Draft Environmental Impact Statement for the Disposal and Reuse of the Former Naval Air Station Joint Reserve Base (NAS JRB) Willow Grove, Horsham, Pennsylvania

December 2013

Prepared by:

Department of the Navy

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Lead Agency:
United States Department of the Navy

DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE DISPOSAL AND REUSE OF THE FORMER NAVAL AIR STATION JOINT RESERVE BASE WILLOW GROVE HORSHAM, PENNSYLVANIA
December 2013

Abstract

This Environmental Impact Statement (EIS) presents an analysis of the U.S. Department of the Navy's (Navy's) proposed action to dispose of Naval Air Station Joint Reserve Base (NAS JRB) Willow Grove, located in Horsham Township, Pennsylvania, and its reuse in a manner consistent with the *NAS JRB Willow Grove Redevelopment Plan* (Redevelopment Plan) that has been approved by the Horsham Township Authority. The Navy was required to close NAS JRB Willow Grove in accordance with Public Law 101-510, the Defense Base Closure and Realignment Act of 1990, as amended in 2005. The EIS examines the potential human and natural environmental consequences of the proposed action and any impacts associated with the reasonably foreseeable reuse of the property. Three redevelopment alternatives and the No Action Alternative were considered. Alternative 1, the preferred alternative, is the reuse of the property in accordance with the Redevelopment Plan, including mixed land use types and densities, as well as open space and natural areas. The airfield and most installation facilities would be demolished. Alternative 2 consists of a higher density of residential development than under Alternative 1, a similar level of mixed-use development, and demolition of the airfield and most installation facilities. Alternative 3 includes commercial and mixed-use development, minimal residential development, and conversion of the military airfield to a general aviation airfield. The No Action Alternative is the retention of the former NAS JRB Willow Grove property by the U.S. government in caretaker status. The Navy is the lead agency for the proposed action.

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Comments must be postmarked by **February 10, 2014.**

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Executive Summary

This environmental impact statement (EIS) evaluates the potential human and natural environmental consequences of the disposal and redevelopment of the former Naval Air Station Joint Reserve Base (NAS JRB) Willow Grove property and any impacts associated with the reasonably foreseeable reuse of the property in a manner consistent with the *NAS JRB Willow Grove Redevelopment Plan* (Redevelopment Plan) (RKG 2012) (Alternative 1), as well as Alternatives 2, 3, and a No Action Alternative. The U.S. Department of the Navy (Navy) has declared approximately 910 acres of property at former NAS JRB Willow Grove, in Horsham, Pennsylvania, to be surplus to the needs of the federal government, in accordance with Public Law 101-510, the Defense Base Closure and Realignment Act of 1990, as amended in 2005 (BRAC Law).

This document was prepared by the U.S. Department of the Navy (DON) in accordance with the *National Environmental Policy Act of 1969* (NEPA) (Public Law 91-190, 42 United States Code [U.S.C.] 4321-4370f); the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 Code of Federal Regulations [CFR] 1500-1508); DON regulations implementing NEPA (32 CFR 775); Office of the Chief of Naval Operations Instructions (OPNAVINST) 5090.1C CH-1; DON *Base Realignment and Closure (BRAC) Implementation Guidance* (NBIG); and other applicable Department of Defense (DOD) and DON policy and guidance.

ES.1 Proposed Action, Purpose, and Need

The purpose of the proposed action evaluated in this EIS, and the preferred alternative, is the disposal of the former NAS JRB Willow Grove property by the Navy from federal ownership and its subsequent reuse by the Local Redevelopment Authority (LRA).

The BRAC Law directed the DOD to close United States military operations at the facility. Under the BRAC Law, the decision to close, relocate, or realign bases is exempt from NEPA documentation requirements. However, once that decision has been made, the DOD is required to prepare appropriate NEPA documentation evaluating the environmental impacts of the disposal and subsequent reuse of the property. The reuse of NAS JRB Willow Grove would be in a manner consistent with the Redevelopment Plan. The disposal of the property is the responsibility of the DON, and the LRA is responsible for the implementation of the Redevelopment Plan. The future developer or owner of the property would be responsible for implementation of mitigation measures and project environmental controls identified for resource impacts associated with reuse.

ES.2 Study Area Location and Description

The former NAS JRB Willow Grove is situated on approximately 910 acres in Horsham Township, Montgomery County, Pennsylvania. The former installation property is located approximately 18 miles north of Philadelphia. The main gate is located on Easton Road, approximately 2.5 miles north of the Pennsylvania Turnpike.

The site of NAS JRB Willow Grove was originally a municipal airfield constructed in the mid-1930s. The Navy acquired the airfield in response to World War II, and NAS Willow Grove was commissioned in January 1943. After the end of World War II in 1945, the installation was designated a Reserve Training Station. In 1994, the installation was re-designated a Joint Reserve Base to more accurately reflect its status. The mission of NAS JRB Willow Grove prior to closure was to provide, train, and maintain a ready reserve force for the country.

The BRAC Commission recommended closure of NAS JRB Willow Grove on September 8, 2005. The recommendation to close the installation was approved by President Bush and accepted by Congress on

November 9, 2005. By law, all BRAC actions relating to the closure of NAS JRB Willow Grove had to be complete by September 15, 2011. The installation ceased operations and was officially closed on September 15, 2011.

The Navy established the BRAC PMO to oversee and manage the implementation of BRAC actions throughout the Navy. Under BRAC, the Navy acts as the disposal agency and employs the following procedures: disposal planning and federal transfers (Phase 1), surplus property notice and designation (Phase 2) and property disposal (Phase 3). Transfer and redevelopment planning is a multi-phase process, most of which is specified by law.

For NAS JRB Willow Grove, Phase 1 began on November 9, 2005, when the recommendation to close the installation became law. The first step in the planning involved offering the properties to federal agencies for reuse through a federal transfer process. As a result of the federal transfer process, approximately 48 acres have been or are planned to be transferred from the Navy to the Federal Aviation Administration (3 acres) and United States Air Force (45 acres).

Following the federal transfers, the remaining 861 acres of installation property was made available for non-federal reuse. Phase 2 includes the LRA's redevelopment planning. The Redevelopment Plan (RKG 2012) is a critical component of the Navy's environmental analysis required by NEPA.

After the DOD officially designated the property as surplus, the HRLA began preparation of the Redevelopment Plan. The Redevelopment Plan was completed in March 2012 and was officially adopted on March 21, 2012 (RKG 2012). Following adoption of the Redevelopment Plan (which is discussed in detail in Section 2), the Navy began the NEPA process, in this case, the preparation of this EIS.

Upon completion of the NEPA process, the Navy will prepare a Record of Decision (ROD) indicating disposal decisions, and the redevelopment process will enter the implementation phase. This phase includes the Navy's conveyance of surplus installation property (i.e., property disposal). Any future development of property not transferred to other federal agencies would need to be consistent with the Redevelopment Plan and would fall under the jurisdiction of the local government. The use of land, the reuse of existing buildings and facilities, and the development of new buildings on the former NAS JRB Willow Grove property would be regulated by the local government, zoning ordinances, and other applicable plans and regulations.

ES.3 Scope of the EIS

This EIS evaluates the potential human and natural environmental consequences of the disposal and redevelopment of the former installation property in a manner consistent with the Redevelopment Plan (Alternative 1), as well as Alternatives 2, 3, and a No Action Alternative. The resource areas examined in this EIS and potentially impacted are land use; socioeconomics; community facilities and services; transportation; environmental management; air quality; noise; infrastructure and utilities; cultural resources; topography, geology, and soils; water resources; and biological resources. The EIS also addresses potential cumulative impacts that may result from reasonably foreseeable projects in the region, including both federal and local projects.

This EIS addresses impacts based on a 20-year full build-out of the approved Redevelopment Plan (Alternative 1), Alternative 2, Alternative 3, and No Action, and assumptions regarding foreseeable reuse of the property.

ES.4 Public Involvement

The first step in the NEPA process was the publication of a Notice of Intent (NOI) in the Federal Register on October 18, 2012. The NOI formally opens the public scoping period and includes a description of the proposed action and alternatives, locations to be affected, and how scoping comments may be provided. The public scoping period began on October 18, 2012, and concluded on December 31, 2012, and included public scoping meetings conducted in an open house format on December 13 and 14, 2012. All comments received during the formal scoping period were identified and tabulated, by topic. Similarly, open house public meetings will be conducted concurrent with the Draft EIS comment period, and all comments received during the formal Draft EIS comment period will be considered in the Final EIS.

ES.5 Alternatives Considered in the EIS

The proposed action is the disposal of the former installation property in a manner consistent with the Redevelopment Plan. The primary approach to development of the proposed action and alternatives was to (1) focus on the Navy's disposal of surplus property with the Redevelopment Plan as the reasonably foreseeable reuse of the property and then (2) consider a range of reasonable disposal alternatives and assess the human and natural environmental effects in the context of the reasonably foreseeable reuse of the property.

To assess the potential impacts of the proposed action, the Navy evaluated three property disposal and build alternatives—Alternative 1, Alternative 2, and Alternative 3—and the No Action Alternative. These alternatives are described below.

ES.5.1 Alternative 1 (HLRA Plan - Preferred Alternative)

Alternative 1 includes the disposal of the former installation property by the Navy and reuse of the property in accordance with the Redevelopment Plan. This alternative has been identified as the Preferred Alternative by the Navy. Full build-out of the Redevelopment Plan would be implemented over a 20-year period. The Redevelopment Plan calls for redevelopment of most of the former installation property and includes a mix of land use types and densities, as well as open space and natural areas. The Redevelopment Plan was designed to incorporate mixed-use, pedestrian-oriented features (e.g., a town center, walkable neighborhoods, and bike lanes), open spaces, best management practices (BMPs) for stormwater management, and green and sustainable design principles.

The redevelopment would make available approximately 2.3 million square feet of building space and a mix of 1,486 residential housing units. The Redevelopment Plan at full build-out would include the following elements:

Town Center. This would be a mixed-use, pedestrian-oriented area accessible from both Horsham Road (State Route [SR] 463) and Easton Road (SR 611). The Town Center would include compact pedestrian-oriented development, including a mix of retail, business, and support services; restaurants; civic and cultural uses; and parks. In addition, this area would include higher-density attached residential housing such as condominiums and apartments.

Residential District. This area would provide residential housing connected together by a network of streets, including a central Runway Boulevard, which would provide access to open space and parks. The district would consist of a mix of detached/attached single-family housing, multi-family apartments, townhomes, and condominiums.

Office Park. This district would include professional office space and be positioned next to public open space and a golf course.

Hotel/Conference Center. This area would be located adjacent to the Town Center and Office Park and would be visible from Easton Road (SR 611).

Continuing Care Retirement Community (CCRC). This area would provide a variety of housing types to support independent living, assisted living, and nursing home care.

School. This approximately 40-acre area is designated for the Hatboro-Horsham School District for replacement of existing facilities and future expansion. This site would include a future middle school and administrative and recreational facilities. It would be located within walking distance of the residential neighborhoods.

Retail. In addition to the retail component programmed for the Town Center, retail frontage would be located along Easton Road (SR 611).

Regional Recreation Center. A regional indoor recreation center with several adjacent outdoor recreation fields would be located adjacent to the existing Gate 1. The indoor facility would include a number of athletic features, including a swimming pool, gymnasium, basketball courts, climbing walls, tennis and racquetball courts, and a health and fitness club.

Aviation Museum and Park. An approximately 10-acre site would house an aviation museum and park and would be directly visible from Easton Road (SR 611). The aviation museum and park are being sponsored by Montgomery County, on behalf of the Delaware Valley Historical Aircraft Association. The proposed facility would include a number of restored aircraft within new hangar facilities and would incorporate the existing Harold F. Pitcairn Wings of Freedom Air Museum.

Bucks County Housing Group (BCHG) Housing. This approximately 10-acre area would accommodate housing for the homeless. This site would provide permanent supportive housing of up to 70 townhomes and duplex units.

ES.5.2 Alternative 2 (HLRA Plan with Increased Residential Development)

Alternative 2 provides for the disposal of the former installation property by the Navy and reuse at a higher density of residential development and a similar level of mixed-use development. As with Alternative 1, the airfield and most installation facilities would be demolished. This alternative includes a mix of land use types and open space and natural areas, and incorporates smart-growth principles that include pedestrian-friendly transportation and compact development. Full build-out is proposed to be implemented over a 20-year period. This alternative calls for the development of approximately 544 acres (63 percent) of the total installation property.

Alternative 2 at full build-out includes many of the same elements as Alternative 1, with the following notable exceptions:

Regional Recreation Center. The area for this facility would be increased from approximately 12 acres under Alternative 1 to approximately 22 acres.

Recreation and Open Space District. This area would provide 317 acres of land for a wide variety of active and passive outdoor recreation, whereas Alternative 1 would provide approximately 241 acres.

ES.5.3 Alternative 3 (Airfield Reuse)

Alternative 3 would maintain the existing runway and a portion of the taxiways, parking aprons, and hangar space for airfield operations. After accounting for the area taken up by critical airfield/air

operation elements (approximately 350 acres) and the areas that provide open space surrounding the airfield due to safety setbacks associated with the airfield (approximately 300 acres), the remaining land available for redevelopment would be approximately 210 acres.

The layout of Alternative 3 incorporates the approximate sizes and locations of several Alternative 1 elements, such as the recreation center, aviation museum, and golf course. However, due to the land use constraints imposed by the inclusion of the airfield, this option excludes virtually all residential development land uses within the former installation property, including the Town Center. Under this alternative, areas such as the hotel and conference center were located to the southern portion of the property (along Horsham Road), away from the airfield. Alternative 3 would provide more green space and more retail space compared to Alternative 1.

ES.5.4 No Action Alternative

The No Action Alternative is retention of the surplus property at NAS JRB Willow Grove by the federal government in caretaker status. No reuse or redevelopment would occur on any of the property. The No Action Alternative is evaluated in this EIS as prescribed by CEQ regulations.

ES.6 Summary of Potential Environmental Consequences

The EIS examines the potential human and natural environmental consequences of the proposed action and any impacts associated with the reasonably foreseeable reuse of the property. Potential environmental impacts associated with Alternatives 1, 2, and 3 and the No Action Alternative are summarized in Table ES-1.

In addition, resources that are anticipated to be significantly impacted or have the potential to be significantly impacted are described individually below.

ES.6.1 Traffic

Under Alternatives 1, 2, and 3, the proposed development would result in a significant increase in vehicle trips in areas surrounding the former NAS JRB Willow Grove property. As a result, all of the intersections analyzed would experience an increase in seconds of delay and the majority (12 of 14 existing intersections for Alternatives 1 and 2, and 11 of 14 existing intersections for Alternative 3) would experience a drop in the level of service (LOS) when compared to the LOS under existing conditions. Full build-out at the former installation is proposed over a 20-year period; therefore, as part of the analysis, a background growth factor was applied to existing traffic conditions to account for an increase in vehicle trips not directly associated with the redevelopment. Proposed mitigation, such as adjusting signal timing, adding through-lanes, multiple left-turn lanes, and channelized right-turn lanes, where appropriate, may reduce traffic impacts related to the redevelopment to conditions similar to those expected under the No Action Alternative.

ES.6.2 Infrastructure and Utilities

Water Demand. The development proposed under Alternatives 1, 2, and 3 would result in an increase in the water demand related to the former installation property. The most substantial increase in water demand would occur under Alternative 2 (765,298 gallons per day [gpd]), followed by Alternative 1 (668,649 gpd) and Alternative 3 (201,937 gpd). These would all be in excess of the previous water demands of the former NAS JRB Willow Grove installation when in operation. The water demand under each alternative may be reduced through the incorporation of the latest green and sustainable design principles into building construction. However, the developer may also need to identify drinking water sources to accommodate the needs related to the development.

Wastewater. The development proposed under Alternatives 1, 2, and 3 would result in an increase in the demand for wastewater treatment. The most substantial increase in wastewater treatment demand would occur under Alternative 2 (663,970 gpd), followed by Alternative 1 (586,457 gpd) and Alternative 3 (191,588 gpd). Prior to closure, the former NAS JRB Willow Grove installation had an on-site wastewater treatment plant, which has since been dismantled. The Horsham Water and Sewer Authority (HWSA) plans to expand the Park Creek Sewage Treatment Plant, which would accommodate the estimated increase in volume for Alternatives 1 and 3. However, the development proposed under Alternative 2 may still exceed capacity, even with the proposed expansion.

ES.6.3 Water Resources

Surface Water. The proposed development under Alternatives 1, 2, and 3 has the potential to impact surface waters present at the former NAS JRB Willow Grove property, specifically streams. For the purposes of this EIS, it was assumed that all streams in proposed development (i.e., non-Open Space) areas would be impacted. Since the final site design for the development has not been completed, the locations of these streams could be considered and avoided, where practicable. This, along with the developer complying with federal, state, and local requirements, would mitigate potential impacts.

Water Quality. The proposed development under Alternatives 1, 2, and 3 has the potential to impact water quality due to the increase in impervious surfaces at the former installation property. However, the developer's implementation of best management practices during construction activities, compliance with federal, state, and local permit requirements, and incorporation of improvements in the stormwater collection system would mitigate these potential impacts.

Wetlands. The proposed development under Alternatives 1, 2, and 3 has the potential to impact wetlands present at the former NAS JRB Willow Grove property. For the purposes of this EIS, it was assumed that all wetlands in proposed development (i.e., non-Open Space) areas would be impacted. Since the final site design for the development has not been completed, the locations of these wetlands could be considered and avoided, where practicable. This, along with the developer complying with federal, state, and local requirements, would mitigate potential impacts.

ES.6.4 Biological Resources

Vegetation. Construction under Alternatives 1, 2, and 3 would have a significant impact on vegetation on the former installation property. Impacted areas would range from 47 acres (Alternative 3) to 68 acres (Alternative 1). It was assumed that following construction, the areas surrounding buildings would be landscaped by the developer and/or allowed to return to their natural state.

