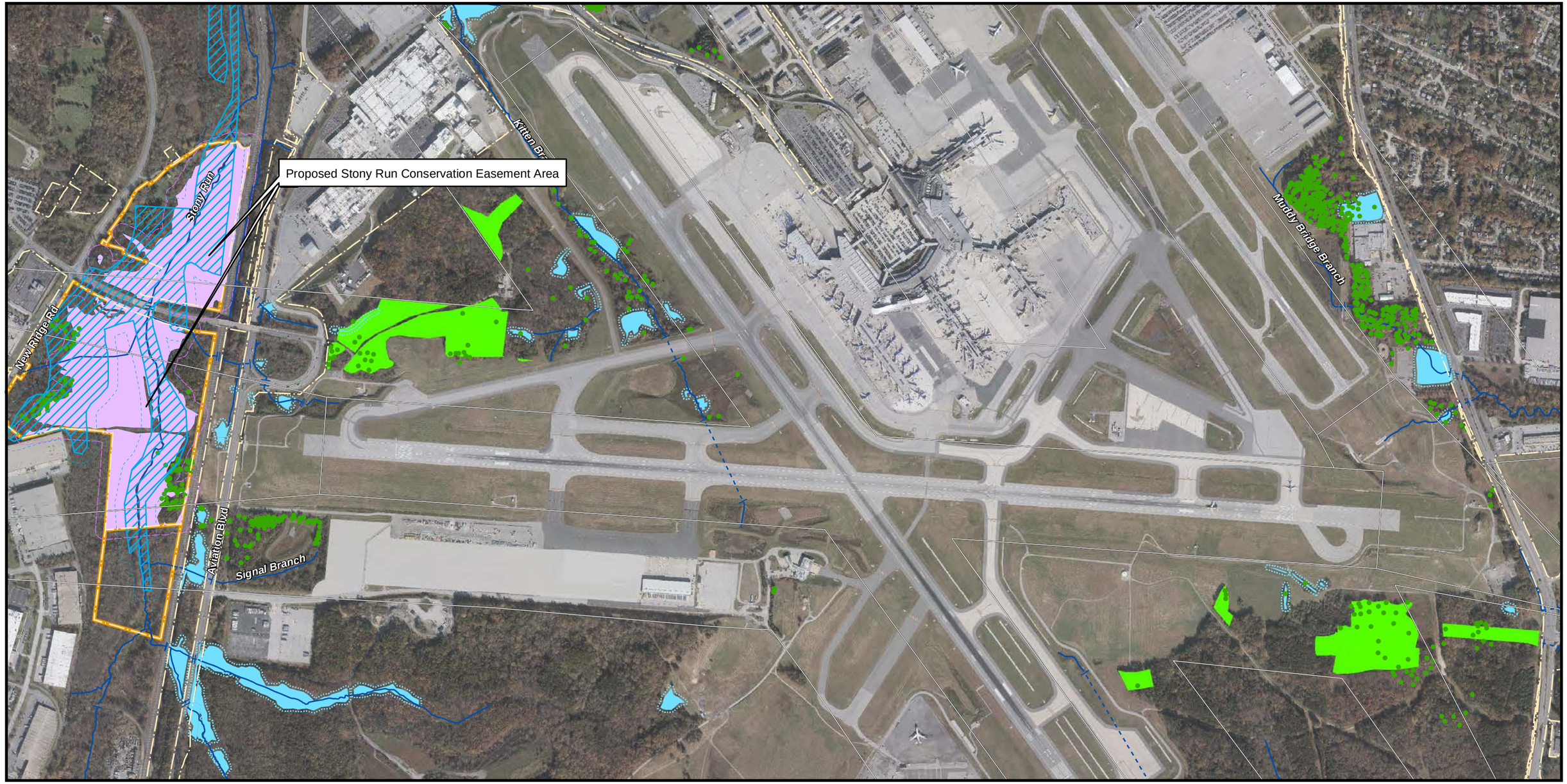
Note: [1] Impacts to the 100-year floodplain include impacts to the MAA-delineated floodplain along Kitten Branch, Stony Run, and Signal Branch.

Sources: *Appendix D, Preliminary Engineering Project Quantities Table*, BWI NRI Map, and JMT analysis, 2017.

Surface Waters

The Sponsor's Preferred Alternative projects would result in an increase in stormwater runoff from the additional impervious surfaces proposed. Based on preliminary engineering design, the Sponsor's Preferred Alternative projects would result in a net increase of approximately 95.6 acres of impervious surface, as summarized in **Table 5.14.4.** Stormwater treatment would be required to provide water quality and quantity control. **Figure 5.14-10** shows the Sponsor's Preferred Alternative projects with subwatersheds.

One stormwater management pond would be impacted by the proposed relocation of Taxiways R and F (1). Pond B3 would be fully impacted and would be removed. The loss of water quality treatment provided by Pond B3 would be included in stormwater treatment requirements during project design. Discussion of stormwater treatment requirements is addressed in more detail in Section 5.14.5 and in *Appendix L, Attachment 1*. One jurisdictional pond would potentially be impacted by the relocation of Taxiways R and F (1) and the New Airline Maintenance Facility (P11). Pond B4 is outside the grading limits of these projects. However, if design results in impacts to the pond, it is assumed the pond or equal capacity facility would be reconstructed in its place.



LEGEND

- Airport Property Boundary
- Part 77 (Primary, Approach and Transitional Surface Limits)
- Tree Obstruction Removal (2014 FMP Part 77 Conflict Areas)* (No Mitigation Required)
- Obstruction Removal (2015 ALP Obstruction Points) - (Selective Removal/Alteration)
- Proposed Stony Run Conservation Easement Area

Note: * Sponsor's Preferred Alternative Tree Obstruction Removal Areas include Part 77 Conflict Areas where they overlap with project LODs.

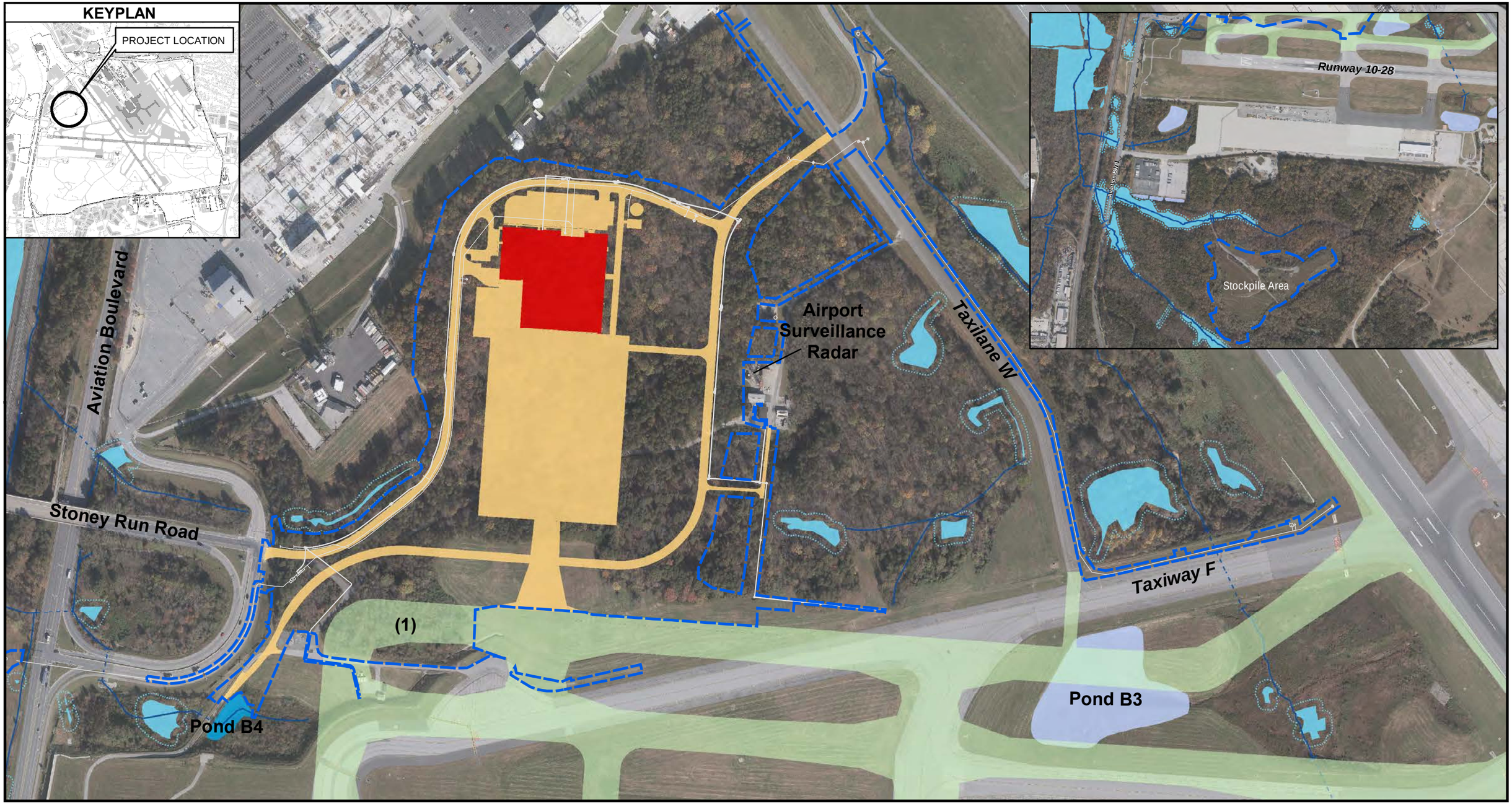
- Wetlands with 25' Buffers
- Wetlands of Special State Concern with 100' Buffers (MAA-delineated)
- Wetlands of Special State Concern with 100' Buffers (DNR)
- Stream
- Culverted Stream