Table ES-1 Comparison of Environmental Consequences

Resource	Alternative 1 (HLRA Plan - Preferred Alternative)	Alternative 2 (HLRA Plan with Increased Residential Development)	Alternative 3 (Airfield Reuse)	No Action Alternative
Land Use				
On-site / Surrounding Land Use	**Changes in land use would occur:** • Redevelopment of 861-acre former installation property. • Rezoning would be required to allow the proposed mix of development. • No direct impact on surrounding land uses. ***Mitigation*:** None proposed.	**Changes in land use would occur:** • Redevelopment of 861-acre former installation property. • Rezoning would be required to allow the proposed mix of development. • No direct impact on surrounding land uses. ***Mitigation*:** None proposed.	**Changes in land use would occur:** • Redevelopment of 861-acre former installation property. • Rezoning would be required to allow the proposed mix of development. • Reestablish land use and development controls at ends of runways. • No direct impact on surrounding land uses. ***Mitigation*:** None proposed.	**No impact:** • No impact would occur because no reuse or redevelopment would occur. ***Mitigation*:** N/A
Consistency with Local Planning (full build-out)	**Primarily consistent with local planning, but mitigation would further reduce adverse impacts:** • Not consistent with Horsham Township Zoning Ordinance of 1995. • Not entirely consistent with the Horsham Township Comprehensive Plan Update 2011 (due to Tournament Drive). • Consistent with DVRPC's Connections Plan. • Consistent with the HLRA's Redevelopment Plan. ***Mitigation:*** Revise zoning to provide development criteria.	**Inconsistent with local planning, but mitigation would reduce impacts:** • Not consistent with Horsham Township Zoning Ordinance of 1995. • Consistent with the Horsham Township Comprehensive Plan Update 2011. • Consistent with DVRPC's Connections Plan. • Not consistent with the HLRA's Redevelopment Plan. ***Mitigation:*** Revise zoning to provide development criteria.	**Inconsistent with local planning, but mitigation would reduce impacts:** • Not consistent with Horsham Township Zoning Ordinance of 1995. • Not consistent with the Horsham Township Comprehensive Plan Update 2011. • Not consistent with DVRPC's Connections Plan. • Not consistent with the HLRA's Redevelopment Plan. ***Mitigation:*** Revise zoning to provide development criteria.	**Inconsistent with local planning with no feasible mitigation measures:** • Consistent with Horsham Township Zoning Ordinance of 1995. • Not consistent with the Horsham Township Comprehensive Plan Update 2011. • Not consistent with DVRPC's Connections Plan. • Not consistent with the HLRA's Redevelopment Plan. ***Mitigation:*** None proposed.

Table ES-1 Comparison of Environmental Consequences

Resource	Alternative 1 (HLRA Plan - Preferred Alternative)	Alternative 2 (HLRA Plan with Increased Residential Development)	Alternative 3 (Airfield Reuse)	No Action Alternative
Socioeconomics and Environmental Justice				
Economy, Employment, and Income	**Beneficial impact - increase in expenditures and job creation:** • $928 million in total construction expenditures. • 7,577 direct and 2,780 indirect/induced jobs created. • Positive short-term and long-term regional indirect and induced employment and income impacts. ***Mitigation*:** None proposed.	**Beneficial impact - increase in expenditures and job creation:** • $944.7 million in total construction expenditures. • 7,131 direct and 2,629 indirect/induced jobs created. • Positive short-term and long-term regional indirect and induced employment and income impacts. ***Mitigation*:** None proposed.	**Beneficial impact - increase in expenditures and job creation:** • $274.3 million in total construction expenditures. • 5,283 direct and 2,330 indirect/induced jobs created. • Positive short-term and long-term regional indirect and induced employment and income impacts. ***Mitigation*:** None proposed.	**No change from existing conditions:** • No construction spending. • No new jobs created. ***Mitigation*:** N/A
Population	**Increase in local population:** • Potential population increase of 3,555 people. ***Mitigation*:** None proposed.	**Increase in local population:** • Potential population increase of 4,653 people. ***Mitigation*:** None proposed.	**No substantial increase in local population:** • Potential population increase of 137 people. ***Mitigation*:** None proposed.	**No impact:** • No change in population. ***Mitigation*:** N/A
Housing	**Increase in number of housing units:** • Addition of 1,486 new housing units. ***Mitigation*:** None proposed.	**Increase in number of housing units:** • Addition of 1,999 new housing units. ***Mitigation*:** None proposed.	**Minor increase in housing:** • Addition of 70 new housing units. ***Mitigation*:** None proposed.	**No impact:** • No new housing. ***Mitigation*:** N/A
Taxes and Revenue	**Increase in local tax revenue:** • An annual addition of $15.6 million in tax revenues for Horsham Township. ***Mitigation*:** None proposed.	**Increase in local tax revenue:** • An annual addition of $16.9 million in tax revenues for Horsham Township. ***Mitigation*:** None proposed.	**Increase in local tax revenue:** • An annual addition of $4.2 million in tax revenues for Horsham Township and the potential for collecting airport fees. ***Mitigation*:** None proposed.	**No change from existing conditions:** • No additional taxes generated. ***Mitigation*:** N/A

Table ES-1 Comparison of Environmental Consequences

Resource	Alternative 1 (HLRA Plan - Preferred Alternative)	Alternative 2 (HLRA Plan with Increased Residential Development)	Alternative 3 (Airfield Reuse)	No Action Alternative
Environmental Justice	**No disproportionately high or adverse human health or environmental effect:** • Potential minority or low-income populations exist within the study area. However, they would not experience a disproportionately high or adverse human health or environmental effect as the impacts would be experienced by the entire community (e.g., traffic). In addition, economic impacts would be considered beneficial. ***Mitigation*:** None proposed.	**No disproportionately high or adverse human health or environmental effect:** • Potential minority or low-income populations exist within the study area. However, they would not experience a disproportionately high or adverse human health or environmental effect as the impacts would be experienced by the entire community (e.g., traffic). In addition, economic impacts would be considered beneficial. ***Mitigation*:** None proposed.	**No disproportionately high or adverse human health or environmental effect:** • Potential minority or low-income populations exist within the study area. However, they would not experience a disproportionately high or adverse human health or environmental effect as the impacts would be experienced by the entire community (e.g., traffic). In addition, economic impacts would be considered beneficial. ***Mitigation*:** None proposed.	**No disproportionately high or adverse human health or environmental effect:** • No change. ***Mitigation*:** N/A
Community Facilities and Services				
Schools	**Additional student enrollment would not exceed capacity:** • The anticipated increase in school enrollment of 571 would not be expected to exceed capacity. The loss of Federal Impact Aid would be replaced by additional school tax revenue from redevelopment. ***Mitigation*:** None proposed.	**Additional student enrollment would not exceed capacity:** • The anticipated increase in school enrollment of 807 would not be expected to exceed capacity for the elementary and high school. It is assumed that construction of the proposed new middle school would accommodate the slight increase in enrollment at the middle school. The loss of Federal Impact Aid would be replaced by additional school tax revenue from redevelopment. ***Mitigation*:** None proposed.	**Additional student enrollment would not exceed capacity:** • The anticipated increase in school enrollment of 53 would not be expected to exceed capacity. The loss of Federal Impact Aid would be replaced by additional school tax revenue from redevelopment. ***Mitigation*:** None proposed.	**No additional student enrollment:** • The loss of Federal Impact Aid would not be replaced through additional school tax revenue from redevelopment. ***Mitigation*:** None proposed.
Police, Fire, Health Services	**Minor change in public safety and health services:** • The need for services would increase. The associated municipal cost would be offset by additional tax revenue from redevelopment. ***Mitigation*:** None proposed.	**Minor change in public safety and health services:** • The need for services would increase. The associated municipal cost would be offset by additional tax revenue from redevelopment. ***Mitigation*:** None proposed.	**Minor change in public safety and health services:** • The need for services would increase. The associated municipal cost would be offset by additional tax revenue from redevelopment. ***Mitigation*:** None proposed.	**No impact:** • No change. ***Mitigation*:** N/A

Table ES-1 Comparison of Environmental Consequences

Resource	Alternative 1 (HLRA Plan - Preferred Alternative)	Alternative 2 (HLRA Plan with Increased Residential Development)	Alternative 3 (Airfield Reuse)	No Action Alternative
Recreation	**Beneficial impact on recreational space:** • A beneficial impact would result as additional recreational space and facilities would be added as part of the redevelopment. ***Mitigation*:** None proposed.	**Beneficial impact on recreational space:** • A beneficial impact would result as additional recreational space and facilities would be added as part of the redevelopment. ***Mitigation*:** None proposed.	**Beneficial impact on recreational space:** • A beneficial impact would result as additional recreational space and facilities would be added as part of the redevelopment. ***Mitigation*:** None proposed.	**No change to existing conditions:** • No change. ***Mitigation*:** N/A
Transportation				
Traffic	**Significant and unavoidable increase in traffic even with implementation of proposed mitigation measures:** • 36,250 new external daily weekday trips generated. • 2,820 new external a.m. peak-hour trips • 3,719 new external p.m. peak-hour trips. • All intersections would experience an increase in delay of more than 10 seconds, and 12 of 14 existing intersections would experience a drop in LOS compared to existing conditions. • One new intersection proposed; would operate at acceptable levels. ***Mitigation*:** • 20-year development period with background growth in traffic unrelated to the action. • Adjust signal timing. • Add signalization to stop-sign controlled intersections. • Add through-lanes, multiple left-turn lanes, and channelized right-turn lanes, as appropriate (see Section 4.4).	**Significant and unavoidable increase in traffic even with implementation of proposed mitigation measures:** • 35,335 new external daily weekday trips generated. • 2,817 new external a.m. peak-hour trips • 3,592 new external p.m. peak-hour trips. • All intersections would experience an increase in delay of more than 10 seconds, and 12 of 14 existing intersections would experience a drop in LOS compared to existing conditions. • One new intersection proposed; would operate at acceptable levels. ***Mitigation*:** • 20-year development period with background growth in traffic unrelated to the action. • Adjust signal timing. • Add signalization to stop-sign controlled intersections. • Add through-lanes, multiple left-turn lanes, and channelized right-turn lanes, as appropriate (see Section 4.4).	**Significant and unavoidable increase in traffic even with implementation of proposed mitigation measures:** • 23,126 new external daily weekday trips generated. • 1,456 new external a.m. peak hour trips • 2,203 new external p.m. peak hour trips. • All intersections would experience an increase in delay of more than 10 seconds, and 11 of 14 existing intersections would experience a drop in LOS compared to existing conditions. ***Mitigation*:** • 20-year development period with background growth in traffic unrelated to the action. • Adjust signal timing. • Add signalization to stop-sign controlled intersections. • Add through-lanes, multiple left-turn lanes, and channelized right-turn lanes, as appropriate (see Section 4.4).	**Not a significant increase in traffic:** • Although 13 of 14 existing intersections would experience an increase in delay of more than 10 seconds and 11 of 14 existing intersections would experience a drop in LOS compared to existing conditions, this is related to the estimated background growth in traffic and is unrelated to the action. ***Mitigation:*** None proposed.

Table ES-1 Comparison of Environmental Consequences

Resource	Alternative 1 (HLRA Plan - Preferred Alternative)	Alternative 2 (HLRA Plan with Increased Residential Development)	Alternative 3 (Airfield Reuse)	No Action Alternative
Environmental Management				
Hazardous Waste and Materials	**No impact on the environment related to hazardous waste and materials:** • The quantity of hazardous materials and waste generated, stored, or disposed of would be less than 2010 conditions, the last year the base was fully operational. • Assumed beneficial impact due to removal of storage tanks during redevelopment. ***Mitigation*:** • Management in accordance with federal, state, and Town of Horsham requirements.	**No impact on the environment related to hazardous waste and materials:** • The quantity of hazardous materials and waste generated, stored, or disposed of would be less than 2010 conditions, the last year the base was fully operational. • Assumed beneficial impact due to removal of storage tanks during redevelopment. ***Mitigation*:** • Management in accordance with federal, state, and Town of Horsham requirements.	**No impact on the environment related to hazardous waste and materials:** • The quantity of hazardous materials and waste generated, stored, or disposed of would be expected to be greater than under Alternatives 1 or 2 due to aircraft/airfield operations. However, the quantity would still be less than 2010 conditions, the last year the base was fully operational. • Assumed beneficial impact due to removal of storage tanks during redevelopment. ***Mitigation:*** • Management in accordance with federal, state, and Town of Horsham requirements.	**No impact:** • No hazardous materials or waste would be generated, stored, or disposed of because no redevelopment activities would occur. ***Mitigation*:** N/A
Radioactive Materials Sites	**No impact on the environment related to radioactive materials sites:** • The presence of radioactive contamination has not been confirmed. • Potential for radioactive contamination described in the scoping survey would be managed by the Navy likely under the ER program, and redevelopment would be compatible with the Navy's commitment to clean up any contaminated sites. ***Mitigation*:** • Management in accordance with federal, state, and Town of Horsham requirements.	**No impact on the environment related to radioactive materials sites:** • The presence of radioactive contamination has not been confirmed. • Potential for radioactive contamination discussed in the scoping survey would be managed by the Navy likely under the ER program, and redevelopment would be compatible with the Navy's commitment to clean up any contaminated sites. ***Mitigation*:** • Management in accordance with federal, state, and Town of Horsham requirements.	**No impact on the environment related to radioactive materials sites:** • The presence of radioactive contamination has not been confirmed. • Radioactive contamination discussed in the scoping survey would be managed by the Navy likely under the ER program, and redevelopment would be compatible with the Navy's commitment to clean up any contaminated sites. ***Mitigation*:** • Management in accordance with federal, state, and Town of Horsham requirements.	**No impact:** • The presence of radioactive contamination has not been confirmed. • Radioactive contamination discussed in the scoping survey would be managed by the Navy likely under the ER program. • Despite the lack of redevelopment, the Navy would continue to clean up any contaminated sites. ***Mitigation*:** • Management in accordance with federal, state, and Town of Horsham requirements.

Table ES-1 Comparison of Environmental Consequences

Resource	Alternative 1 (HLRA Plan - Preferred Alternative)	Alternative 2 (HLRA Plan with Increased Residential Development)	Alternative 3 (Airfield Reuse)	No Action Alternative
Environmental Restoration Program	**No impact on the environment related to the environmental restoration program:** • Redevelopment would be compatible with the Navy's program and commitment to clean up hazardous waste sites. ***Mitigation:*** • Management in accordance with federal, state, and Town of Horsham requirements.	**No impact on the environment related to the environmental restoration program:** • Redevelopment would be compatible with the Navy's program and commitment to clean up hazardous waste sites. ***Mitigation*:** • Management in accordance with federal, state, and Town of Horsham requirements.	**No impact on the environment related to the environmental restoration program:** • Redevelopment would be compatible with the Navy's program and commitment to clean up hazardous waste sites. ***Mitigation:*** • Management in accordance with federal, state, and Town of Horsham requirements.	**No impact on the environment related to the environmental restoration program:** • Despite the lack of redevelopment, the Navy would continue clean up hazardous waste sites. ***Mitigation:*** • Management in accordance with federal, state, and Town of Horsham requirements.

Table ES-1 Comparison of Environmental Consequences

Resource	Alternative 1 (HLRA Plan - Preferred Alternative)	Alternative 2 (HLRA Plan with Increased Residential Development)	Alternative 3 (Airfield Reuse)	No Action Alternative
Air Quality				
Construction and Operational Emissions	**Moderate impacts, and mitigation would further reduce adverse impacts:** Construction Emissions: • The generation of construction emissions would not be permanent. • Emissions could occur intermittently during the 20-year development period. Operational Emissions: • Operational emissions result from building energy use of fuel oil, natural gas, and electricity primarily for heating and cooling. • Increased vehicle traffic would result in increased vehicle emissions. ***Mitigation:*** • Construction emissions could be mitigated through best management practices (BMPs) for equipment management and dust control. • Emissions related to building use could be mitigated through energy-efficient design. • Transportation emissions could be mitigated through Smart Growth principles and public transportation.	**Moderate impacts, and mitigation would further reduce adverse impacts:** Construction Emissions: • The generation of construction emissions would not be permanent. • Emissions could occur intermittently during the 20-year development period. Operational Emissions: • Similar to Alternative 1; operational emissions from building energy use of fuel oil, natural gas, and electricity primarily for heating and cooling. • Increased vehicle traffic would result in increased vehicle emissions. ***Mitigation:*** • Construction emissions could be mitigated through BMPs for equipment management and dust control. • Emissions related to building use could be mitigated through energy-efficient design. • Transportation emissions could be mitigated through Smart Growth principles and public transportation.	**Moderate impacts, and mitigation would further reduce adverse impacts:** Construction Emissions: • The generation of construction emissions would not be permanent. • Emissions could occur intermittently during the 20-year development period. Operational Emissions: • Slightly less than under Alternatives 1 and 2; operational emissions from building energy use of fuel oil, natural gas, and electricity primarily for heating and cooling. • Increased vehicle traffic and aircraft operations associated with airfield reuse would result in increased mobile emissions. ***Mitigation:*** • Construction emissions could be mitigated through BMPs for equipment management and dust control. • Emissions related to building use could be mitigated through energy-efficient design. • Transportation emissions could be mitigated through Smart Growth principles and public transportation.	**No impact:** • No impact because no reuse or redevelopment would occur. ***Mitigation***: N/A

Table ES-1 Comparison of Environmental Consequences

Resource	Alternative 1 (HLRA Plan - Preferred Alternative)	Alternative 2 (HLRA Plan with Increased Residential Development)	Alternative 3 (Airfield Reuse)	No Action Alternative
Greenhouse Gas (GHG) Emissions	**Minor impacts, and mitigation would further reduce adverse impacts:** • The change in GHG emissions would be less than the standard of 25,000 metric tons recommended by the CEQ to warrant further analysis. ***Mitigation*:** • Energy efficiency, renewable energy, and Smart Growth principles would reduce GHG emissions.	**Minor impacts, and mitigation would further reduce adverse impacts:** • The change in GHG emissions would be less than the standard of 25,000 metric tons recommended by the CEQ to warrant further analysis. ***Mitigation*:** • Energy efficiency, renewable energy, and Smart Growth principles would reduce GHG emissions.	**Minor impacts, and mitigation would further reduce adverse impacts:** • The change in GHG emissions would be less than the standard of 25,000 metric tons recommended by the CEQ to warrant further analysis. ***Mitigation*:** • Energy efficiency, renewable energy, and Smart Growth principles would reduce GHG emissions.	**No impact.** • Emissions would not change because no reuse or redevelopment would occur. ***Mitigation*:** N/A
Noise				
Construction Noise	**Minor impacts, and mitigation would further reduce adverse impacts:** • Short-term noise impacts during construction. ***Mitigation:*** • If noise exceeds the maximum permitted sound pressure level (SPL), developers may need to implement noise-suppression measures to achieve the permitted SPL. • Conduct construction between the hours of 7:00 a.m. and 8:00 p.m., when the noise would be less disturbing for area residents.	**Minor impacts, and mitigation would further reduce adverse impacts:** • Short-term noise impacts during construction. ***Mitigation*:** • If noise exceeds the maximum permitted SPL, developers may need to implement noise-suppression measures to achieve the permitted SPL. • Conduct construction between the hours of 7:00 a.m. and 8:00 p.m., when the noise would be less disturbing for area residents.	**Minor impacts, and mitigation would further reduce adverse impacts:** • Short-term noise impacts during construction. ***Mitigation*:** • If noise exceeds the maximum permitted SPL, developers may need to implement noise-suppression measures to achieve the permitted SPL. • Conduct construction between the hours of 7:00 a.m. and 8:00 p.m., when the noise would be less disturbing for area residents.	**No impact.** • No impact because no reuse or redevelopment would occur. ***Mitigation:*** N/A
Operational Traffic Noise	**Minor impact on traffic noise:** • The largest estimated increase in traffic noise would be 5.4 dBA. • The noise increase would exceed the FHWA's noise abatement threshold, but not substantially exceed the threshold (i.e., by more than 15 dBA). ***Mitigation:*** None proposed.	**Minor impact on traffic noise:** • The largest increase in traffic noise would be 5.4 dBA. • The noise increase would exceed the FHWA's noise abatement threshold, but not substantially exceed the threshold (i.e., by more than 15 dBA). ***Mitigation:*** None proposed.	**Minor impact on traffic noise:** • The largest increase in traffic noise would be 4.9 dBA. • The increase noise would exceed the FHWA's noise abatement threshold, but not substantially exceed the threshold (i.e., by more than 15 dBA). ***Mitigation:*** None proposed.	**No impact.** • Although there would be a minor increase in traffic noise over existing conditions because of projected background traffic growth, this would be unrelated to the action. ***Mitigation*:** None proposed.

Table ES-1 Comparison of Environmental Consequences

Resource	Alternative 1 (HLRA Plan - Preferred Alternative)	Alternative 2 (HLRA Plan with Increased Residential Development)	Alternative 3 (Airfield Reuse)	No Action Alternative
Operational Aircraft Noise	**No impact:** • No proposed aircraft operations. ***Mitigation*:** N/A	**No impact:** • No proposed aircraft operations. ***Mitigation*:** N/A	**Minor impact:** • Noise from aircraft operations would be present; however, total acreage within the 65 dB DNL noise zone would decrease from 2010 conditions. ***Mitigation:*** None proposed.	**No impact.** • The airfield would not be reused and no proposed aircraft operations would occur. ***Mitigation*:** N/A
Infrastructure and Utilities				
Water Demand	**A significant increase in water demand would occur, but mitigation measures would reduce impacts to not significant:** • Demand of 668,649 gallons per day (gpd) would exceed the current capacity of the Horsham Water and Sewer Authority (HWSA). • The existing water distribution system would need to be expanded to accommodate redevelopment. ***Mitigation*:** • The developer may be required to estimate the potential impacts on the water system and identify a source of drinking water to accommodate the proposed development. • Water demand may be further reduced through the incorporation of the latest green and sustainable design principles.	**A significant increase in water demand would occur, but mitigation measures would reduce impacts to not significant:** • Demand of 765,298 gpd would exceed the current capacity of the HWSA. • The existing water distribution system would need to be expanded to accommodate redevelopment. ***Mitigation*:** • The developer may be required to estimate the potential impacts on the water system and identify a source of drinking water to accommodate the proposed development. • Water demand may be further reduced through the incorporation of the latest green and sustainable design principles.	**An increase in water demand would occur, but mitigation measures would reduce impacts:** • Demand of 201,937 gpd would exceed the current capacity of the HWSA. • The existing water distribution system would need to be expanded to accommodate redevelopment. ***Mitigation*:** • The developer may be required to estimate the potential impacts on the water system and identify a source of drinking water to accommodate the proposed development. • Water demand may be further reduced through the incorporation of the latest green and sustainable design principles.	**No impact.** • No impact on infrastructure and utilities would occur because reuse or redevelopment would not occur. ***Mitigation*:** N/A

Table ES-1 Comparison of Environmental Consequences

Resource	Alternative 1 (HLRA Plan - Preferred Alternative)	Alternative 2 (HLRA Plan with Increased Residential Development)	Alternative 3 (Airfield Reuse)	No Action Alternative
Wastewater	**A significant increase in wastewater generated would occur, but mitigation would reduce impacts to not significant:** • Demand of 586,457 gpd of generated wastewater would exceed the current capacity of the HWSA. • The existing wastewater collection system would need to be expanded to accommodate redevelopment. ***Mitigation*:** • Planned future expansion would be expected to accommodate the increased demand associated with redevelopment.	**A significant increase in wastewater generated would occur, but mitigation would reduce impacts to not significant:** • Demand of 663,970 gpd of generated wastewater would exceed the current capacity of the HWSA. • The existing wastewater collection system would need to be expanded to accommodate redevelopment. ***Mitigation*:** • Planned future expansion would be expected to accommodate the majority of the proposed redevelopment, but may not be adequate to accommodate the redevelopment in its entirety.	**An increase in wastewater generated would occur, but mitigation would reduce impacts:** • Demand of 191,588 gpd of generated wastewater would exceed the current capacity of the HWSA. • The existing wastewater collection system would need to be expanded to accommodate redevelopment. ***Mitigation*:** • Planned future expansion would be expected to accommodate the increased demand associated with redevelopment.	**No impact.**
Stormwater	**Increase in amount of impervious surface would occur, but mitigation would reduce impacts:** • Impervious surface area would increase by an estimated 103 acres (a 12 percent increase from baseline). • The existing stormwater collection system would require modification and expansion to accommodate redevelopment. ***Mitigation*:** • The developer would be required to draft a stormwater management plan and adhere to the Horsham Township's requirement for using a watershed approach.	**Increase in amount of impervious surface would occur, but mitigation would reduce impacts:** • Impervious surface area would increase by an estimated 102 acres (a 12 percent increase from baseline). • The existing stormwater collection system would require modification and expansion to accommodate redevelopment. ***Mitigation*:** • The developer would be required to draft a stormwater management plan and adhere to the Horsham Township's requirement for using a watershed approach.	**Increase in amount of impervious surface would occur, but mitigation would reduce impacts:** • Impervious surface area would increase by 52 acres (a 6 percent increase from baseline). • The existing stormwater collection system would require modification and expansion to accommodate redevelopment. ***Mitigation*:** • The developer would be required to draft a stormwater management plan and adhere to the Horsham Township's requirement for using a watershed approach.	**No impact.**

Table ES-1 Comparison of Environmental Consequences

Resource	Alternative 1 (HLRA Plan - Preferred Alternative)	Alternative 2 (HLRA Plan with Increased Residential Development)	Alternative 3 (Airfield Reuse)	No Action Alternative
Other Utility Systems	**Minor impact on other utility systems would occur:** Electric: • Annual demand of 48,515,031 kilowatt hours (kWh) would be provided by the Pennsylvania Electric Company (PECO). • No anticipated capacity constraints for the foreseeable future. • New electric connections/ infrastructure would be required. Natural Gas: • Annual demand of 179,935,948 cubic feet (cf) of natural gas. • No anticipated capacity constraints due to planned improvements to natural gas infrastructure within PECO Energy's service territory. • New gas connections/infrastructure would be required. ***Mitigation*:** None proposed.	**Minor impact on other utility systems would occur:** Electric: • Annual demand of 47,897,027 kWh would be provided by PECO. • No anticipated capacity constraints for the foreseeable future. • New electric connections/ infrastructure would be required. Natural Gas: • Annual demand of 196,425,488 cf of natural gas. • No anticipated capacity constraints due to planned improvements to natural gas infrastructure within PECO Energy's service territory. • New gas connections/infrastructure would be required. ***Mitigation*:** None proposed.	**Minor impact on other utility systems would occur:** Electric: • Annual demand of 23,306,943 kWh would be provided by PECO. • No anticipated capacity constraints for the foreseeable future. • New electric connections/ infrastructure would be required. Natural Gas: • Annual demand of 55,923,668 cf of natural gas. • No anticipated capacity constraints due to planned improvements to natural gas infrastructure within PECO Energy's service territory. • New gas connections/infrastructure would be required. ***Mitigation*:** None proposed.	**No impact.**

Table ES-1 Comparison of Environmental Consequences

Resource	Alternative 1 (HLRA Plan - Preferred Alternative)	Alternative 2 (HLRA Plan with Increased Residential Development)	Alternative 3 (Airfield Reuse)	No Action Alternative
Cultural Resources				
Archaeological	**Significant, negative, indirect impacts** on two National Register of Historic Places (NRHP)-eligible archaeological sites would potentially occur. These impacts would be mitigated to a finding of no adverse effect as discussed below for NRHP-eligible historic properties. ***Mitigation*:** • See NRHP-Listed or -Eligible Historic Properties for mitigation.	**Significant, negative, indirect impacts** on two NRHP-eligible archaeological sites would potentially occur. These impacts would be mitigated to a finding of no adverse effect as discussed below for NRHP-eligible historic properties. ***Mitigation*:** • See NRHP-Listed or -Eligible Historic Properties for mitigation.	**Significant, negative, indirect impacts** on two NRHP-eligible archaeological sites would potentially occur. These impacts would be mitigated to a finding of no adverse effect as discussed below for NRHP-eligible historic properties. ***Mitigation*:** • See NRHP-listed or -Eligible Historic Properties for mitigation.	**No impact:** • No impact on cultural resources or historic properties because no reuse or redevelopment would occur.
Architectural	**No significant direct or indirect impacts** on architectural resources would occur as none are NRHP-listed or eligible for listing. ***Mitigation*:** N/A	**No significant direct or indirect impacts** on architectural resources would occur as none are NRHP-listed or eligible for listing. ***Mitigation*:** N/A	**No significant direct or indirect impacts** on architectural resources would occur as none are NRHP-listed or eligible for listing. ***Mitigation*:** N/A	
NRHP-Listed or -Eligible Historic Properties	**No adverse effect with mitigation:** The Navy is proposing a finding of no adverse effect with mitigation (deed restrictions and covenants imposed on the property recipient). Consultation on the proposed finding of effect is ongoing. ***Mitigation*:** • The transferred property would have deed restrictions and covenants placed upon it where the future developer would be required to obtain written permission of the Pennsylvania SHPO prior to any ground disturbance at these two sites.	**No adverse effect with mitigation:** The Navy is proposing a finding of no adverse effect with mitigation (deed restrictions and covenants imposed on the property recipient). Consultation on the proposed finding of effect is ongoing. ***Mitigation*:** • The transferred property would have deed restrictions and covenants placed upon it where the future developer would be required to obtain written permission of the Pennsylvania SHPO prior to any ground disturbance at these two sites.	**No adverse effect with mitigation:** The Navy is proposing a finding of no adverse effect with mitigation (deed restrictions and covenants imposed on the property recipient). Consultation on the proposed finding of effect is ongoing. ***Mitigation*:** • The transferred property would have deed restrictions and covenants placed upon it where the future developer would be required to obtain written permission of the Pennsylvania SHPO prior to any ground disturbance at these two sites.	
Native American Resources	Consultation to determine potential impacts on Native American resources is ongoing. ***Mitigation*:** N/A	Consultation to determine potential impacts on Native American resources is ongoing. ***Mitigation*:** N/A	Consultation to determine potential impacts on Native American resources is ongoing. ***Mitigation*:** N/A	

Table ES-1 Comparison of Environmental Consequences

Resource	Alternative 1 (HLRA Plan - Preferred Alternative)	Alternative 2 (HLRA Plan with Increased Residential Development)	Alternative 3 (Airfield Reuse)	No Action Alternative
Topography, Geology, and Soils				
Topography	**Minor impact on topography would occur:** • Development would largely occur in areas that have been previously developed by the Navy. • Some alteration of the existing topography would be expected as a result of grading and associated cut-and-fill activities necessary to accommodate the new buildings. ***Mitigation*:** None proposed.	**Minor impact on topography would occur:** • Development would largely occur in areas that have been previously developed by the Navy. • Some alteration of the existing topography would be expected as a result of grading and associated cut-and-fill activities necessary to accommodate the new buildings. ***Mitigation*:** None proposed.	**Minor impact on topography would occur:** • Development would largely occur in areas that have been previously developed by the Navy. • Some alteration of the existing topography would be expected as a result of grading and associated cut-and-fill activities necessary to accommodate the new buildings. ***Mitigation*:** None proposed.	**No impact:** • No impact on topography, geology, and soils would occur, because no reuse or redevelopment would occur.
Geology	**No impact.** ***Mitigation*:** N/A	**No impact.** ***Mitigation*:** N/A	**No impact.** ***Mitigation*:** N/A	
Soils	**Minor impact on soils would occur, and mitigation would further reduce impacts:** • Development would largely occur in areas where soils have been previously disturbed by the Navy. • New construction could impact soils that have moderate erosion potential, are very dense, and have moderate frost action. ***Mitigation*:** • Implementation of appropriate erosion and sediment control measures in accordance with local and state laws and permits.	**Minor impact on soils would occur, and mitigation would further reduce impacts:** • Development would largely occur in areas where soils have been previously disturbed by the Navy. • New construction could impact soils that have moderate erosion potential, are very dense, and have moderate frost action. ***Mitigation*:** • Implementation of appropriate erosion and sediment control measures in accordance with local and state laws and permits.	**Minor impact on soils would occur, and mitigation would further reduce impacts:** • Development would largely occur in areas where soils have been previously disturbed by the Navy. • New construction could impact soils that have moderate erosion potential, are very dense, and have moderate frost action. ***Mitigation*:** • Implementation of appropriate erosion and sediment control measures in accordance with local and state laws and permits.	

Table ES-1 Comparison of Environmental Consequences

Resource	Alternative 1 (HLRA Plan - Preferred Alternative)	Alternative 2 (HLRA Plan with Increased Residential Development)	Alternative 3 (Airfield Reuse)	No Action Alternative
Water Resources				
Surface Water	**Potentially significant impacts on surface water would potentially occur, but mitigation would reduce impacts:** • Potential direct impact on 1,909 linear feet of stream. ***Mitigation*:** • The developer will consider the locations of surface waters in their final design. • The developer will comply with the requirements of Chapter 230-49(E) of the Horsham Township Code, which relate to waterbodies at the former installation. • Mitigation requirements for direct stream impacts will be determined through coordination with USACE and PADEP, and a site-specific management plan will be developed (to be completed following the final design phase and as part of the Section 401/404 permit process).	**Potentially significant impacts on surface water would potentially occur, but mitigation would reduce impacts:** • Potential direct impact on 1,687 linear feet of stream. ***Mitigation*:** • The developer will consider the locations of surface waters in their final design. • The developer will comply with the requirements of Chapter 230-49(E) of the Horsham Township Code, which relate to waterbodies at the former installation. • Mitigation requirements for direct stream impacts will be determined through coordination with USACE and PADEP, and a site-specific management plan will be developed (to be completed following the final design phase and as part of the Section 401/404 permit process).	**Potentially significant impacts on surface water would potentially occur, but mitigation would reduce impacts:** • Potential direct impact on 1,932 linear feet of stream. ***Mitigation*:** • The developer will consider the locations of surface waters in their final design. • The developer will comply with the requirements of Chapter 230-49(E) of the Horsham Township Code, which relate to waterbodies at the former installation. • Mitigation requirements for direct stream impacts will be determined through coordination with USACE and PADEP, and a site-specific management plan will be developed (to be completed following the final design phase and as part of the Section 401/404 permit process).	**No impact:** • No impact on water resources would occur, because no reuse or redevelopment would occur.

Table ES-1 Comparison of Environmental Consequences

Resource	Alternative 1 (HLRA Plan - Preferred Alternative)	Alternative 2 (HLRA Plan with Increased Residential Development)	Alternative 3 (Airfield Reuse)	No Action Alternative
Water Quality	**Potentially significant impacts on water quality would occur, but mitigation would reduce impacts:** • Impervious surface area would increase to 352 acres (an increase of 103 acres above existing conditions). • Full build-out would impact water quality, but the impact would be partially offset by the use of BMPs during construction and improvements to the stormwater collection system, as noted in mitigation. ***Mitigation*:** • The developer would be required to draft a stormwater management plan and adhere to Horsham Township's requirement for using a watershed approach. • Compliance with local and state permit requirements (permit from Town of Horsham and NPDES Construction Permit from state), as well as local stormwater and construction runoff ordinances. • Implementation of BMPs, as outlined in Section 6.2.	**Potentially significant impacts on water quality would occur, but mitigation would reduce the impacts:** • Impervious surface area would increase to 351 acres (an increase of 102 acres above existing conditions). • Full build-out would impact water quality, but the impact would be partially offset by the use of BMPs during construction and improvements to the stormwater collection system, noted in mitigation. ***Mitigation*:** • The developer would be required to draft a stormwater management plan and adhere to Horsham Township's requirement for using a watershed approach. • Compliance with local and state permit requirements (permit from Town of Horsham and NPDES Construction Permit from state), as well as local stormwater and construction runoff ordinances. • Implementation of BMPs, as outlined in Section 6.2.	**Potentially significant impacts on water quality would occur, but mitigation would reduce the impacts:** • Impervious surface area would increase to 301 acres (an increase of 52 acres above existing conditions). • Full build-out would impact water quality, but the impact would be partially offset by the use of BMPs during construction and improvements to the stormwater collection system, as noted in mitigation. ***Mitigation*:** • The developer would be required to draft a stormwater management plan and adhere to Horsham Township's requirement for using a watershed approach. • Compliance with local and state permit requirements (permit from Town of Horsham and NPDES Construction Permit from state), as well as local stormwater and construction runoff ordinances. • Implementation of BMPs, as outlined in Section 6.2.	