Sponsor's Preferred Alternative Impacts to Wetlands and Streams
Part 77 Obstruction Removal
Figure 5.14-7

N

0 500 1,000 2,000 Feet

Sources: Aerial - MDOT MAA (2016), BWI NRI Map



LEGEND

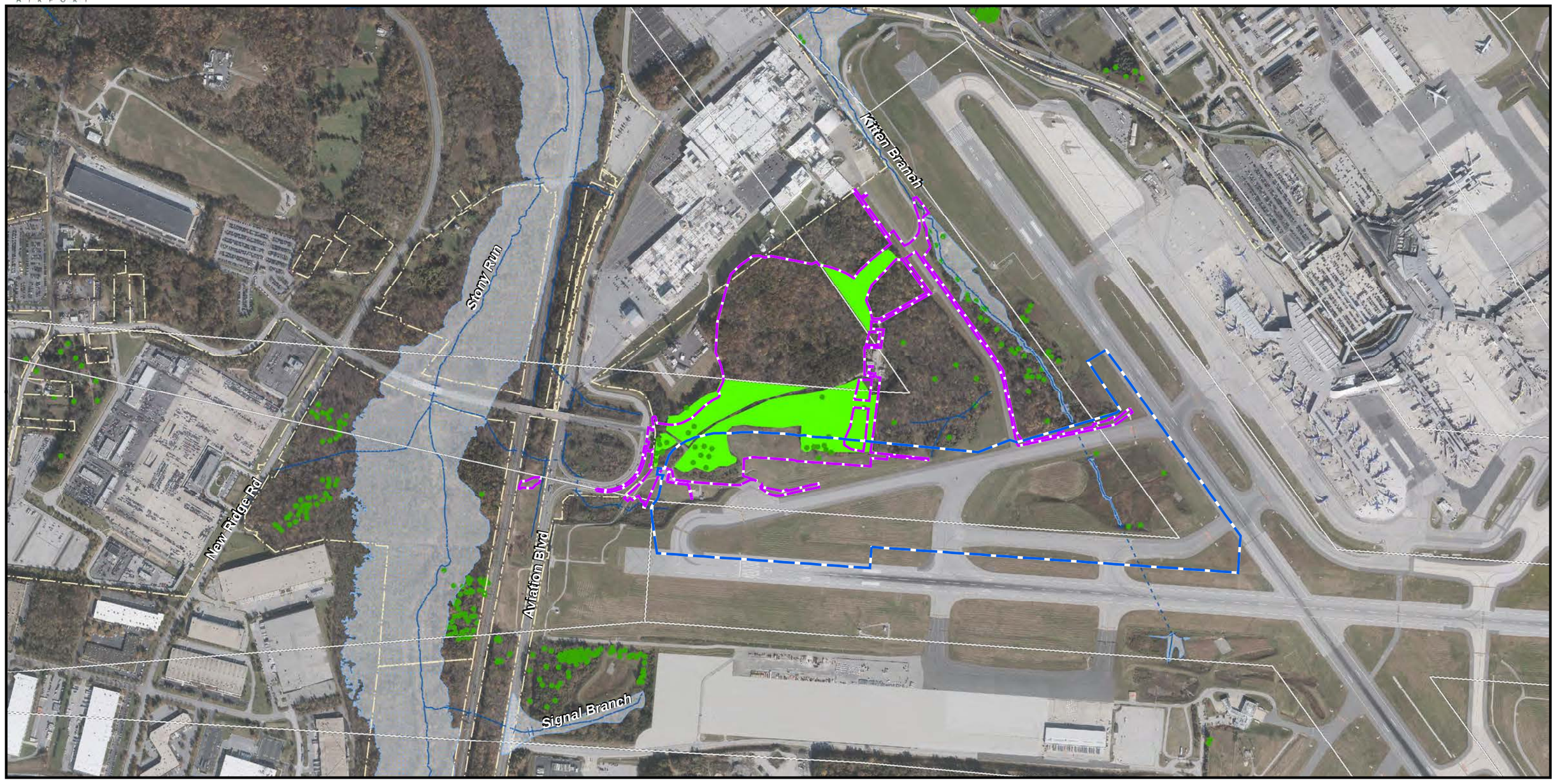
- Limit of Disturbance
- New Impervious
- Other EA Projects
- Building
- Utility Line
- Existing Fence
- Wetlands with 25' Buffers
- Stormwater Management Pond
- USACE Jurisdictional Pond
- Stream
- Culverted Stream

Sponsor's Preferred Alternative Impacts to Wetlands and Streams
New Airline Maintenance Facility
Figure 5.14-8

N

0 175 350 700 Feet

Source: Aerial - MDOT MAA (2018), ADCI



LEGEND

- Airport Property Boundary
- 100-Year Floodplain
- Part 77 (Primary, Approach and Transitional Surface Limits)
- Tree Obstruction Removal (2014 FMP Part 77 Conflict Areas)*
- Obstruction Removal (2015 ALP Obstruction Points)
- (1) Relocate Taxiways R and F Project Limits of Disturbance
- (P11) New Airline Maintenance Facilities Limits of Disturbance
- Stream
- Culverted Stream

Note: * Sponsor's Preferred Alternative Tree Obstruction Removal Areas include Part 77 Conflict Areas where they overlap with project LODs.

Encroachments on Floodplains - Sponsor's Preferred Alternative
Figure 5.14-9

N

0 400 800 1,600 Feet

Sources: Aerial - MDOT MAA (2018), BWI NRI Map, FEMA and 1996 MAA-delineated floodplains (Signal, Hawkins, and Clark Branch)