Table ES-1 Comparison of Environmental Consequences

Resource	Alternative 1 (HLRA Plan - Preferred Alternative)	Alternative 2 (HLRA Plan with Increased Residential Development)	Alternative 3 (Airfield Reuse)	No Action Alternative
Groundwater	**Minor impacts on groundwater would occur, and mitigation would further reduce adverse impacts:** • Temporary construction could extend below ground surface to a depth that would directly impact the underlying water table. • Potential spills of fuels or other chemicals and hazardous materials could occur during construction. ***Mitigation*:** • Use of standard dewatering techniques. • Compliance with stormwater permits, management plans, and erosion and sediment control plans. • Implementation of BMPs, as outlined in Section 6.2.	**Minor impacts on groundwater would occur, and mitigation would further reduce adverse impacts:** • Temporary construction could extend below ground surface to a depth that would directly impact the underlying water table. • Potential spills of fuels or other chemicals and hazardous materials could occur during construction. ***Mitigation*:** • Use of standard dewatering techniques. • Compliance with stormwater permits, management plans, and erosion and sediment control plans. • Implementation of BMPs, as outlined in Section 6.2.	**Minor impacts on groundwater would occur, and mitigation would further reduce adverse impacts:** • Temporary construction could extend below ground surface to a depth that would directly impact the underlying water table. • Potential spills of fuels or other chemicals and hazardous materials could occur during construction or during aircraft maintenance or operation. ***Mitigation*:** • Use of standard dewatering techniques. • Compliance with stormwater permits, management plans, and erosion and sediment control plans. • Implementation of BMPs, as outlined in Section 6.2.	
Floodplains	**No impact on floodplains would occur**: • No structures proposed in areas where floodplains would occur. ***Mitigation*:** N/A	**No impact on floodplains would occur**: • No structures proposed in areas where floodplains would occur. ***Mitigation*:** N/A	**No impact on floodplains would occur**: • No structures proposed in areas where floodplains would occur. ***Mitigation*:** N/A	

Table ES-1 Comparison of Environmental Consequences

Resource	Alternative 1 (HLRA Plan - Preferred Alternative)	Alternative 2 (HLRA Plan with Increased Residential Development)	Alternative 3 (Airfield Reuse)	No Action Alternative
Wetlands	**Potentially significant impacts on wetlands could occur, but mitigation would reduce impacts:** • Potential direct impact on 13 wetlands, encompassing 7.0 acres of wetlands. ***Mitigation*:** • The developer will consider the locations of surface waters in their final design. • If design cannot avoid impacts, mitigation requirements will be determined through coordination with USACE and PADEP, and a site-specific management plan will be developed (to be completed following the final design phase and as part of the Section 401/404 permit process).	**Potentially significant impact on wetlands could occur, but mitigation would reduce impacts:** • Potential direct impact on 12 wetlands encompassing 7.5 acres of wetlands. ***Mitigation:*** • The developer will consider the locations of surface waters in their final design. • If design cannot avoid impacts, mitigation requirements will be determined through coordination with USACE and PADEP, and a site-specific management plan will be developed (to be completed following the final design phase and as part of the Section 401/404 permit process).	**Potentially significant impact on wetlands could occur, but mitigation would reduce impacts:** • Potential direct impact on 10 wetlands encompassing 5.0 acres of wetlands. ***Mitigation:*** • The developer will consider the locations of surface waters in their final design. • If design cannot avoid impacts, mitigation requirements will be determined through coordination with USACE and PADEP, and a site-specific management plan will be developed (to be completed following the final design phase and as part of the Section 401/404 permit process).	
Biological Resources				
Vegetation	**Significant and unavoidable impacts on vegetation would occur with no feasible mitigation measures**: • Proposed construction could result in the long-term loss or alteration of approximately 68 acres of currently undeveloped land. ***Mitigation*:** None proposed.	**Significant and unavoidable impacts on vegetation would occur with no feasible mitigation measures**: • Proposed construction could result in the long-term loss or alteration of approximately 56 acres of currently undeveloped land. ***Mitigation*:** None proposed.	**Significant and unavoidable impacts on vegetation would occur with no feasible mitigation measures**: • Proposed construction could result in the long-term loss or alteration of approximately 47 acres of currently undeveloped land. ***Mitigation*:** None proposed.	**No impact on biological resources:** • No protected species or habitat is present, and no reuse or redevelopment would occur.

Table ES-1 Comparison of Environmental Consequences

Resource	Alternative 1 (HLRA Plan - Preferred Alternative)	Alternative 2 (HLRA Plan with Increased Residential Development)	Alternative 3 (Airfield Reuse)	No Action Alternative
Wildlife	**Minor impact on wildlife would occur**: • Wildlife species such as small mammals may be temporarily displaced in peripheral areas during construction when noise and human activity levels increase. **Mitigation:** None proposed.	**Minor impact on wildlife would occur**: • Wildlife species such as small mammals may be temporarily displaced in peripheral areas during construction when noise and human activity levels increase. **Mitigation:** None proposed.	**Minor impact on wildlife would occur**: • Wildlife species such as small mammals may be temporarily displaced in peripheral areas during construction when noise and human activity levels increase. • Given past aircraft operations at NAS JRB Willow Grove and the ability of wildlife to acclimate or habituate to noise exposure, noise generated from aircraft operations would not be expected to impact wildlife. **Mitigation:** None proposed.	***Mitigation*:** N/A
Threatened and Endangered Species	**No effect:** • No threatened or endangered species are known to occur on the property, and no designated critical habitat occurs on the property. ***Mitigation*:** N/A	**No effect:** • No threatened or endangered species are known to occur on the property, and no designated critical habitat occurs on the property. ***Mitigation*:** N/A	**No effect:** • No threatened or endangered species are known to occur on the property, and no designated critical habitat occurs on the property. ***Mitigation*:** N/A	

ES.7 Summary of Potential Cumulative Impacts

ES.7.1 Alternative 1 (HLRA Plan - Preferred Alternative)

Land Use. There would be potential cumulative impacts on land uses in the study area due to an increase the overall building density of the townships within the study area. Local planning processes are in place to ensure that changes in land use associated with the proposed development and redevelopment projects would be consistent with local land use controls and compatible with existing surrounding land use or planned land uses.

Socioeconomics. There would be the potential for positive cumulative impacts on the local economy and employment in the study area. There would be a potential moderate cumulative impact on the local housing market associated with an increase in the number of housing units and potential effects on prices and availability. There would be a potential cumulative impact on the size of the local population and an increase in commercial and retail space.

Community Facilities. There would be potential cumulative impacts from an increase in the number of school-aged children, increase in demand for police and fire protection, increase in demand for health care and medical services, and increase in demand for recreational facilities.

Transportation. Projected traffic volumes and the level of service of surrounding roadways would be affected primarily by the increase in traffic associated with overall projected growth in the region. Cumulative traffic impacts, however, could occur at a variety of intersections surrounding the former NAS JRB Willow Grove property.

Air Quality. There could be potential cumulative impacts associated with an increase in construction, building use, mobile source, and greenhouse gas emissions.

Infrastructure and Utilities. There would be a potential for cumulative impacts on water demand. Upgrades to the Park Creek sewage treatment plant would result in a beneficial cumulative impact on wastewater treatment. Horsham Township would require the future property developer to comply with Pennsylvania Department of Environmental Protection (PADEP) stormwater management policies and incorporate stormwater management into the redevelopment design. There would be a cumulative impact on the demand for electricity, resulting in an increase.

Water Resources. Cumulative impacts on surface waterbodies and wetlands could occur as a result of ground disturbance associated with clearing and grading and the addition of impervious surfaces.

ES.7.2 Alternative 2 (HLRA Plan with Increased Residential Development)

Potential cumulative impacts under Alternative 2 would be similar to those described under Alternative 1, as the mix of land uses for redevelopment are similar.

ES.7.3 Alternative 3 (Airfield Reuse)

Potential cumulative impacts under Alternative 3 would be similar to those described under Alternative 1 for the following resource areas: land use, socioeconomics, community facilities, infrastructure and utilities and water resources. Cumulative impacts to transportation and air quality under Alternative 3 would differ from Alternative 1 and are described below**.**

Transportation. Projected traffic volumes and the level of service of surrounding roadways would be affected primarily by the increase in traffic associated with overall projected growth in the region.

Cumulative traffic impacts, however, could occur at a variety of intersections surrounding the former NAS JRB Willow Grove property, although less traffic volume is expected to be generated under Alternative 3.

Air Quality. There could be potential cumulative impacts associated with an increase in construction emissions, building use emissions, aircraft operations, and greenhouse gas emissions. Mobile source emissions due to the change in aircraft from a military airfield to general aviation airfield would result in reductions of emission from the 2010 baseline conditions of all criteria pollutants except carbon monoxide, and the increased carbon monoxide emissions would be spread over the airfield property and would likely not contribute to cumulative impacts.

ES.7.4 No Action Alternative

There would be no cumulative impact on land use, socioeconomics, community facilities, transportation, air quality, infrastructure and utilities, or water resources under the No Action Alternative since no redevelopment would occur.

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Acronyms and Abbreviations

ACHP	Advisory Council on Historic Preservation
ACM	asbestos-containing material
ACNOD	Airport Crash and Noise Overlay District
AFF	aqueous film-forming foam
AFRC	Armed Forces Reserve Center
AHERA	Asbestos Hazard Emergency Response Act
AICUZ	Air Installations Compatible Use Zones
AIMD	Aircraft Intermediate Maintenance Department
ALP	Airport Layout Plan
amsl	above mean sea level
ANG	Air National Guard
APE	area of potential effect
APZ	accident potential zone
AQI	Air Quality Index
AST	aboveground storage tank
ATR	automatic traffic recorder
BASH	bird/animal aircraft strike hazard
BCHG	Bucks County Housing Group
bgs	below ground surface
BMP	best management practices
BRAC Law	Defense Base Closure and Realignment Act
BRAC	Base Realignment and Closure
CAA	Clean Air Act
CAFE	Corporate Average Fuel Economy Standards
CBC	Christmas Bird Count
ccf	hundred cubic feet
CCRC	Continuing Care Retirement Community
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cf	cubic feet
CFR	Code of Federal Regulations
CMP	corrugated metal pipe
CNO	Chief of Naval Operations

CO	carbon monoxide
COC	contaminant of concern
Connections	*Connections – The Regional Plan for a Sustainable Future*
CWA	Clean Water Act
CWS	community water system
dB	decibel
dBA	A-weighted decibel
DERP	Defense Environmental Restoration Program
DMM	discarded military munitions
DNL	day-night average sound level
DO	dissolved oxygen
DOD	U.S. Department of Defense
DON	U.S. Department of the Navy
DOPAA	Description of Proposed Action and Alternatives
DRBC	Delaware River Basin Commission
DVRPC	Delaware Valley Regional Planning Commission
EA	environmental Assessment
EDC	Economic Development Conveyance (EDC
EDMS	Emissions and Dispersion Modeling System
EIA	Energy Information Agency
EIS	Environmental Impact Statement
EISA	Energy Independence and Security Act
EO	Executive Order
EPA	(United States) Environmental Protection Agency
ER	environmental restoration
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FFA	Federal Facility Agreement
FHWA	Federal Highway Administration
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FONSI	Finding of No Significant Impact
FOSET	Finding of Suitability for Early Transfer
FOSL	Finding of Suitability to Lease
FOST	Finding of Suitability to Transfer

FUDS	formerly used defense sites
G-RAM	general radioactive material
GHG	greenhouse gas
GI	green infrastructure
gm/ft^2	grams per square foot
gpd	gallons per day
GWPA	groundwater protection area
HAPs	hazardous air pollutants
HSA	historical site assessment, or historic site area
HJII	Horsham Joint Interagency Installation
HLRA[1]	Horsham Township Authority, or Horsham Land Redevelopment Authority
HRA	historical radiological assessment
HUC	Hydrologic Unit Code
HUD	U.S. Department of Housing and Urban Development
HWSA	Horsham Water & Sewer Authority
IBA	Important Bird Area
IMRMP	Integrated Natural Resources Management Plan
INM	Integrated Noise Model
IPM	Integrated Pest Management
IR	installation restoration
IRP	Installation Restoration Program
JPA	Joint Permit Application
kg	kilograms
kWh	kilowatt-hour
LBA	Louis Berger & Associates, Inc.
LBP	lead-based paint
LEED	Leadership in Energy and Environmental Design
LID	low-impact development
L_{max}	maximum sound level
LNAPL	light non-aqueous phase liquid
LOS	level of service
LRA	Local Redevelopment Authority

[1] HLRA is used to describe two different organizations depending on the time period being discussed. Prior to 2012, the HLRA was the Horsham Township Authority and after 2012, it was the Horsham Land Redevelopment Authority.

LUC	land use controls
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MBTA	Migratory Bird Treaty Act
MC	munitions constituent
MEC	munitions and explosives of concern
MF	migratory fishery
$\mu g/ft^2$	micrograms per square foot
MMRP	Military Munitions Restoration Program
MSA	Metropolitan Statistical Area
MSAT	Mobile Source Air Toxics
n.d.	no date
NAAQS	National Ambient Air Quality Standards
NAC	noise abatement criteria
NAS JRB	Naval Air Station Joint Reserve Base
NAVFAC	Naval Facilities Engineering Command
NAVRAMP	Navy Radon Assessment and Mitigation Program
Navy	U.S. Department of the Navy
NBIG	Navy BRAC Implementation Guidance
NEPA	National Environmental Policy Act
NESHAPs	National Emissions Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
NLCD	National Land Cover Database
NMFS	National Marine Fisheries Service
NNPP	Naval Nuclear Propulsion Program
NO_2	nitrogen dioxide
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
O_3	ozone
OPNAVINST	Office of the Chief of Naval Operations Instruction
OW	Palustrine Open Water Wetlands
OWS	oil/water separator
PAA	Primary Aircraft Authorization

PACM	presumed asbestos-containing material
PADCNR	Pennsylvania Department of Conservation and Natural Resources
PADEP	Pennsylvania Department of Environmental Protection
PAH	polychlorinated aromatic hydrocarbon
Pb	lead
PBBA	Pennsylvania Breeding Birds Atlas
PBC	public benefit conveyance
PCBs	Polychlorinated biphenyls
PCE	tetrachloroethylene
pCi/L	picoCuries per liter
PECO	Philadelphia Electric Company
PEM	Palustrine Emergent Wetland
PennDOT	Pennsylvania Department of Transportation
PFBC	Pennsylvania Fish and Boat Commission
PFO	Palustrine Forested Wetlands
PGC	Pennsylvania Game Commission
PHMC	Pennsylvania Historical and Museum Commission
PM_{10}	particulate matter with an aerodynamic diameter of 10 microns or less
$PM_{2.5}$	particulate matter with an aerodynamic diameter of 2.5 microns or less
PMO	(BRAC) Program Management Office
PNDI	Pennsylvania Natural Diversity Inventory
POV	personally owned vehicle
ppb	parts per billion
PPC	Preparedness, Prevention and Contingency
ppm	parts per million
PSS	Palustrine Scrub-Shrub Wetlands
RA	Remedial Action
RCCD	Riparian Corridor Conservation District
RCP	reinforced concrete pipes
RCRA	Resource Conservation and Recovery Act
Redevelopment Plan	NAS JRB Willow Grove Redevelopment Plan
RI/FS	Remedial Investigation/Feasibility Study
RIMS	Regional Input-Output Modeling System
ROD	Record of Decision
RONA	Record of Non-Applicability

SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
SEPTA	Southeastern Pennsylvania Transportation Authority
SHPO	State Historic Preservation Office(r)
SIP	State Implementation Plan
SMP	Stormwater Management Plan
SO_2	sulfur dioxide
SPCC	Spill Prevention, Control, and Countermeasure
SPL	sound pressure level
SSURGO	Soil Survey Geographic Database
STP	sewage treatment plant
SUV	sport utility vehicle
SWPPP	stormwater pollution prevention plan
TCE	trichloroethylene
TCLP	toxicity characteristic leaching procedure
THPO	Tribal Historic Preservation Office(r)
TMDL	total maximum daily load
TNM	Traffic Noise Model
TSCA	Toxic Substances Control Act
TSF	trout-stocked fishery
U.S.C.	United States Code
UMHJSA	Upper Moreland Hatboro Joint Sewer Authority
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UST	underground storage tank
UU/UE	unrestricted use/unrestricted exposure
UXO	unexploded ordnance
VMT	vehicle miles travelled
VOC	volatile organic compound
WWF	warm-water fishery

1 Introduction

The U.S. Department of the Navy (Navy) has declared approximately 910 acres of property at Naval Air Station Joint Reserve Base (NAS JRB) Willow Grove, in Horsham, Pennsylvania, to be surplus to the needs of the federal government, in accordance with Public Law 101-510, the Defense Base Closure and Realignment Act of 1990, as amended in 2005 (BRAC Law).

This environmental impact statement (EIS) evaluates the potential human and natural environmental consequences of the disposal and redevelopment of the property and any impacts associated with the reasonably foreseeable reuse of the property in a manner consistent with the *NAS JRB Willow Grove Redevelopment Plan* (Redevelopment Plan) (RKG 2012) (Alternative 1), as well as Alternatives 2, 3, and a No Action Alternative. The decision to close NAS JRB Willow Grove is exempt from the National Environmental Policy Act (NEPA) of 1969 per the BRAC Law. However, disposal actions are considered "major federal actions" and are thus subject to compliance with NEPA. To comply with this requirement, the action proponent, the Naval Facilities Engineering Command Base Realignment and Closure Program Management Office (NAVFAC BRAC PMO), has prepared this EIS, which evaluates the potential environmental consequences of the disposal of NAS JRB Willow Grove and its reuse in accordance with the Redevelopment Plan (Alternative 1), as well as Alternatives 2, 3, and a No Action Alternative.

This document was prepared by the U.S. Department of the Navy (DON) in accordance with the *National Environmental Policy Act of 1969* (NEPA) (Public Law 91-190, 42 United States Code [U.S.C.] 4321-4370f); the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 Code of Federal Regulations [CFR] 1500-1508); DON regulations implementing NEPA (32 CFR 775); Office of the Chief of Naval Operations Instructions (OPNAVINST) 5090.1C CH-1; DON *Base Realignment and Closure (BRAC) Implementation Guidance* (NBIG); and other applicable Department of Defense (DOD) and DON policy and guidance. There were no cooperating agencies for the preparation of this EIS.

1.1 Background

In 2005, the BRAC Commission recommended closure of NAS JRB Willow Grove on September 8, 2005, as discussed further in Section 1.5. The recommendation to close NAS JRB Willow Grove was approved by President Bush and accepted by Congress on November 9, 2005. By law, all BRAC actions relating to the closure of NAS JRB Willow Grove had to be complete by September 15, 2011. The installation ceased operations and was officially closed on September 15, 2011.

1.2 Proposed Action

The proposed action is the disposal of the former NAS JRB Willow Grove property by the Navy and its subsequent reuse by the Local Redevelopment Authority (LRA).

1.3 Study Area Location and Description

NAS JRB Willow Grove was situated on approximately 910 acres in Horsham Township, Montgomery County, Pennsylvania. The installation property is located approximately 18 miles north of Philadelphia. The main gate is located on Easton Road, approximately 2.5 miles north of the Pennsylvania Turnpike (see Figure 1-1).

The site of NAS JRB Willow Grove was originally a municipal airfield constructed in the mid-1930s. The Navy acquired the airfield in response to World War II, and NAS Willow Grove was commissioned in January 1943. After the end of World War II in 1945, the installation was designated a Reserve Training Station. In 1994, the installation was re-designated a Joint Reserve Base to more accurately

reflect its status. The mission of NAS JRB Willow Grove prior to closure was to provide, train, and maintain a ready reserve force for the country.

1.4 Purpose and Need

The purpose of the proposed action evaluated in this EIS, and the preferred alternative, is the disposal of NAS JRB Willow Grove from federal ownership and its subsequent reuse in a manner consistent with the Redevelopment Plan. The proposed action is needed to provide the local community an opportunity for economic development and job creation.

The BRAC Law directed the DOD to close United States military operations at the facility. Under the BRAC Law, the decision to close, relocate, or realign bases is exempt from NEPA documentation requirements. However, once that decision has been made, the DOD is required to prepare appropriate NEPA documentation evaluating the environmental impacts of the disposal and subsequent reuse of the property. The reuse of NAS JRB Willow Grove would be in a manner consistent with the Redevelopment Plan. The disposal of the property is the responsibility of the DON, and the LRA is responsible for the implementation of the Redevelopment Plan. The future developer or owner of the property would be responsible for implementation of mitigation measures and project environmental controls identified for resource impacts associated with reuse.

1.5 BRAC Process

Base closure and realignment is the process used by the DOD to reorganize its installation infrastructure to more efficiently and effectively support its forces, increase operational readiness, and facilitate new ways of doing business. The BRAC process is established by the provisions of Title II of the Defense Authorization Amendments and Base Closure and Realignment Act, Public Law 100-526, and the BRAC Law.

Congress authorized a 2005 round of BRAC by amending the BRAC Law of 1990. The amendment created the 2005 BRAC Commission and a timetable for the 2005 BRAC decision-making process. The Commission conducted its analysis of DOD recommendations, held public meetings, and made recommendations to the President for closures and realignments, including the closure of NAS JRB Willow Grove. The President approved and forwarded the recommendations to Congress on September 15, 2005. The recommended closures and alignments became public law on November 9, 2005.

The approved 2005 BRAC Commission recommendation for the closure of NAS JRB Willow Grove is as follows:

Close NAS JRB Willow Grove, Pennsylvania. Relocate all Navy and Marine Corps squadrons, their aircraft and necessary personnel, equipment and support to McGuire Air Force Base, in Cookstown, New Jersey. Relocate the minimum amount of manpower and equipment to support intermediate maintenance workload and capacity for Tire and Wheel, non-destruction inspections, and Aviation Life Support System equipment to McGuire Air Force Base. Relocate intermediate maintenance workload and capacity for Aircraft Components, Aircraft Engines, Fabrication & Manufacturing, and Support Equipment to Fleet Readiness Center East, Marine Corps Air Station Cherry Point, North Carolina. Distribute the 15 A-10 aircraft assigned to the 111th Fighter Wing (Air National Guard [ANG]); the 15 A-10 aircraft assigned to the 124th Wing (ANG), Boise Air Terminal Air Guard Station, Boise, Idaho; the 15 A-10 aircraft assigned to the 175th Wing (ANG), Martin State Airport Air Guard Station, Baltimore, Maryland; and the 15 F-16 aircraft assigned to the 127th Wing (ANG), Selfridge Air National Guard Base, Mount Clemens, Michigan, to meet the Primary Aircraft Authorizations (PAA) requirements established by the Base Closure and Realignment recommendations of the Secretary of Defense, as amended by the Defense Base Closure and Realignment Commission.

Path: M:\VA_Beach\Willow_Grove\Maps\MXD\Report\EIS\Regional_Location_Map.mxd

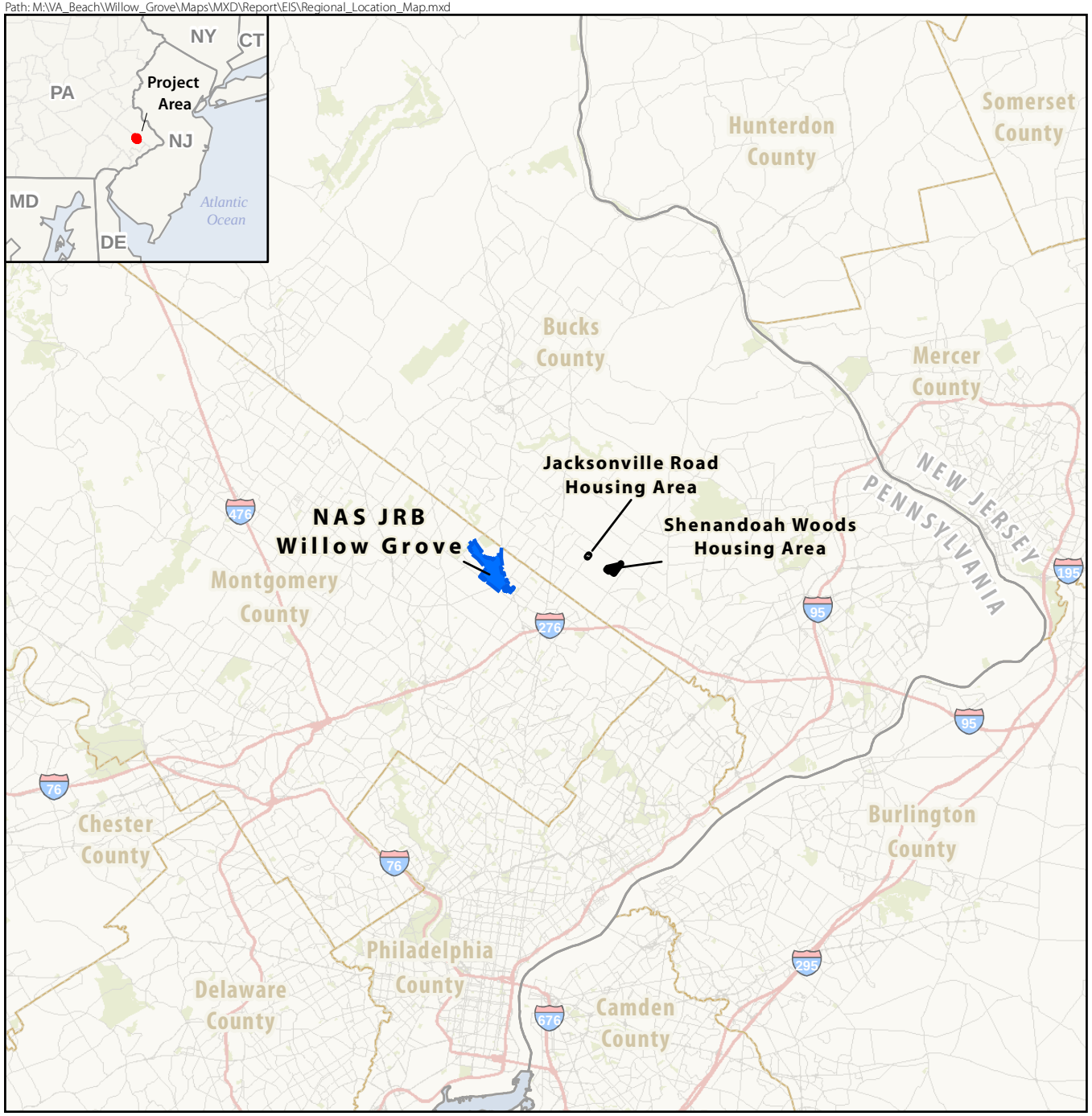

Figure1-1

Regional Location Map

Former NAS JRB Willow Grove

Horsham, PA

Legend

- Freeway
- Major Road
- NAS JRB Willow Grove
- Housing Area
- State Boundary
- County Boundary
- Park

SCALE

0 5 10 Miles

SOURCE: Ecology and Environment 2013; ESRI 2010; Tetra Tech 2012.

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If the Commonwealth of Pennsylvania decides to change the organization, composition, and location of the 111th Fighter Wing (ANG) to integrate the unit into the Future Total Force, all personnel allotted to the 111th Fighter Wing (ANG), including the unit's Expeditionary Combat Support (ECS) elements, will remain in place and assume a mission relevant to the security interests of the Commonwealth of Pennsylvania and consistent with the integration of the unit into the Future Total Force, including but not limited to air mobility, Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR), Information Operations, engineering, flight training, or unmanned aerial vehicles. Where appropriate, unit personnel will be retrained in skills relevant to the emerging mission. This recommendation does not effect a change to the authorized end-strength of the Pennsylvania ANG. The distribution of aircraft currently assigned to the 111th Fighter Wing (ANG) is based on a resource-constrained determination by the DOD that the aircraft concerned will better support national security requirements in other locations and is not conditioned upon the agreement of the commonwealth.

Relocate Co A/228th Aviation to Fort Dix, Trenton, New Jersey. Relocate Reserve Intelligence Area 16 to Fort Dix. Establish a contiguous enclave for the 111th Fighter Wing (ANG) and the 270th Engineering Installation Squadron (ANG) sufficient to support operations of those units, including flight operations, and compatible with joint use of the former Naval Air Station as a civilian airport. The Army Reserve units not relocated from Willow Grove by this recommendation, as amended, and those relocated to Willow Grove by other recommendations, as amended, will be incorporated into the Armed Forces Reserve Center (AFRC) established by Army Recommendation 82. The property retained under federal title to construct the AFRC shall be limited to the absolute minimum essential to construct that facility, shall be encompassed within the enclave established by the 111th Fighter Wing (ANG) and the 270th Engineering Installation Squadron (ANG), and shall be sited to minimize interference with the Air Guard enclave and joint civilian use of the former Naval Air Station as a civilian airport. The Commission defines the authority granted to the Army by the words "retain essential facilities to support activities of the Reserve Components" where they appear in Army Recommendation 82, to be limited to the property necessary to construct AFRC itself. If the Secretary of the Army determines that access to more property would be beneficial, a joint-use agreement should be executed to obtain a tenancy from the Commonwealth of Pennsylvania. Realign Cambria Regional Airport, in Johnstown, Pennsylvania, by relocating Marine Light Attack Helicopter Squadron 775 Detachment A, including all required personnel, equipment, and support, to McGuire Air Force Base.

To comply with the BRAC Law, the installation closed on September 15, 2011. The closure of NAS JRB Willow Grove and the realignment or relocation of assets are not included in this NEPA analysis. The NEPA analysis specifically evaluates the potential reuse and redevelopment of the former installation property.

1.5.1 Phases of the BRAC Process

The Navy established the BRAC PMO to oversee and manage the implementation of BRAC actions throughout the Navy. Under BRAC, the Navy acts as the disposal agency and employs the following procedures.

Phase 1: Disposal Planning – Federal Transfer

Transfer and redevelopment planning is a multi-phase process, most of which is specified by law. For NAS JRB Willow Grove, Phase 1 began on November 9, 2005, when the recommendation to close the installation became law. The first step in the planning involved offering the properties to federal agencies for reuse through a federal transfer process. As a result of the federal transfer process, approximately 48 acres have been or are planned to be transferred from the Navy to the following federal agencies:

- Federal Aviation Administration (FAA): 3 acres along Horsham Road, including a radar tower.
- United States Air Force: 45 acres to Horsham Air Guard Station.

Following the federal transfers, the remaining 861 acres of installation property was declared surplus and made available for reuse.

Phase 2: Surplus Property Notice and Designation as Surplus

Phase 2 includes the LRA's redevelopment planning. The Redevelopment Plan (RKG 2012) is a critical component of the Navy's environmental analysis required by NEPA.

The Horsham Township Authority (HLRA) for NAS JRB Willow Grove was formed by Horsham Township Resolution 2005-26 on October 12, 2005, to oversee and facilitate the creation of a redevelopment plan. On November 7, 2005, the HLRA was established as a corporation under the authority of the Pennsylvania Authorities Act. On March 6, 2006, the HRLA was designated by DOD's Office of Economic Adjustment as the entity responsible for preparing the Redevelopment Plan with respect to the installation (RKG 2012).

The disposal and reuse process was changed on September 30, 2008, due to the passing of Public Law 110-329, Section 8115, which directed that Navy transfer all excess NAS JRB Willow Grove property to the Air Force for subsequent conveyance to the Commonwealth of Pennsylvania for operation of the Horsham Joint Interagency Installation (HJII). In a letter dated November 12, 2009, the Governor of Pennsylvania advised the Secretary of Defense that the Commonwealth would not be using NAS JRB Willow Grove for the HJII and that ownership and title of the installation should remain with the United States. A response by the Under Secretary of Defense dated December 22, 2009, stated that NAS JRB Willow Grove would now be disposed using BRAC procedures. In January 2010, federal agencies were given another opportunity to acquire the property.

The HLRA held periodic public meetings from 2006 through 2010 to inform the community on the status of the 2005 BRAC action. After the DOD officially designated the property as surplus, the HRLA began preparation of the Redevelopment Plan. The Redevelopment Plan was completed in March 2012 and was officially adopted on March 21, 2012 (RKG 2012).

Phase 3: Property Disposal

Upon completion of the NEPA process, as described below, the Navy will prepare a Record of Decision (ROD) indicating disposal decisions, and the redevelopment process will enter the implementation phase. This phase includes the Navy's conveyance of surplus installation property (i.e., property disposal). Any future development of property not transferred to other federal agencies would need to be consistent with the Redevelopment Plan and would fall under the jurisdiction of the local government. The use of land, the reuse of existing buildings and facilities, and the development of new buildings on the former NAS JRB Willow Grove property would be regulated by the local government, zoning ordinances, and other applicable plans and regulations.

1.6 Environmental Review Process

1.6.1 The National Environmental Policy Act

NEPA requires the consideration of potential environmental consequences of federal actions. The CEQ established regulations for federal agency implementation of NEPA (40 CFR 1500-1508). Under NEPA, federal agencies must prepare an environmental assessment (EA) or an EIS for any major federal action,

except those actions that are determined to be "categorically excluded" from further analysis. The Navy NEPA regulations (32 CFR 775) provide a list of Categorical Exclusions.

An EA is a concise public document that provides sufficient analysis for determining whether the potential environmental impacts of a proposed action are significant, which would result in the preparation of an EIS, or not significant, which would result in the preparation of a Finding of No Significant Impact (FONSI). An EIS is prepared for those federal actions that may significantly affect the quality of the human environment. Thus, the Navy determined that the proposed action could have a significant impact on the quality of the human environment and an EIS was prepared, leading to a ROD.

An EIS should include the purpose of and need for the proposed action, the alternatives, the affected environment, the environmental impacts of the proposed action and alternatives, a listing of agencies and persons consulted, and a discussion of the cumulative impacts associated with the alternatives. The ROD will summarize the finding of the environmental analysis. The ROD will be signed by the Navy, and a notice of availability will be published in local newspapers and the *Federal Register*.

The Navy prepared this EIS in accordance with applicable federal and state regulations and instructions, as well as with other applicable laws, rules, and policies. These include but are not limited to the following:

- NEPA, as amended by Public Law 94-52, July 3, 1975 (42 U.S.C. 4321 et seq.), which requires environmental analysis for major federal actions significantly affecting the quality of the environment.
- CEQ regulations, as contained in 40 Code of Federal Regulations (CFR) Parts 1500 to 1508, which direct federal agencies on how to implement the provisions of NEPA.
- Navy regulations for implementing NEPA in 32 CFR 775.
- Office of the Chief of Naval Operations Instruction (OPNAVINST) 5090.1C, Change 1.
- DON *Base Realignment and Closure (BRAC) Implementation Guidance* (NBIG).