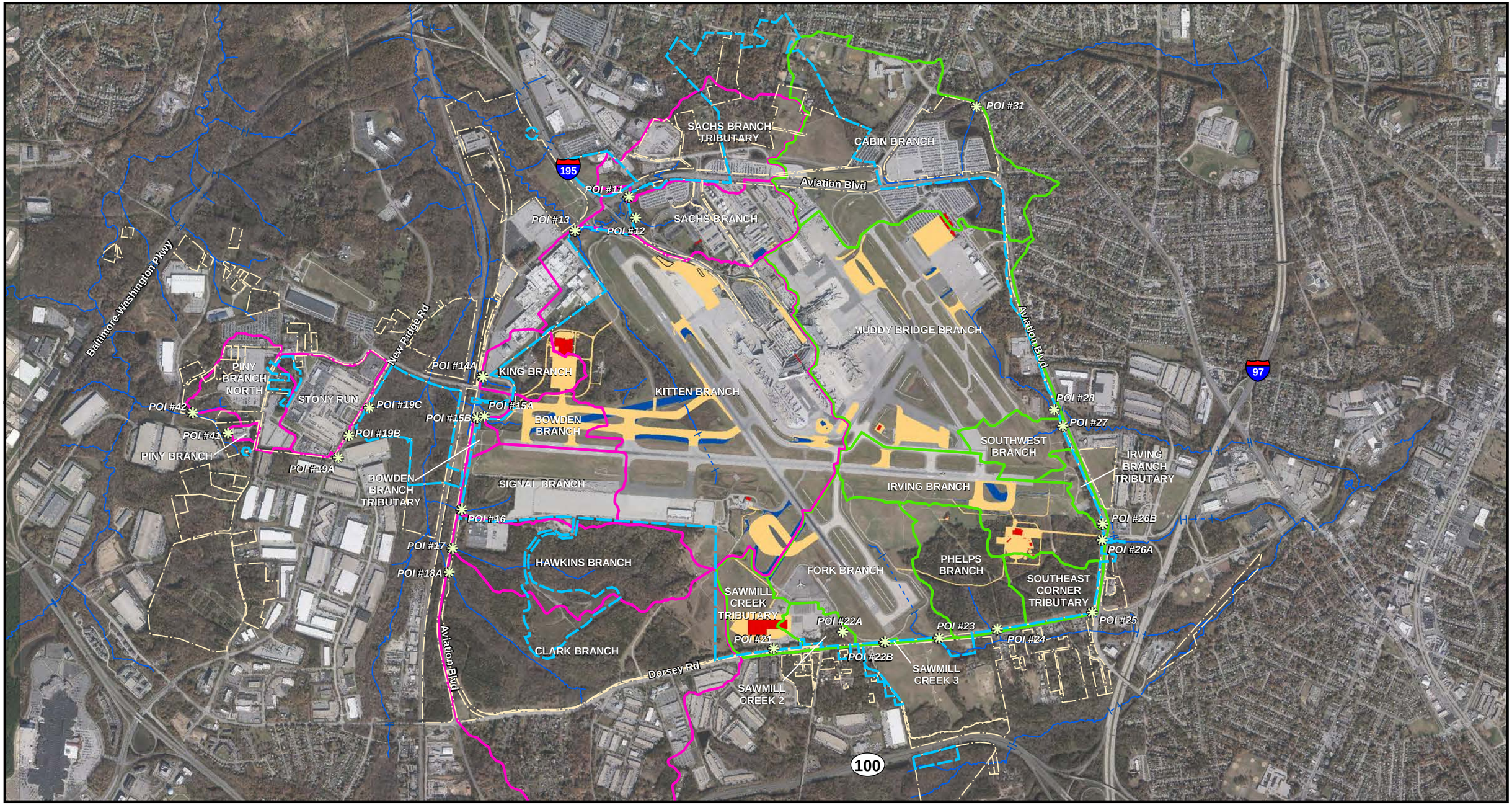
Table 5.14.4

Net Impervious Area – Sponsor's Preferred Alternative

	Project	Watersheds Impacted	Net Increase in Impervious Area (Acres)
1	Relocate Taxiways R and F	Kitten, Bowden, King	17.36
2	Taxiway U3	Irving	2.89
3	International Terminal Area Taxiway Fillets/Shoulders	Muddy	3.51
4	New Infill Pavement Near Taxiways T, P and Future P	Kitten, Muddy	2.19
6	Relocate Taxiways K and L	Muddy	1.76
7	Isolation/RON Apron	Kitten, Fork	8.26
8	Runway 28 Deicing Pad Expansion	Muddy	1.68
12	Relocate Taxiway H	Kitten	-0.19
14	New Sky Bridge C	Kitten	0.12
15	Terminal Roadway Widening and Access Improvements	Kitten	0.12
17	Taxiway V Relocation	Irving	3.72
18	Runway 15R Deicing Pad Expansion	Kitten	5.37
19	Upper Level Roadway Widening at Concourse E	Kitten	1.82
20	VSR Connector	Sawmill Trib	0.93
21	Relocate RTR Facility	Phelps	0.16
D-113	Building 113 Demolition	Sachs	0
P10	Existing ARFF Expansion Bays	Kitten	0.39
P11	Airline Maintenance Facility	Kitten, King, Bowden	24.19
P13	Runway Deicing Chemical Storage and Access Road	Sachs	0.12
P30	Airport Maintenance Complex	Sawmill Trib, Sawmill 2	6.82
P45	Relocated Fire Training Facility	Irving, SE Corner, Phelps, Fork, Kitten, SW Branch	14.82
P7	Second FBO	Muddy	-0.41
Total			**95.63**[1]

Note: [1] Total represents the sum of net impervious of the stand alone projects and does not take into account project overlap.

Sources: *Appendix D, Preliminary Engineering Project Quantities*, and HNTB analysis, 2019.



LEGEND

- Airport Property Boundary
- Physical Development Study Area
- Pavement Improvements
- Proposed Structures
- Demolition
- Point of Investigation
- Stream
- Culverted Stream
- Baltimore Harbor Subwatershed (MDE No. 02130903)
- Patapsco River Lower North Branch Subwatershed (MDE No. 02130906)

Subwatersheds with Sponsor's Preferred Alternative
Figure 5.14-10

N

0 1,000 2,000 4,000 Feet

Sources: Aerial - MDOT MAA (2018), BWI NRI Map

The following Sponsor's Preferred Alternative projects impact existing ITs:

- Airport Maintenance Complex
  - Sawmill Creek Tributary IT and ponding area.
- Relocate Taxiways R and F (1)
  - Bowden IT
- New Infill Pavement Near Taxiways T, P and Future P (4)
  - Three (3) Kitten Branch ITs (IT64, IT65 and IT66)
- Relocated Airfield Lighting Vault (P14)
  - Muddy IT-5
- Taxiway V Relocation (17)
  - Irving Branch IT

Additionally, multiple NRD areas are impacted by the proposed projects. The loss in treatment provided by ponds, infiltration trenches and/or NRD area as a result of the impacts would be accounted for in the stormwater designs.

Three projects make up over half of the increase in impervious area (56 total acres): (1) Relocated Taxiways R and F, (P45) Relocated Fire Training Facility, and (P11) the Airline Maintenance Facility. These projects would require larger stormwater facilities (i.e., dry detention ponds) to meet treatment requirements. See *Appendix L, Attachment 1* for details on stormwater treatment requirements by project, including the loss of water quality from impacts to existing practices.

Stormwater management will be implemented in accordance with MDE's *Stormwater Management Guidelines for State and Federal Projects* to control stormwater run-off. Stormwater management will ensure all water quality standards established by Federal, state, local, and tribal regulatory agencies are met, and that no public drinking water supply will be adversely affected. Therefore, the Sponsor's Preferred Alternative would not result in a significant impact to surface water quality.

Groundwater

Potential storage tanks included as part of the Sponsor's Preferred Alternative would be designed to meet regulations for spill containment measures and therefore would not impact groundwater as described under the 2015 ALP Alternative.

The Sponsor's Preferred Alternative would not impact groundwater such that groundwater quality standards set forth by Federal, state, or local agencies would be exceeded or would have the potential to contaminate an aquifer used for public water supply. Therefore, the Sponsor's Preferred Alternative would not result in a significant impact to groundwater.

Comparison of 2015 ALP Alternative and Sponsor's Preferred Alternative

Table 5.14.5 compares the potential impacts to water resources for the 2015 ALP Alternative and the Sponsor's Preferred Alternative. The Sponsor's Preferred Alternative includes a greater net increase in impervious area and a greater amount of stream channel impacts as compared to the 2015 ALP Alternative. However, the Sponsor's Preferred Alternative reduces total wetland and floodplain impacts by selective harvesting of individual tree obstructions within environmentally sensitive areas and through environmentally preferred project planning.

Table 5.14.5
Comparison of 2015 ALP Alternative and Sponsor's Preferred Alternative Impacts to Water Resources

Project	Wetlands	Wetland Buffers	Stream Channel	100-Year Floodplain	Net Increase in Impervious Area
2015 ALP Alternative Total	5.44 ac. (237,077 sf)	6.28 ac. (273,672 sf)	838 lf	7.07 ac.	86.01 ac.
Sponsor's Preferred Alternative Total	0.57 ac. (24,994 sf)	1.99 ac. (86,657 sf)	1,003 lf	13 Trees (0.33 ac)	95.63 ac.

Source: JMT analysis, 2019.

5.14.4.3 No Action Alternative

Under the No Action Alternative, the proposed improvements would not be constructed. No impacts would occur to nontidal wetlands (or WSSC), 25-foot wetland buffers (or 100-foot WSSC buffers), streams, the 100-year floodplains, or surface and groundwater quality.

5.14.5 Mitigation

Wetlands and Streams (Waters of the U.S.)

MDOT MAA must provide compensatory mitigation for any unavoidable permanent impacts to wetlands and streams. Mitigation requirements are determined by MDE and USACE on a case-by-case basis and therefore cannot be firmly determined at this time; however, typical mitigation ratios (presented as acres of mitigation per acre of impact) are as follows: 1:1 for emergent wetlands; 2:1 for scrub-shrub and forested wetlands; and 1:1 for conversion of wetland type (e.g., forested to scrub-shrub). Impacts to WSSC require mitigation at the following ratios: 2:1 for emergent wetlands and 3:1 for scrub-shrub or forested wetlands. Mitigation ratios for linear feet of streams is typically set at a 1:1 ratio. Based on these typical mitigation ratios and the impacts detailed in this EA and Section 4(f) Determination, potential mitigation for the 2015 ALP Alternative would be to purchase credits to offset the needed 10.7 acres of wetland and 838 linear feet of stream mitigation, and the Sponsor's Preferred Alternative would be to purchase credits to offset the needed 0.9 acres of wetland and 1,003 linear feet of stream mitigation.

MDOT MAA is proposing to meet most to all wetland and stream mitigation off-site, through the use of wetland mitigation banking credits in the Gunpowder-Patapsco watershed (USGS 0206003). There are also options for MDOT MAA to develop mitigation sites on parcels that are currently owned by MDOT MAA.

Surface Waters

Impacts to water quality resulting from an increase in impervious surface would be avoided and mitigated using stormwater management techniques. Stormwater treatment requirements for the proposed projects were determined in accordance with MDE's *Stormwater Management Guidelines for State and Federal Projects*. Redevelopment projects require treatment of the first 1" of rainfall for 50% of the

redeveloped area and new development requires treatment of 100% of the net impervious surface. Treatment requirements are based on preliminary engineering estimates of changes in impervious areas and limits of disturbance. Concepts for stormwater quantity management are discussed by project, including use of ESD practices, structural BMPs, and water quality credits. See *Appendix L, Attachment 1* for details on stormwater treatment requirements by project. At the time of design for each project, stormwater design will adhere to MDE guidelines and regulations. A Stormwater Management Concept Report will be provided during project design.

The proposed improvements would not be located near or create a wildlife hazard as defined in FAA AC 150/5200-33, "Wildlife Hazards On and Near Airports." The AC warns against the creation of any open water within 10,000 feet of aircraft movement areas or within five miles of approach or departure surfaces. In addition, design standards require that ESD is used to the MEP for stormwater management and does not allow for open water facilities or landscaping that would serve as habitat or attract waterfowl or potentially hazardous wildlife on Airport property. MDOT MAA has design standards for SWM and landscaping that do not allow construction of wildlife hazards on Airport property. All SWM facilities will be designed for consistency with Maryland standards for both water quality (COMAR 26.08.02) and stormwater management (COMAR 26.17.02).

Floodplains

Mitigation measures to minimize potential impacts to surface waters and floodplains include:

- Designing facilities above the base flood elevation.
- Minimizing fill placed in floodplains and wetlands.
- Construction controls to minimize erosion and sedimentation.
- Restoring vegetation on disturbed areas to prevent soil erosion following project completion.
- Designing facilities to allow adequate flow circulation and preserve free, natural drainage.
- Comply with special flood-related design criteria.
- Controlling run off, while ensuring the run-off control measures does not attract wildlife hazardous to aviation.
- Controlling waste and spoils disposal to prevent contamination of ground and surface water.
- Section 404 and 401 permit terms and conditions for minimizing and compensating for impacts to surface waters

An Erosion and Sediment Control Plan would be developed in accordance with MDE guidelines and implemented during construction activities to minimize erosion and sedimentation and its impacts on surface waters.