NEPA establishes an environmental review process for actions undertaken by federal agencies. The review process is intended to help public officials make decisions that are based on an understanding of environmental consequences and to take actions that protect, restore, and enhance the environment (40 CFR 1500.1). NEPA provides the means to carry out these goals by the following measures:

- Mandating that every federal agency prepare a detailed statement of the effects of "major federal actions significantly affecting the quality of the human environment."
- Establishing the need for agencies to consider alternatives to those actions.
- Requiring the use of multiple disciplines to develop alternatives and analyze environmental effects.
- Requiring that each agency consult with and obtain comments from any federal, state, tribal, or local agency that has jurisdiction, either by law or special expertise, with respect to any environmental impact involved.
- Requiring that detailed statements, comments, and views of the appropriate federal, state, tribal, and local agencies be made available to the public.

In accordance with NEPA, the Navy must analyze the environmental effects of the disposal of surplus property before disposing of the property. This EIS for the disposal and reuse of NAS JRB Willow Grove thus analyzes the environmental effects of the proposed property disposal and implementation of the Redevelopment Plan in the context of reasonably foreseeable reuses of the property.

1.6.2 Scoping and Public Involvement

1.6.2.1 Public Notification

The first step in the NEPA process was the publication of a Notice of Intent (NOI) in the *Federal Register* on October 18, 2012. The NOI formally opens the public scoping period and includes a description of the proposed action and alternatives, locations to be affected, and how scoping comments may be provided.

The public scoping period began on October 18, 2012, and concluded on December 31, 2012, and included public scoping meetings. The public scoping period was extended due to the initially scheduled public scoping meetings being cancelled and rescheduled due to Superstorm Sandy. The NOI was re-published in the *Federal Register* on November 23, 2012, and notified the public of the meetings to be held on December 13 and 14, 2012.

Media announcements for the public scoping period and public meetings dates and locations were published in regional newspapers (*Philadelphia Inquirer, Intelligencer, Bucks County Courier Times,* and *Hatboro-Horsham Patch*), and on Pennsylvania Public Radio. A newspaper display notice was published in the above-noted newspapers on the following dates:

- *Philadelphia Inquirer:* October 22, 26, 27, and 28 and December 6, 10, 11, and 12.
- *Intelligencer:* October 22, 25, 26, and 28 and December 6, 10, 11, and 12.
- *Bucks County Courier Times:* October 22, 25, 26, and 28 and December 6, 10, 11, and 12.
- *Hatboro-Horsham Patch:* Week of October 22-28 and December 6-12.

During the public scoping period, comments were requested from federal, state, and local agencies and members of the public regarding the scope of issues to be addressed in the EIS.

1.6.2.2 Public Scoping

Scoping is an early and open process for determining the scope of the proposed action and the resources to be analyzed in the EIS. During the scoping process, the public assists the Navy in defining and prioritizing issues through meaningful participation, including the submission of written comments.

The public scoping meetings were conducted in an open house format. The scoping meetings were used to inform the public about the EIS process, enable community members to ask questions, and solicit written comments regarding resources to be addressed in the EIS. The meetings featured displays, fact sheets, and interaction between Navy staff and the public. The meetings were scheduled as follows:

- Thursday, December 13, 2012 (4 p.m. to 8 p.m.), Horsham Township Community Center, 1025 Horsham Road, Horsham, Pennsylvania
- Friday, December 14, 2012 (10 a.m. to 2 p.m.), Horsham Township Community Center, 1025 Horsham Road, Horsham, Pennsylvania

1.6.2.3 Public Comments

All comments received during the formal scoping period were identified and tabulated, by topic. Table 1-1 provides a breakdown of comments received, organized by frequency and topic.

Table 1-1 Frequency of Comments by Topic

Topic	Number of Comments
Proposed Action and Alternatives	4
• Airfield Reuse (Alternative 3)	25
Land Use and Zoning	3
• Airfield Safety	3
Socioeconomics/Community Facilities and Services	10
Transportation	10
Air Quality	2
Noise	2
Infrastructure/Energy	4
Biological Resources	1
Environmental Management	5
Cumulative Impacts	1
Miscellaneous	4
Total	**74**

1.6.3 Agency Coordination and Permit Requirements

In addition to NEPA, other laws, regulations, permits, and licenses may be applicable to the proposed action. The Navy is responsible for disposal of the former NAS JRB Willow Grove property and the HLRA is responsible for implementation of the Redevelopment Plan. The future developer or owner of the property will be responsible for acquiring applicable building permits, zoning approvals, and environmental permits for development of the property.

Table 1-2 summarizes the applicable regulatory requirements and approvals. Consistency with other federal, state, and local plans, policies, and regulations is further described in Section 7 (Other Considerations Required by NEPA) of this EIS.

Table 1-2 Applicable Regulatory Requirements and Approvals

Regulation	Regulatory Agency	Permit/Application	Regulated Activity	Responsible Party/Status
National Environmental Policy Act (NEPA), 42 U.S.C. § 4321 et seq.	U.S. Environmental Protection Agency	Record of Decision (ROD)	Federal actions	Navy. Ongoing.
Clean Air Act (CAA), 42 U.S.C. § 7401 et seq.	U.S. Environmental Protection Agency	Compliance with National Ambient Air Quality Standards Conformity Determination	Federal actions that result in air emissions Compliance with the General Conformity Rule	Navy. Completed a RONA.

Table 1-2 Applicable Regulatory Requirements and Approvals

Regulation	Regulatory Agency	Permit/Application	Regulated Activity	Responsible Party/Status
Clean Water Act, 33 U.S.C § 1251 et seq.	U.S. Army Corps of Engineers	Sections 401 and 404	Impacts on jurisdictional wetlands and/or other waters of the United States	Developer. To be initiated following transfer of property and prior to redevelopment.
Clean Water Act (33 U.S.C. 1251 et seq.) as implemented by the Pennsylvania Storm Water Management Act (Title 10.1, Chapter 6, Article 1.1)	U.S. Environmental Protection Agency; implemented by the Pennsylvania Department of Environmental Protection	National Pollutant Discharge Elimination System National Pollutant Discharge Elimination System	Discharges of stormwater associated with industrial activities Construction activities equal to or larger than 1 acre	Navy was responsible for implementing provisions of the permit prior to closure. Developer responsible for applying for and implementing provisions of the permit. Developer responsible for applying for and implementing provisions of the permit (Alternative 3 only).
National Historic Preservation Act of 1966 as amended (16 U.S.C. § 470 and amendments)	■ Advisory Council on Historic Preservation ■ State Historic Preservation Office	Section 106 consultation	Federal undertakings that affect properties listed on or determined to be eligible for listing on the National Register of Historic Places	Navy to conduct and complete Section 106 consultation process. Following property transfer, developer to adhere to terms of deed restrictions or covenants, if applicable.
American Indian Religious Freedom Act of 1978, Archaeological Resources Protection Act of 1979, and Native American Graves Protection and Repatriation Act of 1990	Appropriate representative of the affected tribe(s)	Consultation with affected tribe(s)	Presence of cultural resources on federal land	Navy to conduct and complete consultation process prior to transfer; consultation ongoing.

Table 1-2 Applicable Regulatory Requirements and Approvals

Regulation	Regulatory Agency	Permit/Application	Regulated Activity	Responsible Party/Status
Endangered Species Act, 16 U.S.C. §§ 1531-1544	■ U.S. Fish and Wildlife Service ■ Pennsylvania Fish & Boat Commission ■ Pennsylvania Game Commission ■ Pennsylvania Natural Heritage Program,	Agency consultation for presence of threatened and endangered species	Federal actions potentially impacting threatened and endangered species or resulting in the destruction or adverse modification of the designated critical habitat of such species	The Navy did not undergo Section 7 consultation because no federally listed threatened or endangered species are known to occur on the property. The developer will need to confer with appropriate state agencies.
Migratory Bird Treaty Act (16 U.S.C. 703-712)	U.S. Fish and Wildlife Service	Agency consultation on migratory birds	Activities with the potential to take, capture, kill, or attempt to take a migratory bird	Navy analyzed impacts of reuse on populations of migratory birds.
Comprehensive Environmental Response, Compensation, and Liability Act, as amended 42 U.S.C. § 9601 et seq.	U.S. Environmental Protection Agency	Cleanup of hazardous waste contamination from abandoned hazardous waste disposal sites or accidental spills	Ongoing responsibility for the investigation and cleanup of Installation Restoration sites and other sites	Navy responsible for clean-up of property prior to transfer; clean-up activities ongoing. Developer responsible for adhering to restrictions and/or land use controls resulting from remedial process.
Resource Conservation and Recovery Act, 42 U.S.C. 6901 et seq.	U.S. Environmental Protection Agency	Procedures for hazardous waste management and corrective action	Ongoing responsibility for waste management and corrective actions	Navy responsible for management of hazardous waste generated prior to transfer; ongoing. Developer responsible for management of hazardous waste generated following transfer.
Pennsylvania Noxious Weed Control Law (3 P.S. §§ 255.1-255.11)	Pennsylvania Department of Agriculture, Bureau of Plant Industry	Compliance with requirements of the law	Ongoing responsibility for control of noxious weeds	Navy responsible for adhering to applicable requirements of the law prior to transfer. Developer responsible for adhering to requirements of the law following transfer.

1.7 Organization of Document

The EIS evaluates the potential direct, indirect, short-term, and long-term impacts on the human and natural environments resulting from the disposal of surplus property at NAS JRB Willow Grove and its reuse in accordance with the Redevelopment Plan (Alternative 1), as well as Alternatives 2, 3, and a No Action Alternative.

The resources and factors examined in this EIS include land use; socioeconomics and environmental justice; community facilities and services; transportation; environmental management; air quality; noise; infrastructure and utilities; cultural resources; topography, geology, and soils; water resources; and biological resources. The EIS also addresses potential cumulative impacts resulting from reasonably foreseeable projects in the region, including other disposal or realignment actions.

The impacts addressed are based on implementation of the approved Redevelopment Plan (i.e., full build-out over the course of 20 years) and assumptions made regarding foreseeable reuses of the surplus property under the Redevelopment Plan (Alternative 1), as well as Alternatives 2, 3, and a No Action Alternative; existing and proposed land use and zoning regulations; and the build-out timeline and development mix.

The information and data used in the preparation of this EIS were obtained by reviewing existing documents and studies, including literature, maps, and planning documents, government agency Web sites, and communication and coordination with local, state, and federal stakeholders, official agencies, and other organizations and the public.

This EIS has been organized as follows:

- **Chapter 2 – Proposed Action and Alternatives,** provides a description of each alternative developed for analysis within the EIS and a summary comparison of each alternative.
- **Chapter 3 – Affected Environment,** provides an assessment of each baseline resource.
- **Chapter 4 – Environmental Consequences,** provides an assessment of the impacts on resources as a result of implementation of the alternatives.
- **Chapter 5 – Cumulative Impacts,** provides the cumulative impacts assessment for all pertinent resources, taking into account the proposed action coupled with other regional actions.
- **Chapter 6 – Best Management Practices, Mitigation and Monitoring,** provides a list of the measures that will be implemented to minimize impacts.
- **Chapter 7 – Other Considerations Required by NEPA,** discusses consistency with other federal, state, and local land use plans, policies and controls.
- **Chapter 8 – References,** provides the list of references cited throughout the EIS.
- **Chapter 9 – List of Preparers,** provides the names of primary authors, reviewers, and other supporting staff, along with an indication of their specific role and education.

2 Proposed Action and Alternatives

This section provides a description of the proposed action and alternatives. This EIS evaluates three action alternatives for reuse of the surplus property and the No Action Alternative. The preferred reuse alternative (Alternative 1) is use of the surplus property consistent with the Redevelopment Plan. Alternative 2 is redevelopment of the property with a more dense mixture of land uses. Alternative 3 is redevelopment of the property as an airfield.

In accordance with NEPA regulations, the EIS also addresses a No Action Alternative. The No Action Alternative is the retention of NAS JRB Willow Grove by the federal government in caretaker status. Under this scenario, no reuse or redevelopment of the property would occur.

2.1 Establishment of the Redevelopment Plan

In response to the BRAC recommendation to close NAS JRB Willow Grove, Horsham Township passed a resolution on October 12, 2005, establishing the HLRA and tasking the HLRA with coordinating the preparation of a redevelopment plan. The resulting Redevelopment Plan took into account the planning principles and goals established by the HLRA, existing conditions on the installation and in the region, properties available for redevelopment, and public participation. Proposed land uses considered past use of the property, existing property conditions, the needs of the homeless in the vicinity of the installation, and goals for economic redevelopment and other development.

2.1.1 Redevelopment Plan Goals and Objectives

In the early stages of the redevelopment planning effort, the HLRA defined a series of Planning Principles to provide general guidance for development of the Redevelopment Plan. The Planning Principles were presented on July 27, 2011, and include the following:

- The Redevelopment Plan must secure viable sources for water and wastewater utilities to support development.
- The final land use plan should create a sense of place and community.
- All future reuse alternatives for the installation property should seek to improve cross-circulation of traffic through the site, where appropriate.
- All employment-generating uses should be sensitive to the impacts of traffic congestion and traffic flow around and through the installation property and attempt to mitigate these impacts.
- Improved transportation management technology and signal coordination should be used.
- Employment-generating uses should be integrated into a larger, mixed-use development plan.
- The Redevelopment Plan should incorporate the latest green and sustainable design principles, where appropriate.

2.1.2 Evaluation of Existing Conditions and Properties Available for Redevelopment

Once the Planning Principles were established, the HLRA began looking at existing conditions and properties available for redevelopment. Specifically, the HLRA evaluated the environmental conditions of the installation property, existing infrastructure, transportation networks, and the local and regional markets. Restrictions needed to protect human health and the environment were also identified. As

discussed in Section 1, approximately 48 acres of the main installation have been or will be allocated to other federal agencies. Therefore, these parcels are not available for redevelopment.

Based on the remaining parcels available, the HLRA conducted a "state and local screening process." Through this process, surplus military property may be conveyed to public agencies and not-for-profit organizations to provide public goods and services. Fourteen parcels have been identified for public benefit conveyances. These parcels have been incorporated into the reuse scenarios.

2.1.3 Public Participation during the Planning Process

A critical component of the Redevelopment Plan was public participation. To engage the public in the reuse planning process, the HLRA held a series of public workshops, meetings, and surveys over a 15-month period beginning in December 2010 and ending March 2012. Over this period, the HLRA planning team was introduced to the public; base tours were provided to over 80 people; multiple visioning, plan development, and public comment meetings were held; over 200 people attended topical seminars on housing, transportation, the environment, and alternative energy; a smart growth design workshop was held; and a community telephone survey was conducted. Additional public outreach efforts included email alerts, a public Web site, press releases, and newspaper inserts.

2.1.4 Redevelopment Plan Selection

Based on the planning process, three base reuse concepts were presented to the public. The concepts (Options A, B, and C) were designed to provide a variety of development strategies, density, land use and transportation alternatives, and aviation and non-aviation reuse concepts. Preliminary base land use findings and feedback were synthesized into these three options, which were presented to the public and the HLRA Board on August 17, 2011. In the two months following this presentation, public comments on the three options were solicited. Feedback was collected via email, phone calls, comment cards, and through individual meetings. The initial round of feedback identified elements from each of the three options that were preferred by the community. These elements were incorporated into a single revised land use plan (Option D), which was presented to the public on November 16, 2012. The findings from this additional public review were incorporated and compiled into an updated plan (Option E). A final 30-day public review and comment period resulted in minor facility location changes, producing a final plan (Option F). The final land use plan, known as Option F, was approved by the HLRA Board, and on March 21, 2012, the HLRA adopted this concept as the final Redevelopment Plan.

2.2 Identification of Alternatives

A reasonable range of alternatives has been selected to evaluate the disposal and reuse of NAS JRB Willow Grove. To implement the Proposed Action, the Navy has identified three alternatives, including Alternative 1 (the HLRA Redevelopment Plan), Alternative 2 (the HLRA Plan with Increased Residential Development), and Alternative 3 (Airfield Reuse), as well as the No Action Alternative. Alternative 1, or the Preferred Alternative, is the reuse of the property in accordance with the Redevelopment Plan, as adopted by the HLRA. The Navy developed Alternative 2 to identify any potential impacts if a higher density of residential and mixed-use development were to occur at the site. Alternative 2 was adapted from Base Reuse Option D of the Redevelopment Plan and includes a higher level of commercial and residential development. It was not selected as the preferred reuse of the installation by the HLRA; however, it serves as an appropriate alternative for consideration and comparison. Alternative 3 includes reusing the airfield, parking apron areas, and hangar space along with development of other areas on the installation in a manner that is compatible with airfield operations. The No Action Alternative is required by statute and serves as a point of comparison for the potential environmental consequences resulting from the action alternatives that include redevelopment of the NAS JRB Willow Grove property.

Table 2-1 presents a comparison of the approximate acreages of the various land uses for the surplus installation property proposed under Alternatives 1, 2, and 3 and analyzed in the EIS. Table 2-1 does not include the 48 acres that have been or will be transferred to other federal agencies. The acreages included in the table are comprised of those captured in the HLRA's versions of the Redevelopment Plan, and those adapted from the HLRA to be carried forward for spatial analysis in this EIS. The overall level of build-out (i.e., number of residential units and square footage of commercial space) is consistent with those proposed by the HLRA for Alternatives 1 (Option F) and 2 (Option D).

2.3 Alternatives Considered in the EIS

2.3.1 Alternative 1 (HLRA Plan - Preferred Alternative)

Alternative 1 includes the disposal of NAS JRB Willow Grove by the Navy and reuse of the property in accordance with the Redevelopment Plan (available via the HLRA website at http://www.hlra.org/nas-jrb-willow-grove/redevelopment-plan.aspx). This alternative has been identified as the Preferred Alternative by the Navy. Full build-out of the Redevelopment Plan would be implemented over a 20-year period. The Redevelopment Plan calls for the redevelopment of most of the installation property. Two facilities, the Navy Lodge and the installation fire station, would be reused. The Redevelopment Plan includes a mix of land use types and densities, as well as open space and natural areas. The Redevelopment Plan was designed to incorporate mixed-use, pedestrian-oriented features (e.g., a town center, walkable neighborhoods, and bike lanes), open spaces, best management practices (BMPs) for stormwater management, and green and sustainable design principles.