5.14.6 Permitting

As previously noted, MDOT MAA must receive authorization from both MDE and USACE for temporary and permanent impacts to wetlands and other waters of the U.S., and MDE for temporary and permanent alterations to 25-foot wetland buffers (and 100-foot WSSC buffers) and 100-year

floodplains. Additionally, alterations in drainage areas related to project grading may result in indirect impacts to wetlands outside of project LODs. Monitoring of these indirect impacts would be included as a permit condition for individual projects.

During initial meetings with MDE and USACE, MDOT MAA was advised to submit a single Joint Federal /State Application (JPA) requesting authorization for all planning level impacts associated with the improvements presented in the Draft EA and Draft Section 4(f) Determination. MDE/USACE would provide conditional authorization at the planning level with final authorization issued at the final design stage for individual projects; permit modifications would then be issued for individual projects based on final design impacts. See *Appendix L, Attachments 4 and 6* for MDE and USACE meeting minutes. A joint application was submitted to MDE for review in February 2018, see *Appendix L, Attachment 3*. The MDE and USACE provided comments on the initial JPA submittal, and the MDOT MAA submitted responses with updated impact plates in May and August 2018, see *Appendix L, Attachments 5 and 7*. Due to the unknown design and construction schedule for all proposed improvements impacting wetlands, MDE and USACE directed MDOT MAA to submit individual JPAs at the final design stage of a project.

5.15 Non-Impacted Categories

Based on the nature of the Proposed Action and the environmental setting at BWI Marshall Airport, no impacts are anticipated to Wild and Scenic Rivers (Water Resources).

5.15.1 Wild and Scenic Rivers

There are no river segments listed in the Wild and Scenic River System nor the NRI located within the vicinity of BWI Marshall Airport and the Physical Development Study Area.

5.16 Cumulative Impacts

The regulations which implement NEPA require assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts are defined as "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."[28]

Cumulative impacts were determined by combining the impacts of the Proposed Action (2015 ALP and Sponsor's Preferred Alternatives) with other past, ongoing, and reasonably foreseeable future actions.

Chapter 4, Affected Environment, describes the past, ongoing and reasonably foreseeable future actions to be included in this cumulative impact analysis when combined with the Proposed Action. **Table 5.16.1** shows the list of on-airport projects considered for potential cumulative impacts, along with the potential resource categories the project would impact. Some resources may be beneficially impacted by the project (e.g., air quality related to shuttle bus replacement). Note that these projects may or may not occur and even when a timeframe is provided there is no certainty that this project will actually be accomplished.

Table 5.16.1
BWI Marshall On-Airport Cumulative Projects

Time	Project Name (Type of Project[1])	Year	Potential Impact Categories
Past (2013-2018)	Comprehensive Paving Improvements (A)	2011 - 2014	--
	Runway 10-28 Improvements (Including Runway 15R-33L Intersection) (A)	2011-2014	--
	Concourse B/C Connector Improvements (T)	2011 - 2015	--
	Runway 15L-33R FAA Standards Compliance (A)	2012-2015*	--
	International Terminal Bag Screening Improvements (T)	2014-2015*	--
	Homeowner Assistance Program (M)	2012 - 2016	--
	Sheraton Four Points Demolition (L)	2014-2015*	Haz. Mat.
	Runway 15L-33R FAA Improvements (A)	2015*	--
	Runway 15R-33L Improvements (A)	2015*	--
	Runway 10-28 Improvements (as part of Airfield Standards and Pavement Rehabilitation Project) (A)	2015*	--
	Taxiway Uniform (U) Relocation (A)	2015*	--
	Airfield Standards and Pavement Rehabilitation Project (A)	2015*	--
	Expansion of CUP (S)	2015*	--
	On-Airport Roadway Improvements (S)	2015*	--
	Parking Revenue Control System (Maryland CTP)	2015	-
	DC Optimization of Airspace and Procedures in the Metroplex (Implemented by FAA)	2013-2016	AQ, Noise
	Loading Bridge Replacement Program (Maryland CTP)	2014-2017	--
	Conversion of Runway 4-22 into new Taxiway P (Maryland CTP)	2015-2017	--
	Apron Fill at North Cargo Positions F18/F20 (A)	2016-2017	--
	Concourse E 2-Gate Expansion + 4 Additional Arrival-Only Gates (Phase 1 Expansion) (T)	2016-2018	Water
	Concourse D-E Connector (T)	2015-2017*	--
	Stairtower at Concourse B	2017	--
	Midfield Cargo Facility Apron Expansion (as included in the 2017 Re-Evaluation)	2017	Water

Table 5.16.1
BWI Marshall On-Airport Cumulative Projects

Time	Project Name (Type of Project[1])	Year	Potential Impact Categories
Current (2019)	Consolidated Rental Car Facility Shuttle Bus Fleet Replacement (Maryland CTP)	2018	AQ
	Midfield Cargo Facility Improvements (as included in the 2018 WR/ROD)	2019	AQ, Water, Noise
	RTR Relocation	2019	--
	Concourse B Apron Reconstruction (A)	2019	--
	Taxiway B Reconstruction	2019	--
	BC Alleyway Reconstruction	2019	--
	A/B Connector and Baggage Handling System	2019-2022	--
	Concourse A 5-Gate Extension (T)	2019-2020	--
	Residential Sound Insulation Program (RSIP)	2019-2024	Noise
Future (2020-2027)	Concourse E 2-Gate Expansion (Phase 2 Expansion) (T)	Construct or Under Construction by 2020*	Water
	Taxiway Connectors (between Taxiways T-P) (A)		Water
	New Terminal Response Fire Rescue Station (L)		Water, Traffic
	Service Station Plaza (M)		Water, Haz. Mat.
	New Fuel Storage Tanks at Fuel Farm		Haz Mat
	Midfield Cargo Office Expansion (4,000 SF)	2021-2027	--
	Helipad Relocation (A)		--
	Hotel Construction, Hourly Garage Expansion, and Sky Bridge E (L)		Traffic
	New Airport Traffic Control Tower (S)		--
	C Apron Reconstruction		--
	Demolish and Relocate Taxiway Foxtrot (Stub) – in conjunction with Taxiway T Reconstruction		--
	Upgrade BHS at Concourse B-C		--
	Taxiway Uniform (U) 3 – Phase 2 (A)		Water
	Widening of Taxiway J (A)		Water
	Airline Cargo Demolition		Haz. Mat.
	Demolition of Maintenance Facilities (A)		Haz. Mat.
	Perimeter Road Improvements (A)		--
	Substation Relocations/Expansions (A)		Water
	Relocation of I-195/Aviation Blvd (L)		Traffic, Water
	Relocation of Light Rail Tracks and Light Rail Station (L)		Traffic
	Daily Garage Expansion (L)		Traffic
	Limo/Bus/Shared Ride Staging (L)		Water
	New Police Station – northeast of existing GA terminal area (L)		Water
	Co-Gen and Chiller Plant Expansion (L)		Haz. Mat.

Table 5.16.1
BWI Marshall On-Airport Cumulative Projects

Time	Project Name (Type of Project[1])	Year	Potential Impact Categories
	Pump Stations (L)		Haz. Mat.
	Bus Staging Fuel Facility (L)		Haz. Mat.
	Hiker/Biker Trail Relocation (L)		EJ, Traffic
	Consolidation of Long-Term Parking Lots (L)		Traffic

Notes: "**--**" indicates no potential impacts associated with the project.

[1]Type of Project: (A) – Airfield and Airside improvements; (T) – Terminal enhancement; (S) – Support facility; (L) – Landside; (P) – Private investment project; (M) – MDOT MAA project; (G) – General Aviation.

*Indicates Project Name and/or Year updated based on Draft BWI Marshall 2015 ALP Narrative, January 2015. Construction years may vary as airport planning is ongoing.

Sources: Draft *BWI Marshall 2015 ALP Narrative*, January 2015, and Maryland's FY 2017-2022 Consolidated Transportation Program (CTP).

The majority of off-airport projects, as described in *Section 4.15.2,* are related to transportation improvements (roadways, MARC stations, MAGLEV) or mixed-use developments. These projects would likely result in temporary construction related impacts (noise, air, transportation). The government agency responsible for the development of each cumulative project would be responsible for obtaining all necessary approvals and permits to minimize impacts. Off-airport transportation and development projects would generally benefit the surrounding communities, and local/regional economy.

The following is a qualitative assessment of impact categories in which there may be potential for cumulative impact associated with the on-airport and off-airport projects, when considered along with the anticipated impacts resulting from the implementation of the Proposed Action.

5.16.1 Air Quality

A significant impact to air quality could occur if the Proposed Action, when considered in combination with other past, ongoing, or reasonably foreseeable actions, would exceed a NAAQS or would not conform to the State Implementation Plan. The majority of the cumulative projects include temporary construction related emissions.

Construction BMPs would be utilized to minimize impacts related to fugitive dust. As shown in Table 5.16.1, projects are proposed at the Airport over planning "phases." However, even when a timeframe is provided there is no certainty that the project will actually be implemented. Given the uncertainty of project development and available funding, it is unlikely for there to be cumulative impacts related to construction emissions at the Airport.

The Consolidated Rental Car Facility Shuttle Bus Fleet Replacement project may result in benefits to air quality if the fleet is replaced with electric or clean energy fuel (i.e. natural gas) vehicles.

The total amount of operational air emissions at BWI Marshall Airport is expected to increase in the future, with or without the Proposed Action, and other cumulative projects. This outcome is largely attributable

to the growth in demand for aircraft operations at BWI Marshall Airport over the same timeframe. Adequate capacity exists to accommodate this growth during the period of analysis in this EA and Section 4(f) Determination without further improvement, albeit at an undesirable level of service to the airlines and traveling public. The only exception is the Midfield Cargo Facility Improvements project which added approximately 200,000 square feet of additional warehouse/cargo processing building and 11 acres of apron pavement for cargo aircraft, resulting in aircraft and vehicle related emissions. The aircraft emissions associated with the Midfield Cargo Facility Improvements operations are incorporated into the 2022 and 2027 No Action and Proposed Action emissions inventories presented in this EA and Section 4(f) Determination. Emissions for criteria pollutants included in the State Implementation Plan (SIP) for the *Maintenance Plan for the Washington DC-MD-VA 2008 Ozone NAAQS Nonattainment Area* as submitted to the EPA in October of 2017 are higher than those forecast for 2027 in this EA and Section 4(f) Determination and it is expected that any additional emissions generated by future improvements would be within the SIP emissions expected for BWI Marshall Airport. Therefore, cumulative impacts for air quality are not expected.

5.16.2 Biological Resources

The Proposed Action would impact biological resources, specifically forested areas. The impacts to forested areas are due to both proposed physical development and to meet FAA Part 77 requirements. The impacts associated with physical development would be mitigated and thus the potential for cumulative impacts are reduced. MDOT MAA proposes to meet the mitigation requirements for individual projects through placement of MDNR Forest Conservation Easements on MDOT MAA-owned forests within and surrounding the Stony Run WSSC. Due to the high quality of these resources, MDNR Forest Service has granted three acres of credit for every one acre placed under easement. No mitigation under Maryland's Forest Conservation Act is required for removal of forested areas or individual tree obstructions that occur within FAR Part 77 primary, approach, departure, and transitional surfaces (COMAR 5-1602(b)(11)). None of the cumulative projects listed would be expected to have significant impacts on biological resources. However, per state regulation, any projects near BWI Marshall Airport that impact forested areas will necessarily be mitigated accordingly, thereby reducing the potential for cumulative impact for this resource.

5.16.3 Hazardous Materials, Pollution Prevention, and Solid Waste

Appropriate precautions would be undertaken prior to the construction of Proposed Action projects located near existing hazardous sites, as described in *Section 5.7.4.1*. Similarly, other projects at the Airport take precautions, to include notification of appropriate agencies if hazardous materials are found, and the proper disposal of hazardous materials, including asbestos containing material for demolition projects.

The storage and/or use of hazardous materials would be involved in the operation of the future service station, pump station, bus staging fuel facility, and co-generation and chiller plant expansion projects. The development of these projects would adhere to federal and state regulations as well as best practices pertaining to the use of

hazardous materials, petroleum storage and waste disposal.

The Proposed Action improvements would not result in significant impacts related to hazardous materials or solid waste, and in combination with past, ongoing and future projects there would be no potential for cumulative impacts to hazardous materials or solid waste.

5.16.4 Noise and Noise-Compatible Land Use

The areas within the Proposed Action 65+ DNL contours (2022 and 2027) are expected to increase slightly by approximately 1.0% compared with the No Action, with no additional noise sensitive sites (including population and housing counts) within the 65+ DNL contours. The Proposed Action would not increase noise by DNL 1.5 dB or more over a noise sensitive area, and therefore does not result in significant impacts to noise. The forecasted growth in operations is not induced by the Proposed Action as the proposed improvements serve to maintain efficient and safe operations while achieving a quality level of service. Without the proposed improvements, operations would continue to grow as there are no constraints to continued growth, i.e., the airfield, general aviation, terminal, landside, and support facilities can accommodate additional operations without improvements. Therefore an identical number of flight operations, with the exception of run-up operations,[29] are included in the No Action, 2015 ALP, and Sponsor's Preferred Alternative aircraft noise models. However, without the proposed improvements, inefficiencies would become more apparent and the airport user experience would be of lower quality even though the number of operations will not increase.

The DC Metroplex project was approved in a December 2013 Finding of No Significant Impact (FONSI) and Record of Decision. NextGen flight procedures related to the DC Metroplex project were implemented in 2015 and 2016. The No Action and Proposed Action contours for 2022 and 2027 capture all FAA-implemented NextGen flight procedures. While the DC Metroplex EA resulted in a FONSI, the procedure changes have resulted in noise complaints from residents in surrounding areas.

The Midfield Cargo Facility Improvements project constructed in 2019 may affect noise exposure in the surrounds of BWI Marshall Airport. Expansion of the midfield area for cargo operations has been expected since originally reviewed in the 1998 EA for the Proposed Expansion of Cargo Facilities. A 2018 Technical Report analyzed the extent of the potential impacts to noise resulting from the Midfield Cargo Facility Improvements project, resulting in a WR/ROD by the FAA on October 23, 2018. The noise analysis completed as part of the 2018 Technical Report determined that noise levels over noise sensitive areas would increase by approximately 0.2 dB (or less) when comparing the No Action and Proposed Action, which does not constitute a significant noise impact. Following the WR/ROD by the FAA in October 2018, the operations expected as part of the Midfield Cargo Facility Improvements project were incorporated into the 2022/2027 No Action and Proposed Action noise contours for this EA and Section 4(f) Determination.

MDOT MAA is currently implementing their Residential Sound Insulation Program (RSIP) which reduces interior noise levels for eligible homes around BWI Marshall Airport based on the most recently approved 2008 FAA Part 150 Noise Compatibility Program

(NCP) and the 2014 and 2019 approved Noise Exposure Maps (NEMs). This program would sound insulate eligible existing residences with replacement doors, windows, and insulation to reduce the noise level resulting from aircraft using BWI Marshall Airport. MDOT MAA has provided sound insulation to homes in the past based on previous approved NEMs. Based on the 2014 and 2019 approved NEMs, there are an additional 170 single family homes and 488 multi-family units in 26 buildings, located in five complexes eligible for the program. MDOT MAA is currently putting together a project team to provide sound insulation to the interested eligible residents in 2020. The sound insulation package will provide a reduction in indoor noise level of at least 5 dB and bring the average interior noise level below 45 dB.

As future NEMs are approved at BWI Marshall Airport, eligibility for the RSIP will be reviewed.

Overall, noise contours are expected to increase in future years, with or without the Proposed Action. This outcome is largely attributable to the growth in demand for aircraft operations at BWI Marshall Airport over the same timeframe. Therefore, the Proposed Action does not contribute to significant cumulative noise impacts.

5.16.5 Socioeconomics, Environmental Justice, and Children's Environmental Health and Safety Risks (Traffic)

Improvements to the MARC BWI Rail Station Upgrades and Repairs, and development of the SCMAGLEV project, along with other roadway/ bicycle projects associated with MD 170 – MD 648 as well as on-airport improvements would result in changes to surface transportation and roadways; however, it is anticipated that all improvements would be made within the existing transportation rights-of-way and would be evaluated for any associated impacts. As the Proposed Action has the potential to affect the off-airport roadway loop, a TIA was required and completed for this EA and Section 4(f) Determination. The TIA included background projects provided by Anne Arundel County to ensure that future traffic volumes reflect potential development in the area. Additionally, a 1% annual growth in traffic was applied to account for general growth in the area.

The Midfield Cargo Facility Improvements project was constructed in 2019 along Mathison Way with access at the intersection of Aviation Blvd/MD 170 and Mathison Way. The Midfield Cargo Facility Improvements project was evaluated in a separate NEPA review from this EA and Section 4(f) Determination and was constructed and open by late 2019. The Midfield Cargo Facility Improvements potential increase in vehicular traffic at the subject intersection was analyzed within this EA and Section 4(f) Determination's traffic analysis for the No Action Alternative.

The traffic analysis indicated that the Proposed Action would result in virtually no changes in the traffic volumes versus the No Action Alternative for either 2022 or 2027 conditions. However, four intersections would operate at LOS E or F during the AM and PM peak hours in the 2027 No Action and Proposed Action Alternatives. To address these intersections, mitigation measures such as signal split optimization and restriping of an approach could be implemented.

5.16.6 Water Resources

Implementation of the cumulative projects would result in localized, temporary impacts to water quality. 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.

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 near BWI Marshall Airport would be required to utilize onsite water retention and water quality control measures to prevent degradation of water quality in groundwater and receiving bodies.

Specifically, the Concourse E gate expansion project paved over an open drainage channel near the concourse. The project met stormwater requirements for water quantity and quality control through modifications to the downstream Pond B15 riser structure and use of available water quality credits.

Increases to impervious area with future projects such as the Midfield Cargo Facility Improvements will require adherence to all MDE stormwater management requirements set forth by the Maryland Stormwater Management Act of 2007 (Amended 2009).

The Proposed Action would not impact surface waters such that water quality standards set by MDE would be exceeded. Stormwater management requirements for each project would be met in accordance with MDEs Stormwater Management Guidelines for State and Federal Projects. At the time of design for each project, stormwater design will adhere to the MDE guidelines and regulations.