The redevelopment would make available approximately 2.3 million square feet of building space. Preliminary HLRA estimates predict that, at full build-out, the redeveloped property could eventually provide employment for as many as 7,578 workers. The total projected cost associated with full build-out (including streets, water and sewer systems, storm drainage, and utility infrastructure) is estimated to be approximately $60 million.

Figure 2-1 provides an illustration of the Redevelopment Plan at full build-out, which includes the following elements:

Town Center. This would be a mixed-use, pedestrian-oriented area accessible from both Horsham Road (State Route [SR] 463) and Easton Road (SR 611). The Town Center would include compact pedestrian-oriented development, including a mix of retail, business, and support services; restaurants; civic and cultural uses; and parks. In addition, this area would include higher-density attached residential housing such as condominiums and apartments.

Residential District. This area would provide residential housing connected together by a network of streets, including a central Runway Boulevard, which would provide access to open space and parks. The district would consist of a mix of detached/attached single-family housing, multi-family apartments, townhomes, and condominiums.

Office Park. This district would include professional office space and be positioned next to public open space and a golf course.

Hotel/Conference Center. This area would be located adjacent to the Town Center and Office Park and would be visible from Easton Road (SR 611).

Table 2-1 Land Use Acres and Build-out Conditions by Redevelopment Alternative[1]

Land Use	Alternative 1[2] (HLRA Plan - Preferred Alternative)			Alternative 2[3] (HLRA Plan with Increased Residential Development)			Alternative 3[4] (Airfield Reuse)	
	EIS (acres)	Redevelopment Plan (acres)	Units or Building SF	EIS (acres)	Redevelopment Plan (acres)	Units or Building SF	EIS (acres)	Units or Building SF
Residential								
Large Lot Single Family	**86**	65	90	**-**	-	-	**-**	-
¼ Acre Lot Single Family	**-**	-	-	**50**	42	169	**-**	-
Small Lot Single Family	**53**	34	250	**41**	42	227	**-**	-
Townhomes	**53**	36	350	**39**	33	396	**-**	-
Apartments/Condos	**19**	13	300	**24**	22	645	**-**	-
Town Center Apartment/Condos	**(a)**	(a)	100	**(a)**	(a)	114	**-**	-
BCHG Housing	**11**	10	70	**12**	-	70	**11**	70
CCRC Independent Living	**(b)**	(b)	141	**(b)**	(b)	126	**-**	-
CCRC Assisted Living/Nursing	**(b)**	(b)	185	**(b)**	(b)	252	**-**	-
Total Residential	**222**	**158**	**1,486**	**166**	**139**	**1,999**	**11**	**70**
Commercial and Mixed Use								
CCRC Med Office/Amenities	**39**	30	25,000	**37**	36	58,500	**-**	-
Hotel/Conference	**17**	6	137,000	**20**	17	163,400	**15**	120,882
Town Center Office/Retail/Service	**29**	27	359,370	**29**	27	342,154	**-**	-
Office Park	**157**	134	1,163,052	**143**	130	1,130,818	**90**	666,718
Retail	**15**	14	200,200	**12**	11	139,100	**32**	427,093
Total Commercial and Mixed Use	**257**	**211**	**1,884,622**	**241**	**221**	**1,833,972**	**137**	**1,214,693**
Community Services and Recreation								
Regional Recreation Center	**12**	12	100,000	**22**	22	96,522	**12**	100,000
School	**43**	40	152,727	**15**	14	152,727	**-**	-
Aviation Museum	**14**	13	200,000	**15**	13	55,000	**14**	200,000
Park/Open Space	**241**	205	-	**317**	280	-	**295**	-
Airfield	**-**	-	-	**-**	-	-	**276**	-
Airfield Operations	**-**	-	-	**-**	-	-	**78**	-
Total Community Services and Recreation	**310**	**270**	**452,727**	**369**	**329**	**304,249**	**675**	**300,000**

Table 2-1 Land Use Acres and Build-out Conditions by Redevelopment Alternative[1]

Land Use	Alternative 1[2] (HLRA Plan - Preferred Alternative)			Alternative 2[3] (HLRA Plan with Increased Residential Development)			Alternative 3[4] (Airfield Reuse)	
	EIS (acres)	Redevelopment Plan (acres)	Units or Building SF	EIS (acres)	Redevelopment Plan (acres)	Units or Building SF	EIS (acres)	Units or Building SF
Other								
Roads, Sidewalks, Paths, Shared Lot, Etc.	**72**	220	-	**85**	151	-	**39**	-
Total Other Uses	**72**	**220**	-	**85**	**151**	-	**39**	-
TOTAL	**861**	**859**	**1,486 Res. Units 2.3 Million SF**	**861**	**840**	**1,999 Res. Units 2.1 Million SF**	**861**	**70 Res. Units 1.5 Million SF**

Notes:

[1] The table presents a comparison of the land area (acres) used in the Navy EIS and the Redevelopment Plan. It was necessary to standardize certain land use categories to enable a comparison of the three redevelopment alternatives in the EIS. In addition, based on a February 2012 installation boundary survey, the base encompasses 861 acres and this acreage was utilized in the Navy EIS. The number of housing units and commercial space/other space remained unchanged from what was analyzed in the Redevelopment Plan, even if the amount of land area is different. The difference in acreages between the Navy EIS and the Redevelopment Plan is primarily associated with areas within specific districts being allocated to the roads, sidewalks, paths, etc. category.

[2] The land use acreages for Alternative 1, along with the number of residential units and square footage build-out were adapted from the HLRA's Preferred Redevelopment Plan (Option F).

[3] The land use acreages for Alternative 2, along with the number of residential units and square footage build-out were adapted from the HLRA's Option D, which was an earlier version of the HLRA's proposed redevelopment.

[4] The land use acreages for Alternative 3 were developed by identifying those areas that would be necessary for potential reuse of the airfield (i.e., Airfield and Airfield Operations). There was no Redevelopment Plan evaluation of an airfield alternative; therefore, the column for Redevelopment Plan Acres has been omitted for Alternative 3. The balance of the property was then assigned a similar land use mix as proposed under Alternative 1 and 2, with the exception of residential uses. The square footage for non-residential space was calculated using the same ratio of land area to square footage as Alternative 1 (the Preferred Alternative) and the EIS-measured acreages.

Key:

(a) Acreage for all Town Center components (including apartment/condos, retail/service/restaurants, and office) has been included in a total acreage under the Commercial category. However, the number of residential units is broken out and listed under the Residential category.

(b) Acreage for all Continuing Care Retirement Community (CCRC) components (including independent living, assisted living/nursing, and medical office/amenities) has been included in a total acreage under the Commercial category. However, the number of residential units is broken out and listed under the Residential category.

Continuing Care Retirement Community (CCRC). This area would provide a variety of housing types to support independent living, assisted living, and nursing home care.

School. This approximately 40-acre area is designated for the Hatboro-Horsham School District for replacement of existing facilities and future expansion. This site would include a future middle school and administrative and recreational facilities. It would be located within walking distance of the residential neighborhoods.

Retail. In addition to the retail component programmed for the Town Center, retail frontage would be located along Easton Road (SR 611).

Regional Recreation Center. A regional indoor recreation center with several adjacent outdoor recreation fields would be located adjacent to the existing Gate 1. The indoor facility would include a number of athletic features, including a swimming pool, gymnasium, basketball courts, climbing walls, tennis and racquetball courts, and a health and fitness club.

Aviation Museum and Park. This site would house an aviation museum and park and would be directly visible from Easton Road (SR 611). The aviation museum and park are being sponsored by Montgomery County, on behalf of the Delaware Valley Historical Aircraft Association. The proposed facility would include a number of restored aircraft within new hangar facilities and would incorporate the existing Harold F. Pitcairn Wings of Freedom Air Museum.

Bucks County Housing Group (BCHG) Housing. This approximately 10-acre area would accommodate housing for the homeless. This site would provide permanent supportive housing of up to 70 townhomes and duplex units.

Recreation and Open Space District. This area would provide land for a wide variety of active and passive outdoor recreation, including a 9-hole golf course, public gardens, public parks, nature parks, a festival park, green corridors, and bicycle trails.

Transportation. Transportation improvements would include an interior network of roads at NAS JRB Willow Grove, as well as major road crossings through the former base property to allow for multiple options for transiting from one side of the installation to the other (i.e., Easton Road to Horsham Road) and reduced demand on existing intersections.

2.3.2 Alternative 2 (HLRA Plan with Increased Residential Development)

Alternative 2 provides for the disposal of NAS JRB Willow Grove and its excess properties by the Navy and a higher density of residential and community mixed-use development (available via the HLRA website at http://www.hlra.org/media/7648/preferred%20reuse%20alternative%20d.pdf). As with Alternative 1, the airfield and most installation facilities would be demolished. This alternative includes a mix of land use types and open space and natural areas, and incorporates smart-growth principles that include pedestrian-friendly transportation and compact development. Full build-out is proposed to be implemented over a 20-year period. This alternative calls for the development of approximately 544 acres (63 percent) of the total installation property.

Figure 2-2 provides an illustration of Alternative 2 at full build-out, which includes many of the same elements as Alternative 1, with the following notable exceptions:

Regional Recreation Center. The area for this facility would be increased from approximately 12 acres under Alternative 1 to approximately 22 acres.

Path: M:\VA_Beach\Willow_Grove\Maps\MXD\Report\EIS\Alternative_1_11x17.mxd

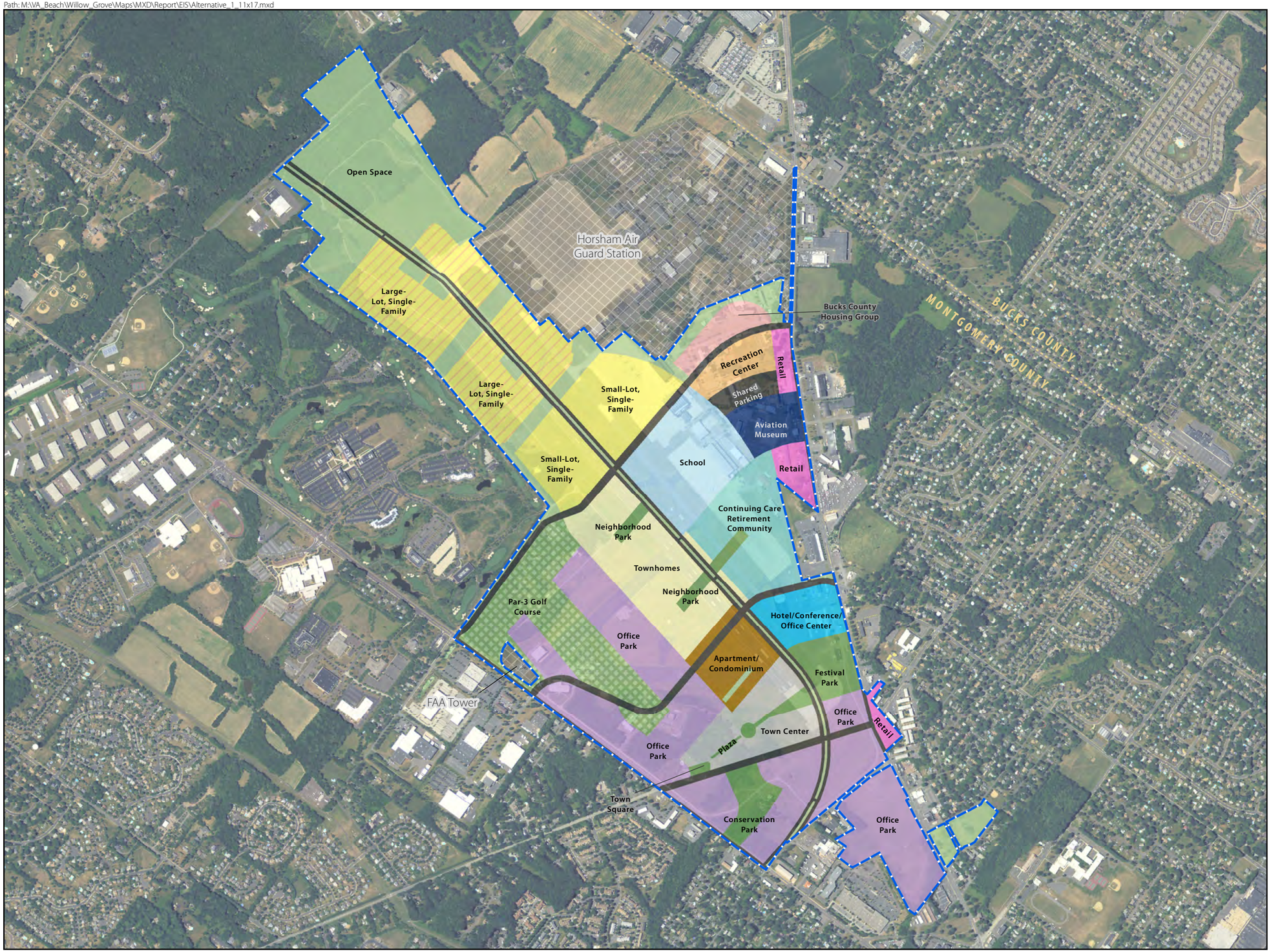

Figure 2-1

Alternative 1

(HLRA Plan - Preferred Alternative)

Former NAS JRB Willow Grove

Horsham, PA

Legend

- County Boundary
- NAS JRB Willow Grove
- FAA Tower and Horsham Air Guard Station (not included in redevelopment)
- Townhomes
- Small-Lot Single-Family
- Large-Lot Single-Family
- Apartment/Condominium
- Aviation Museum
- Bucks County Housing Group (BCHG)
- Continuing Care Retirement Community (CCRC)
- Hotel/Conference/Office Center
- Office Park
- Open Space
- Par-3 Golf Course
- Park
- Recreation Center
- Retail
- Roads/Paths/Parking
- School
- Town Center

SCALE

0 0.25 0.5 Miles

SOURCE: Ecology and Envrionment 2013; ESRI 2010; National Aerial Imagery Program 2010; RKG 2012; Tetra Tech 2012.

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Recreation and Open Space District. This area would provide 317 acres of land for a wide variety of active and passive outdoor recreation, whereas Alternative 1 proposes approximately 241 acres.

2.3.3 Alternative 3 (Airfield Reuse)

Alternative 3 would maintain the existing runway and a portion of the taxiways, parking aprons, and hangar space for airfield operations. After accounting for the area taken up by critical airfield/air operation elements (approximately 350 acres) and the areas that provide open space surrounding the airfield due to safety setbacks associated with the airfield (approximately 300 acres), the remaining land available for redevelopment would be approximately 210 acres.

The layout of Alternative 3, as shown in Figure 2-3, incorporates the approximate sizes and locations of several Alternative 1 elements, such as the recreation center, aviation museum, and golf course. However, due to the proximity to the airfield, this option excludes virtually all residential development land uses, including the Town Center. Areas such as the hotel and conference center were located to the southern portion of the property (along Horsham Road), away from the airfield. As shown in Table 2-1, Alternative 3 would provide more green space and more retail space compared to Alternative 1.

2.3.4 No Action Alternative

The No Action Alternative is retention of the surplus property at NAS JRB Willow Grove by the federal government in caretaker status. No reuse or redevelopment would occur at the installation. This alternative would not take advantage of the site's location, physical characteristics, or infrastructure. In addition, the No Action Alternative would not foster the local redevelopment of the NAS JRB Willow Grove property. The No Action Alternative is evaluated in the EIS as prescribed by CEQ regulations. The No Action Alternative serves as a point of comparison against which the environmental consequences of the other alternatives can be measured.

2.4 Comparison of Alternatives

Table 2-2 provides a comparison of the three redevelopment alternatives and the No Action Alternative. For further discussion of the potential environmental consequences of the three redevelopment alternatives on a resource-specific basis, see Section 4.

2.5 Alternatives Considered but Eliminated from Detailed Analysis

In addition to the preferred alternative, the disposal of NAS JRB Willow Grove by the Navy and reuse of the property in accordance with the Redevelopment Plan (Alternative 1), this EIS considers reasonable alternatives to the proposal. A higher density of residential development, which was a plan that was previously developed by the HLRA through their iterative, public process (Base Reuse Option D of the Redevelopment Plan), was considered (Alternative 2), as was the reuse of a major piece of infrastructure (the runway) for redevelopment (Alternative 3). Alternative 3 was a reuse that was not evaluated further by the HLRA, but was included in the EIS by the Navy for detailed analysis. This option included reuse of the airfield that the Navy considered feasible due to the existence of the runway and a concept that has been considered in other BRAC action NEPA documents and could generate employment and tax benefits. This option did not include a variety of residential development concepts because of the incompatibility of noise zones with residential land uses.

Furthermore, it was assumed that the former NAS JRB Willow Grove property would be redeveloped in a manner consistent with the basic principles developed by the HLRA as a result of the community engagement process and major goals established in the redevelopment planning process. These included developing a mixed land-use plan, maximizing employment and tax base benefits, incorporating a town

center, considering traffic generation, water use, and wastewater generation, and employing green design concepts. As a result, the Navy did not consider any options with single land uses. For example, only open space and recreational land uses would not generate employment opportunities or tax base benefits or only residential uses would not result in mixed land-use plan containing spaces to live, work, and seek recreation. Therefore, other alternatives were considered but excluded from further analysis as they did not adhere to the basic principles of the plan desired by the community, and were not considered as reasonably foreseeable reuses of the property.