All stormwater management facilities would necessarily be designed for consistency with Maryland standards for both water quality (COMAR 26.08.02) and stormwater management (COMAR 26.17.02). Necessary stormwater discharge permits and construction permits would be obtained prior to project implementation. Along with BMPs, adherence to the Maryland Stormwater Management Guidelines for State and Federal Projects, and an NPDES permit, potential water resource impacts of the Proposed Action and cumulative projects would be minimized.

5.16.7 Construction

Overall, the construction phasing of the projects is expected to create minor and temporary impacts at project sites and in the surrounding area. These impacts would be short-term in nature, lasting for the duration of construction activities. The majority of heavy construction equipment traffic would be confined to airport property as fill and spoil materials are expected to remain on airport property and would therefore not impact traffic on the roads surrounding the airport. Construction of the Proposed Action would result in temporary impacts to ambient noise levels, air quality, and potentially localized water quality when runoff occurs.

As shown in *Section 5.1, Air Quality*, although construction-related emissions associated with the proposed improvements would be well below *de minimis* thresholds and temporary in duration, these emissions could be further reduced by employing the BMPs and by incorporating the provisions of *FAA Advisory Circular 150/5370 – 10E, Standards for Specifying Construction of Airports*.

If uncontrolled, construction activities have the potential to cause erosion and sedimentation that can impact water quality. Short-term construction impacts would be minimized by strict adherence to erosion and sediment control procedures. It is expected that runoff from construction projects would be minimized by BMPs that would limit sediment transport.

All impacts associated with construction of the Proposed Action would be temporary and below significance thresholds. Permit requirements would be adhered to and would minimize or mitigate any potential temporary impacts due to construction. Temporary pollution controls employed by MDOT MAA could include 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.

5.16.8 Summary of Potential Cumulative Impacts

Using BMPs and mitigation measures, the potential impacts of the Proposed Action would be in accordance with all Federal, state, and local laws and regulations and therefore not result in a significant impact. The government agency responsible for the development of each cumulative project would 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 Airport, MDOT MAA has concluded that the implementation of the Proposed Action along with the cumulative projects would not result in a significant cumulative impact.

Endnotes

[1] In addition to aircraft flight operations including arrivals and departures, the 2015 ALP Alternative and Sponsor's Preferred Alternative include additional run-up operations expected at the New Airline Maintenance Facility.

[2] Engineering Brief No. 78, Linear Equations for Evaluating the Separation of Airplane Design Groups on Parallel Taxiways and Taxiways to Fixed/Movable Objects, page 2, Part 1: Background, FAA, Sep 28, 2012.

[3] FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*, July 2015, p. 4-4.

[4] In addition to aircraft flight operations including arrivals and departures, the 2015 ALP Alternative and Sponsor's Preferred Alternative include additional run-up operations expected at the New Airline Maintenance Facility.

[5] Forster, P., V. Ramaswamy, P. Artaxo, T. Berntsen, R. Betts, D.W. Fahey, J. Haywood, J. Lean, D.C. Lowe, G. Myhre, J. Nganga, R. Prinn, G. Raga, M. Schulz and R. Van Dorland, 2007: Changes in Atmospheric Constituents and in Radiative Forcing. In: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M.Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

[6] FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*, July 2015, p. 4-6.

[7] FAA Order 1050.1F Desk Reference, July 2015, p. 5-6.

[8] FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*, July 2015, p. 4-6.

[9] The sites listed in this report are not all-inclusive. Environmental Data Resources, Inc. (EDR) records EDR reported additional sites, but due to the regulatory status and nature of these sites they are not considered to be of concern.

[10] Marvin A. Brown, Joseph M. Herbert, Terry H. Klein, and Frank J. Vento, *Part 2: Historic Preservation Plan, Baltimore/Washington International Airport, Anne Arundel County, Maryland* (Timonium: Greiner, Inc., 1996), 35.

[11] Marvin A. Brown, Joseph M. Herbert, Terry H. Klein, and Frank J. Vento, *Part 2: Historic Preservation Plan, Baltimore/Washington International Airport, Anne Arundel County, Maryland* (Timonium: Greiner, Inc., 1996), 35.

[12] Marvin A. Brown, Joseph M. Herbert, Terry H. Klein, and Frank J. Vento, *Part 2: Historic Preservation Plan, Baltimore/Washington International Airport, Anne Arundel County, Maryland* (Timonium: Greiner, Inc., 1996), 36.

[13] FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*, July 2015, p. 4-8.

[14] FAA Order 1050.1F Desk Reference, July 2015, pp. 8-20 and 8-21.

[15] Maryland Historical Trust, *MEDUSA: Maryland's Cultural Resource Information System*, 2018, https://mht.maryland.gov/secure/medusa.

[16] Grey, Barbara, Letter to Gary Shaffer, Subject: Discovery of Unmarked Burials and National Register Evaluation of Burials, Baltimore/Washington International Airport, Anne Arundel County, Maryland, February 6, 1996.

[17] In addition to aircraft flight operations including arrivals and departures, the 2015 ALP Alternative and Sponsor's Preferred Alternative include additional run-up operations expected at the New Airline Maintenance Facility.

[18] Air Carrier: Commercial airline and cargo airline flights operating scheduled air services; Air Taxi: For hire or on-demand flights operating non-scheduled air services; General Aviation: All other civil operations, except air carrier and air taxi; Military: Military flights.

[19] BWI Marshall Airport Part 150 Update, September 2014, pg. 78.

[20] MAA's Homeowners Assistance Program and School Soundproofing Program provide sound insulation for eligible residents and schools identified within the 65 dB DNL contour as defined by the current Part 150 Study Noise Exposure Maps (NEMs).

[21] This area of contour expansion near Ridge Road (10 ft) is within a single residential parcel that already contains a house structure within the parcel.

[22] The minor areas of contour expansion off Old Dorsey Road (5-10 ft) are within a fully developed residential neighborhood. There is no available land to build new houses within the minor expansion area.

[23] US Census Bureau, American Community Survey 2010-2014.

[24] Traffic Analysis Study – Draft Report, BWI Marshall Lower Level Inbound Roadway Study. MAA-AE-14-002, AECOM and JMT, August 31, 2016.

[25] Traffic Analysis Study – Draft Report, BWI Marshall International Concourse Roadway Widening Study. MAA-AE-14-006, AECOM and JMT, July 29, 2016.

[26] Traffic Analysis Study – Draft Report, BWI Marshall International Concourse Roadway Widening Study. MAA-AE-14-006, AECOM and JMT, July 29, 2016.

[27] FAA Order 1050.1F Desk Reference (July 2015), p. 4-11.

[28] Code of Federal Regulations, Title 40 (CFR) Part §1508.7 (1978).

[29] In addition to aircraft flight operations including arrivals and departures, the 2015 ALP Alternative and Sponsor's Preferred Alternative also include run-up operations expected at the New Airline Maintenance Facility.

Chapter 6: PUBLIC AND AGENCY INVOLVEMENT

Public and agency involvement is important to ensure that information is provided to the general public and public agencies. MDOT MAA considers an open public process to be an important component of this project and therefore has involved the public and agencies with jurisdiction or special knowledge in the environmental review process.

The sections that follow provide a summary of public and agency involvement completed for development of this EA. ***Appendix M, Public and Agency Involvement****,* includes materials related to agency coordination and the public involvement process.

6.1 Scoping

MDOT MAA conducted scoping as the first step in preparing the EA. Recognizing the value of identifying issues early and the potential for the Proposed Action to affect resources protected by special purpose laws such as wetlands and floodplains, MDOT MAA conducted scoping with agency and public stakeholders.

During the scoping period for this EA the public and other agencies were given the opportunity to assist in determining the scope of issues to be addressed. In addition to the scoping process, MDOT MAA has held several meetings to educate, inform, and discuss the proposed project, and to receive feedback from concerned citizens and organizations.

6.2 Public and Agency Scoping

The scoping process began with the preparation of a Scoping Information Package that included discussion of the project background, proposed action, preliminary purpose and need, preliminary alternatives, environmental analysis, and preliminary schedule. The package was sent to regulatory agencies and relevant parties prior to the agency and public scoping meeting date. Included in the relevant parties mailing list were property owners of parcels off the Runway 15L end where obstruction removal is proposed on their property.

A public notice detailing the date, location, and purpose of the public scoping meeting was published in the Legal Notices section of *The Baltimore Sun* and the *Daily* on August 5 and 19, 2016 (see *Appendix M, Attachment 1: Scoping Report*). The notice also appeared online at marylandaviation.com.

The Agency and Public Scoping Information Packages and comment form are provided in the Scoping Report in *Appendix M*.

6.3 Scoping Meetings

6.3.1 Agency Scoping Meeting

The agency scoping meeting was held on Thursday, August 25, 2016 at 10:00 a.m. at MDOT MAA's offices in Linthicum, Maryland. Meeting invites and scoping information packages were sent to 20 regulatory agencies that would be considered to have an interest in or regulatory oversight of the

preparation of the EA at BWI Marshall Airport. Of the agencies invited, personnel from four (4) separate agencies attended as well as personnel from MDOT MAA, the FAA, and the EA Project Team. Agencies in attendance included:

- Anne Arundel County DPR
- MDNR
- USDA Animal and Plant Health Inspection Service – Wildlife Services
- USACE

A PowerPoint presentation provided a brief discussion of the purpose of the scoping meetings, project background, proposed actions, EA (to include purpose and need, preliminary alternatives, affected environment, and anticipated environmental impacts), and preliminary schedule. Agencies were encouraged to review the materials and to submit comments to MDOT MAA by September 9, 2016. The presentation, meeting agenda, and agency sign-in sheets are included in the Scoping Report in *Appendix M.*

6.3.2 Public Scoping Meeting

A Public Scoping Meeting was also held on August 25, 2016 from 5:00 p.m. to 8:00 p.m. at MDOT MAA's offices. The public scoping meeting was held in an "open house" format with representatives from MDOT MAA and the Project Team available to answer questions throughout the meeting. Presentation boards were on display to illustrate the proposed improvements, EA process and timeline, obstruction removal diagrams and details, natural resources inventory, anticipated environmental impacts, and scoping comment instructions. Handouts of presentation board graphics were provided to meeting attendees as well as copies of the scoping information package.

A total of 45 people attended the public scoping meeting, with 27 being members of the public, 2 media persons, and the remaining 16 being MDOT MAA personnel or members of the Project Team. The primary comments and questions from the public received at and following the meeting referenced the obstruction / tree removal and visual impacts. The display boards and the sign-in sheet are included in the Scoping Report in *Appendix M.* Over half of those members of the public that attended the Public Scoping Meeting were those who reside off the end of Runway 15L where obstruction removal is proposed on private residential property.

6.4 Scoping Comments

Agencies and the public were invited to comment in various ways during the scoping process. Comment forms were provided in the scoping information packages and at the public scoping meetings. Comments were also accepted via email or through the mail. MDOT MAA requested that comments be submitted by September 9, 2016 so that comments could be considered as early as possible in the EA process. Scoping comments received are included in *Appendix M, Attachment 1*.

All comment forms, letters, and emails were reviewed, and comments were categorized by issue. Note that each comment letter or email, etc. may have discussed more than one issue. A total of five distinct issues were identified. The issues have been considered and incorporated into the EA as appropriate and possible.

The following sections summarize the nature of the issue and provide the number of related comments received.

Issue # 1 – Obstruction Removal / Tree Removal – (3 comments) Residents commented on their concerns about several aspects of the proposed tree removal, including: reducing the shade on their properties; removing the trees instead of trimming; and removing the visual and noise buffer(s) between their properties and proposed development in the area.

Issue # 2 – Noise – (4 comments) Residents raised concerns involving several aspects of noise, including: removing trees that are considered a noise buffer; increasing noise from the proposed maintenance facilities and potential engine run-ups; abating potential noise increases; and increasing aircraft noise.

Issue # 3 – Visual Impacts – (2 comments) Residents indicated that the trees proposed for removal provide a visual buffer from proposed townhome development in the vicinity of their properties.

Issued # 4 – Traffic – (2 comments) One resident raised concerns about the potential for increased traffic on White Avenue while another had concerns about increased traffic on I-295 and Route 100.

Issue # 5 – BWI Trail – (2 comments) One resident and the Anne Arundel County Department of Recreation and Parks commented about concerns over potential impacts to the BWI Trail.

6.5 Other Public Outreach

MDOT MAA attended the Linthicum-Shipley Improvement Association (LSIA) community meeting on November 9, 2016 at Lindale Middle School at 7 PM. Copies of information provided at the August 25, 2016 Public Scoping Meeting were distributed and a PowerPoint presentation was provided. The primary topic at the meeting included the tree removal off the Runway 15L end that are obstructions to the runway approach surface. Concerns about additional noise or environmental effects associated with the proposed tree removal.

6.6 Section 106 and Tribal Consultation

The nature of the project necessitated Section 106 coordination with MHT regarding cultural resources that could potentially be affected by the undertaking. The laws and regulations guiding this consultation can be found in *Chapter 5, Section 5.8.1*. The applicable consultation with the SHPO and MHT is contained in *Appendix J*.

Consultation was initiated with the submission of project review forms which requested approval of a Direct and an Indirect APE for cultural resources. Following these approvals, archaeological work proceeded under a permit for terrestrial archaeology on state lands (*Permit Under Maryland Archeological Historic Properties Act: Terrestrial Archeology*). The archaeological investigation was initiated on June 24, 2016 and culminated in an archaeological report submitted to MHT in 2016, which included final recommendations for affected sites (see Table 5.8.1). Following the submission, MHT comments were incorporated into the report, resulting in the Phase I Archaeological Identification Report which was finalized in March 2017.

Additional project planning efforts in 2018 resulted in the modification of the Direct and Indirect APE. MDOT MAA requested concurrence from MHT for the updated

Direct and Indirect APEs on January 8, 2019, and MHT provided their concurrence with the updated APEs on January 29, 2019 (see *Appendix J, Attachment 3*).

Two historic properties within the Indirect APE were also evaluated for NRHP eligibility. Determination of Eligibility forms were submitted to MHT on May 4, 2017, and MHT concurred with the conclusions that neither properties were eligible for the NRHP.

In order to fulfill requirements with Code of Federal Regulation (CFR) 36 Part 800, the FAA initiated government-to-government consultation as described in Federal Executive Order 13175, *Consultation and Coordination with Indian Tribal Governments*, and FAA's Order 1210.20, *American Indian and Alaska Native Tribal Consultation Policy and Procedures*, to ensure that Federally recognized tribes are given the opportunity to provide meaningful and timely input regarding proposed FAA actions that uniquely or significantly affect tribes. A sample of the package submitted to the tribes is provided in *Appendix M, Attachment 2: Tribal Consultation,* along with a list of the tribes contacted and tribal response received from the Delaware Tribe. The Delaware Tribe indicated that they have no objections to the proposed projects but would like to be notified should a concentration of artifacts be unearthed during construction.

6.7 Other Agency Correspondence

Meetings were held on March 30, 2017 at MDOT MAA Offices, and April 24, 2017 around the BWI Marshall Airport airfield, to discuss the Joint Federal/State Application to be submitted for the Section 404 permit. MDE and USACE were invited to attend these pre-application meetings. MDE attended the March 30 and April 24 meetings, and USACE did not attend either meeting. Meeting minutes are included in *Appendix L.*

Additional agency correspondence not related to agency scoping may be included within the relevant resource category appendix.

6.8 Notice of January 5, 2018 Draft EA and Draft Section 4(f) Determination Availability

The Draft EA must be made available to the public via a Notice of Availability (NOA) for a minimum of a 30-day review period. The NOA also notifies the public and agencies of the FAA's draft Section 4(f) *de minimis* impact determination. The public and agencies had an opportunity to review and comment on the Draft EA and Draft Section 4(f) Determination from January 5, 2018 through February 5, 2018. A NOA was published in *The Baltimore Sun* on January 5, 2018 and again on January 14, 2018. *Appendix M, Attachment 3* includes proof of publication of the NOA. Notice of availability of the Draft and links to the Draft EA and Draft Section 4(f) Determination document were also available on the MDOT MAA website. Hard copies of the document were available to the public during the review period at the following locations:

Federal Aviation Administration
Washington Airports District Office
23723 Air Freight Lane, Suite 210
Dulles, VA 20166

Maryland Department of Transportation
Maryland Aviation Administration
Office of Environmental Services
991 Corporate Boulevard
Linthicum, MD 21090

Anne Arundel County Library
Linthicum Branch
400 Shipley Road
Linthicum, MD 21090

Anne Arundel County Library
Glen Burnie Regional Library
1010 Eastway
Glen Burnie, MD 21060

The Draft EA and Draft Section 4(f) Determination was submitted to the Maryland Department of Planning (MDP) State Clearinghouse for distribution to relevant agencies.

Agency comments received on the January 5, 2018 Draft EA and Draft Section 4(f) Determination are included in ***Appendix N, Comments and Responses***. Any comments received from the public in response to the January 5, 2018 Draft EA and Draft Section 4(f) Determination are also included in *Appendix N,* along with a response to the comment, as part of the reissuance of the Draft EA and Draft Section 4(f) Determination.

6.9 Public Workshop

Advertisement of a public workshop for the January 5, 2018 Draft EA and Draft Section 4(f) Determination was included in the NOA. The public workshop was held on January 25, 2018.

Three people from the public attended the public workshop. The workshop was held in an "open house" format and was intended to share information and invite comments. Graphics were on display to illustrate the information provided in the Draft EA and Draft Section 4(f) Determination including the purpose and need, alternatives, and potential impacts as well as the EA process and schedule. Representatives from MDOT MAA and its Project Team were available to answer questions. In addition, a brief presentation describing information provided in the Draft EA and Draft Section 4(f) Determination was given.

Attendees of the public workshop were concerned with the recent changes to flight paths at BWI Marshall Airport associated with implementation of FAA's Washington, D.C. Optimization of Airspace and Procedures in the Metroplex (DC OAPM) project, and how proposed improvements in the Draft EA and Draft Section 4(f) Determination could further impact noise.

Details of the public workshop are provided in *Appendix M, Attachment 3*, including proof of publication of the NOA, presentation boards, a handout, PowerPoint presentation, sign-in sheet and comment form. Public comments received and responses to official comments are included in *Appendix N*.

6.10 Comments Received on the January 5, 2018 Draft EA

As a part of Maryland's Environmental Clearinghouse Review process, comments were received from several state agencies expressing that they did not have significant concerns regarding the proposed improvements and anticipated impacts.

Comments were received from two members of the public. The public comments were mainly focused on the recent changes to the flight paths at BWI Marshall Airport associated with implementation of FAA's DC OAPM project. The FAA's DC OAPM procedures were approved in a December 2013 Finding of No Significant Impact and Record of Decision. The proposed action is a new and separate action from the FAA's DC OAPM project. The results of implementation of the FAA's DC OAPM

project are however incorporated into the noise analysis completed for this EA.

Following the closure of the 30-day comment period, comments were received from Howard County Office of Law and the BWI Community Roundtable. Both sets of comments were focused on the flight path changes associated with the FAA's DC OAPM project.

6.11 Notice of 2020 Updated Draft EA and Draft Section 4(f) Determination Availability

An Updated Draft EA and Draft Section 4(f) Determination was re-issued for public comment on February 6, 2020 in order to present updated information related to project planning and to respond to public comments on the January 2018 issuance of the Draft EA and Draft Section 4(f) Determination. An NOA was published in *The Baltimore Sun, The Capital Gazette*, and the *Howard County Times* on February 6, 2020 and again in *The Baltimore Sun* on February 9, 2020. Notice of availability of the Updated Draft and links to the Updated Draft EA and Draft Section 4(f) Determination document are available on MDOT MAA website. Hard copies of the document were available to the public for review at the following locations:

Federal Aviation Administration
Washington Airports District Office
13873 Park Center Road, Suite 490S
Herndon, VA 20171

Maryland Department of Transportation
Maryland Aviation Administration
Office of Environmental Services
991 Corporate Boulevard
Linthicum, MD 21090

Anne Arundel County Library
Linthicum Branch
400 Shipley Road
Linthicum, MD 21090

Anne Arundel County Library
Glen Burnie Regional Library
1010 Eastway
Glen Burnie, MD 21060

Howard County Library System
Elkridge Branch
6540 Washington Blvd
Elkridge, MD 21075

Howard County Library System
Savage Branch
9525 Durness Lane
Laurel MD 20723

Howard County Library System
East Columbia Branch
6600 Cradlerock Way
Columbia MD 21045

Howard County Library System
Central Branch
10375 Little Patuxent Pkwy
Columbia, MD 21044

Howard County Library System
Administrative Branch
9411 Frederick Rd
Ellicott City MD 21042

Howard County Library System
Miller Branch
9421 Frederick Rd
Ellicott City MD 21042

The Updated Draft EA and Draft Section 4(f) Determination were submitted to the MDP State Clearinghouse for distribution to relevant agencies. Letters were also sent to the property owners with potential Part 77 tree obstructions on their property.

A public workshop was advertised as part of the NOA to be held at MDOT MAA offices on March 11, 2020, during the review period. Just prior to the scheduled workshop date, responses to the risks of the COVID-19 pandemic were elevated. As a result of public health guidance and at the direction of the State of Maryland, MDOT MAA postponed the public workshop. The NOA for the Updated Draft EA and Draft Section 4(f) Determination, notice of the public workshop, as well as the notices of postponement of the workshop are included in *Appendix M, Attachment 4*.

In April 2020, the FAA authorized MDOT MAA to move forward with holding a virtual public workshop for the project, scheduled for May 21, 2020. An announcement for the virtual public workshop, including an extension of the public comment period to June 4, 2020, was posted online at the MDOT MAA website and in *The Baltimore Sun*, *The Capital Gazette*, and *The Howard County Times* on April 23, 2020 and again in *The Baltimore Sun* on April 26, 2020. Notice of the workshop was also submitted to the MDP Clearinghouse, the BWI Noise Roundtable and MDOT MAA's *eNews Express*. Letters were also sent to the property owners with potential Part 77 tree obstructions on their property.

The virtual public workshop was held via Webex on Thursday, May 21, 2020 at 11:30 AM – 1:30 PM and 6:00 PM – 8:30 PM to share information and invite comments on the project. Those planning to attend were able to register to receive a reminder email with the Webex link prior to the virtual public workshops, however this was not required as the links were made available on MDOT MAA's website the day of the workshops. There were 52 attendees at the midday 11:30 AM session and 30 attendees at the evening 6:00 PM session.

Following an audio-guided presentation with background and information on the project, a question and answer "chat" session between the public and the MDOT MAA project team was held. The public used the Webex chat function to type questions or comments. Members of the project team responded to the comments verbally during the Webex. The "chat" session questions and comments are included as official comments and have received responses in *Appendix N, Comments and Responses* of the Final EA and Section 4(f) Determination.

Prior to the public workshop, materials (PDFs of display board graphics and meeting handout) were posted on MDOT MAA website. Following the workshops, the meeting recordings were also posted on the website. All materials, including the Updated Draft EA and Draft Section 4(f) Determination document remained on the MDOT MAA website through the close of the comment period on June 4, 2020.

All of the Virtual Public Workshop Materials, including the announcements, the letter to property owners with potential Part 77 tree obstructions on their property, attendee list, and meeting materials are included in *Appendix M, Attachment 5.* Responses to comments received during the virtual public workshops and received by MDOT MAA through June 4 are included in the Final EA and Section 4(f) Determination. Refer to *Appendix N* for the comments and a comment-response matrix. The transcripts from the virtual public workshops with questions and comments as they were provided via "chat" from the public are also included in *Appendix N.*

Comments were received on the Updated Draft EA and Draft Section 4(f) Determination through June 4, 2020. Several comments received after this date were also accepted by MDOT MAA. A comment and response matrix for comments received on the Updated Draft EA and Draft Section 4(f) Determination are included in *Appendix N, Attachment 3*. The emails and letters received are included in *Appendix N, Attachment 4.*

A comment and response matrix for the "chat" session questions and comments are included in *Appendix N, Attachment 5.* A transcript of the chat session is included in *Appendix N, Attachment 6.*

During the comment period, three elected officials commented (or forwarded) comments, nine agencies or organizations commented (some via the MDP State Clearinghouse), and 33 comments were received from 30 members of the public.

Fifty comments or questions were received from the Virtual Public Workshop "chat" session from 14 members of the public. Twenty-four (24) comments or questions were received at the 11:30 AM meeting and 26 comments or questions were received at the 6:00 PM meeting.

The primary comments and questions from elected officials and from the public received during and following the virtual public workshops were concerns related to the tree removal associated with the Proposed Action. Two comments were received following the June 4 end date and have been included in the comment-responses; one of the comments had previously been received via email.

Chapter 7: LIST OF PREPARERS

7.1 List of Preparers

This chapter identifies the individuals assisting in the preparation and independent review of this EA and Section 4(f) Determination along with each preparer's responsibilities. **Table 7.1** includes MDOT MAA staff who are responsible for the preparation of the EA and Section 4(f) Determination and/or who were involved in its review. Supporting the FAA in this effort are individuals from HNTB, ADCI, KB Environmental Sciences, and JMT, EAC/Archaeology.

Table 7.1
List of Preparers

Personnel	Title	Years of Experience	Project Responsibilities
FAA			
Mindy Lee	Civil Engineer, Washington Airports District Office	15	Document Review
Andrew Brooks	Regional Environmental Program Manager	20	Document Review
Genevieve Walker	Environmental Protection Specialist, Washington Airports District Office	35	Document Review
John Doyle	JD/MA, Environmental Science and Policy	7	Document Review
MDOT MAA			
Robin Bowie	Director, Office of Environmental Services (left MDOT MAA July 2020)	29	Project Manager
John Hurt	Manager, Environmental Planning Section, Office of Environmental Services (retired February 2020)	34	Document Review
Kevin Clarke	Director, Office of Planning	23	Document Review
Shawn Ames	Deputy Director, Office of Planning	24	Document Review
HNTB			
Kim Hughes, PE	Manager of Environmental Services	34	Program Manager; Quality Assurance, Quality Control
Caroline Pinegar, AICP, Envision SP	Environmental Project Manager	14	EA Development
Ryan Lombardi, PE	Environmental Planner	9	EA Development and Stormwater Analysis
Yue Xu, PE	Aviation and Environmental Planner	12	Noise Analysis
Kent Miller	Senior GIS Analyst	19	GIS; Graphics
Robert Brander, PE	Project Manager, Transportation Planning (left HNTB July 2020)	18	Traffic Analysis

Table 7.1
List of Preparers

Personnel	Title	Years of Experience	Project Responsibilities
Jessica Wyatt	Project Manager II, Aviation	23	Traffic Analysis QA/QC
Airport Design Consultants, Inc. (ADCI)			
Cedrick Johnson, PE	Project Manager	27	Manager, Technical Lead, QA/QC
Keith Fritz, PE	Senior Engineer	24	QA/QC
Michael Pizza, PE	Senior Engineer	25	Alternatives Development
Sean Chisam, PE	Project Engineer	15	Alternatives Development
Holly Webb	Engineer	11	Alternatives Development
Raj Kondapalli	Engineer	11	Alternatives Development
Rosalyn Zhou	CAD Designer	11	Alternatives Development
KB Environmental Sciences, Inc.			
Mike Kenney	Senior Environmental Scientist	33	Project Manager
Carrol Fowler	Senior Environmental Scientist	33	Air Quality QA/QC
Justin Godin	Air Quality Specialist/ Meteorologist	17	Air Quality, Climate, Hazardous Materials
Paola Pringle	Senior Air Quality Specialist	18	Air Quality Analysis
JMT			
Leyla Lange	Senior Environmental Scientist	26	Biological and Water Resources Impact Analysis
Lindsey Snyder	Environmental Scientist	15	Fieldwork, and Wetland and Forest Impact Analysis
Stacey Gill	Environmental Scientist	15	Fieldwork
Russ Ruffing	Section Head/Practice Lead	33	QA/QC of technical writing
EAC/Archaeology			
Elizabeth Comer	Principal Investigator	37	Cultural Resources Survey
Robert Wanner	Archaeologist	20	Cultural Resources Survey