Path: M:\VA_Beach\Willow_Grove\Maps\MXD\Report\EIS\Alternative_2_11x17.mxd

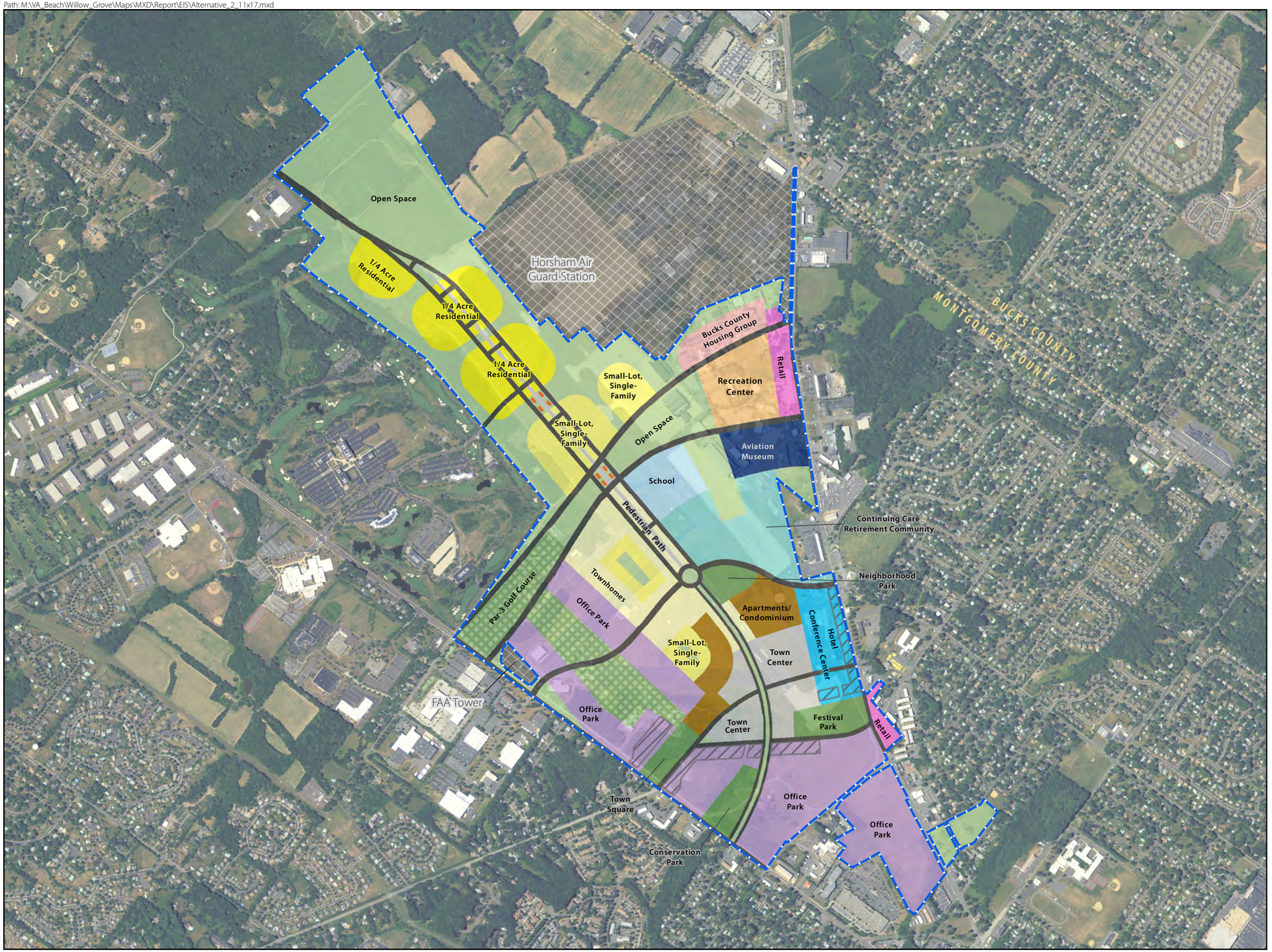

Figure 2-2
Alternative 2
(HLRA Plan with Increased Residential Devlopment)
Former NAS JRB Willow Grove
Horsham, PA

Legend

- County Boundary
- NAS JRB Willow Grove
- FAA Tower and Horsham Air Guard Station (not included in redevelopment)
- Townhomes
- Small-Lot Single-Family
- 1/4 Acre Residential
- Apartments/Condominium
- Aviation Museum
- Bucks County Housing Group (BCHG)
- Continuing Care Retirement Community (CCRC)
- Hotel Conference Center
- Office Park
- Open Space
- Par-3 Golf Course
- Park
- Courts
- Pedestrian Path/Plaza
- Recreation Center
- Retail
- Roads/Plazas
- School
- Town Center
- Indicates Ground Floor Retail

SCALE
0 0.25 0.5 Miles

SOURCE: Ecology and Environment 2013; ESRI 2010; National Aerial Imagery Program 2010; RKG 2012; Tetra Tech 2012.

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Path: M:\VA_Beach\Willow_Grove\Maps\MXD\Report\EIS\Alternative_3_11x17.mxd

Figure 2-3
Alternative 3
(Airfield Reuse)
Former NAS JRB Willow Grove
Horsham, PA

Legend

- County Boundary
- NAS JRB Willow Grove
- FAA Tower and Horsham Air Guard Station (not included in redevelopment)
- Airfield
- Airfield Operations
- Aviation Museum
- Bucks County Housing Group (BCHG)
- Park
- Open Space
- Hotel/Conference Center
- Office Park
- Par-3 Golf Course
- Recreation Center
- Retail
- Roads/Parking

SCALE

0 0.25 0.5 Miles

SOURCE: Ecology and Environment 2013; ESRI 2010; National Aerial Imagery Program 2010; RKG 2012; Tetra Tech 2012.

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Table 2-2 Comparison of Environmental Consequences

Resource	Alternative 1 (HLRA Plan - Preferred Alternative)	Alternative 2 (HLRA Plan with Increased Residential Development)	Alternative 3 (Airfield Reuse)	No Action Alternative
Land Use				
On-site / Surrounding Land Use	**Changes in land use would occur:** • Redevelopment of 861-acre former installation property. • Rezoning would be required to allow the proposed mix of development. • No direct impact on surrounding land uses. ***Mitigation*:** None proposed.	**Changes in land use would occur:** • Redevelopment of 861-acre former installation property. • Rezoning would be required to allow the proposed mix of development. • No direct impact on surrounding land uses. ***Mitigation*:** None proposed.	**Changes in land use would occur:** • Redevelopment of 861-acre former installation property. • Rezoning would be required to allow the proposed mix of development. • Reestablish land use and development controls at ends of runways. • No direct impact on surrounding land uses. ***Mitigation*:** None proposed.	**No impact:** • No impact would occur because no reuse or redevelopment would occur. ***Mitigation*:** N/A
Consistency with Local Planning (full build-out)	**Primarily consistent with local planning, but mitigation would further reduce adverse impacts:** • Not consistent with Horsham Township Zoning Ordinance of 1995. • Not entirely consistent with the Horsham Township Comprehensive Plan Update 2011 (due to Tournament Drive). • Consistent with DVRPC's Connections Plan. • Consistent with the HLRA's Redevelopment Plan. ***Mitigation:*** Revise zoning to provide development criteria.	**Inconsistent with local planning, but mitigation would reduce impacts:** • Not consistent with Horsham Township Zoning Ordinance of 1995. • Consistent with the Horsham Township Comprehensive Plan Update 2011. • Consistent with DVRPC's Connections Plan. • Not consistent with the HLRA's Redevelopment Plan. ***Mitigation:*** Revise zoning to provide development criteria.	**Inconsistent with local planning, but mitigation would reduce impacts:** • Not consistent with Horsham Township Zoning Ordinance of 1995. • Not consistent with the Horsham Township Comprehensive Plan Update 2011. • Not consistent with DVRPC's Connections Plan. • Not consistent with the HLRA's Redevelopment Plan. ***Mitigation:*** Revise zoning to provide development criteria.	**Inconsistent with local planning with no feasible mitigation measures:** • Consistent with Horsham Township Zoning Ordinance of 1995. • Not consistent with the Horsham Township Comprehensive Plan Update 2011. • Not consistent with DVRPC's Connections Plan. • Not consistent with the HLRA's Redevelopment Plan. ***Mitigation:*** None proposed.

Table 2-2 Comparison of Environmental Consequences

Resource	Alternative 1 (HLRA Plan - Preferred Alternative)	Alternative 2 (HLRA Plan with Increased Residential Development)	Alternative 3 (Airfield Reuse)	No Action Alternative
Socioeconomics and Environmental Justice				
Economy, Employment, and Income	**Beneficial impact - increase in expenditures and job creation:** • $928 million in total construction expenditures. • 7,577 direct and 2,780 indirect/induced jobs created. • Positive short-term and long-term regional indirect and induced employment and income impacts. ***Mitigation*:** None proposed.	**Beneficial impact - increase in expenditures and job creation:** • $944.7 million in total construction expenditures. • 7,131 direct and 2,629 indirect/induced jobs created. • Positive short-term and long-term regional indirect and induced employment and income impacts. ***Mitigation*:** None proposed.	**Beneficial impact - increase in expenditures and job creation:** • $274.3 million in total construction expenditures. • 5,283 direct and 2,330 indirect/induced jobs created. • Positive short-term and long-term regional indirect and induced employment and income impacts. ***Mitigation*:** None proposed.	**No change from existing conditions:** • No construction spending. • No new jobs created. ***Mitigation*:** N/A
Population	**Increase in local population:** • Potential population increase of 3,555 people. ***Mitigation*:** None proposed.	**Increase in local population:** • Potential population increase of 4,653 people. ***Mitigation*:** None proposed.	**No substantial increase in local population:** • Potential population increase of 137 people. ***Mitigation*:** None proposed.	**No impact:** • No change in population. ***Mitigation*:** N/A
Housing	**Increase in number of housing units:** • Addition of 1,486 new housing units. ***Mitigation*:** None proposed.	**Increase in number of housing units:** • Addition of 1,999 new housing units. ***Mitigation*:** None proposed.	**Minor increase in housing:** • Addition of 70 new housing units. ***Mitigation*:** None proposed.	**No impact:** • No new housing. ***Mitigation*:** N/A
Taxes and Revenue	**Increase in local tax revenue:** • An annual addition of $15.6 million in tax revenues for Horsham Township. ***Mitigation*:** None proposed.	**Increase in local tax revenue:** • An annual addition of $16.9 million in tax revenues for Horsham Township. ***Mitigation*:** None proposed.	**Increase in local tax revenue:** • An annual addition of $4.2 million in tax revenues for Horsham Township and the potential for collecting airport fees. ***Mitigation*:** None proposed.	**No change from existing conditions:** • No additional taxes generated. ***Mitigation*:** N/A

Table 2-2 Comparison of Environmental Consequences

Resource	Alternative 1 (HLRA Plan - Preferred Alternative)	Alternative 2 (HLRA Plan with Increased Residential Development)	Alternative 3 (Airfield Reuse)	No Action Alternative
Environmental Justice	**No disproportionately high or adverse human health or environmental effect:** • Potential minority or low-income populations exist within the study area. However, they would not experience a disproportionately high or adverse human health or environmental effect as the impacts would be experienced by the entire community (e.g., traffic). In addition, economic impacts would be considered beneficial. ***Mitigation*:** None proposed.	**No disproportionately high or adverse human health or environmental effect:** • Potential minority or low-income populations exist within the study area. However, they would not experience a disproportionately high or adverse human health or environmental effect as the impacts would be experienced by the entire community (e.g., traffic). In addition, economic impacts would be considered beneficial. ***Mitigation*:** None proposed.	**No disproportionately high or adverse human health or environmental effect:** • Potential minority or low-income populations exist within the study area. However, they would not experience a disproportionately high or adverse human health or environmental effect as the impacts would be experienced by the entire community (e.g., traffic). In addition, economic impacts would be considered beneficial. ***Mitigation*:** None proposed.	**No disproportionately high or adverse human health or environmental effect:** • No change. ***Mitigation*:** N/A
Community Facilities and Services				
Schools	**Additional student enrollment would not exceed capacity:** • The anticipated increase in school enrollment of 571 would not be expected to exceed capacity. The loss of Federal Impact Aid would be replaced by additional school tax revenue from redevelopment. ***Mitigation*:** None proposed.	**Additional student enrollment would not exceed capacity:** • The anticipated increase in school enrollment of 807 would not be expected to exceed capacity for the elementary and high school. It is assumed that construction of the proposed new middle school would accommodate the slight increase in enrollment at the middle school. The loss of Federal Impact Aid would be replaced by additional school tax revenue from redevelopment. ***Mitigation*:** None proposed.	**Additional student enrollment would not exceed capacity:** • The anticipated increase in school enrollment of 53 would not be expected to exceed capacity. The loss of Federal Impact Aid would be replaced by additional school tax revenue from redevelopment. ***Mitigation*:** None proposed.	**No additional student enrollment:** • The loss of Federal Impact Aid would not be replaced through additional school tax revenue from redevelopment. ***Mitigation*:** None proposed.
Police, Fire, Health Services	**Minor change in public safety and health services:** • The need for services would increase. The associated municipal cost would be offset by additional tax revenue from redevelopment. ***Mitigation*:** None proposed.	**Minor change in public safety and health services:** • The need for services would increase. The associated municipal cost would be offset by additional tax revenue from redevelopment. ***Mitigation*:** None proposed.	**Minor change in public safety and health services:** • The need for services would increase. The associated municipal cost would be offset by additional tax revenue from redevelopment. ***Mitigation*:** None proposed.	**No impact:** • No change. ***Mitigation*:** N/A

Table 2-2 Comparison of Environmental Consequences

Resource	Alternative 1 (HLRA Plan - Preferred Alternative)	Alternative 2 (HLRA Plan with Increased Residential Development)	Alternative 3 (Airfield Reuse)	No Action Alternative
Recreation	**Beneficial impact on recreational space:** • A beneficial impact would result as additional recreational space and facilities would be added as part of the redevelopment. ***Mitigation*:** None proposed.	**Beneficial impact on recreational space:** • A beneficial impact would result as additional recreational space and facilities would be added as part of the redevelopment. ***Mitigation*:** None proposed.	**Beneficial impact on recreational space:** • A beneficial impact would result as additional recreational space and facilities would be added as part of the redevelopment. ***Mitigation*:** None proposed.	**No change to existing conditions:** • No change. ***Mitigation*:** N/A
Transportation				
Traffic	**Significant and unavoidable increase in traffic even with implementation of proposed mitigation measures:** • 36,250 new external daily weekday trips generated. • 2,820 new external a.m. peak-hour trips • 3,719 new external p.m. peak-hour trips. • All intersections would experience an increase in delay of more than 10 seconds, and 12 of 14 existing intersections would experience a drop in LOS compared to existing conditions. • One new intersection proposed; would operate at acceptable levels. ***Mitigation*:** • 20-year development period with background growth in traffic unrelated to the action. • Adjust signal timing. • Add signalization to stop-sign controlled intersections. • Add through-lanes, multiple left-turn lanes, and channelized right-turn lanes, as appropriate (see Section 4.4).	**Significant and unavoidable increase in traffic even with implementation of proposed mitigation measures:** • 35,335 new external daily weekday trips generated. • 2,817 new external a.m. peak-hour trips • 3,592 new external p.m. peak-hour trips. • All intersections would experience an increase in delay of more than 10 seconds, and 12 of 14 existing intersections would experience a drop in LOS compared to existing conditions. • One new intersection proposed; would operate at acceptable levels. ***Mitigation*:** • 20-year development period with background growth in traffic unrelated to the action. • Adjust signal timing. • Add signalization to stop-sign controlled intersections. • Add through-lanes, multiple left-turn lanes, and channelized right-turn lanes, as appropriate (see Section 4.4).	**Significant and unavoidable increase in traffic even with implementation of proposed mitigation measures:** • 23,126 new external daily weekday trips generated. • 1,456 new external a.m. peak hour trips • 2,203 new external p.m. peak hour trips. • All intersections would experience an increase in delay of more than 10 seconds, and 11 of 14 existing intersections would experience a drop in LOS compared to existing conditions. ***Mitigation*:** • 20-year development period with background growth in traffic unrelated to the action. • Adjust signal timing. • Add signalization to stop-sign controlled intersections. • Add through-lanes, multiple left-turn lanes, and channelized right-turn lanes, as appropriate (see Section 4.4).	**Not a significant increase in traffic:** • Although 13 of 14 existing intersections would experience an increase in delay of more than 10 seconds and 11 of 14 existing intersections would experience a drop in LOS compared to existing conditions, this is related to the estimated background growth in traffic and is unrelated to the action. ***Mitigation:*** None proposed.

Table 2-2 Comparison of Environmental Consequences

Resource	Alternative 1 (HLRA Plan - Preferred Alternative)	Alternative 2 (HLRA Plan with Increased Residential Development)	Alternative 3 (Airfield Reuse)	No Action Alternative
Environmental Management				
Hazardous Waste and Materials	**No impact on the environment related to hazardous waste and materials:** • The quantity of hazardous materials and waste generated, stored, or disposed of would be less than 2010 conditions, the last year the base was fully operational. • Assumed beneficial impact due to removal of storage tanks during redevelopment. ***Mitigation*:** • Management in accordance with federal, state, and Town of Horsham requirements.	**No impact on the environment related to hazardous waste and materials:** • The quantity of hazardous materials and waste generated, stored, or disposed of would be less than 2010 conditions, the last year the base was fully operational. • Assumed beneficial impact due to removal of storage tanks during redevelopment. ***Mitigation*:** • Management in accordance with federal, state, and Town of Horsham requirements.	**No impact on the environment related to hazardous waste and materials:** • The quantity of hazardous materials and waste generated, stored, or disposed of would be expected to be greater than under Alternatives 1 or 2 due to aircraft/airfield operations. However, the quantity would still be less than 2010 conditions, the last year the base was fully operational. • Assumed beneficial impact due to removal of storage tanks during redevelopment. ***Mitigation:*** • Management in accordance with federal, state, and Town of Horsham requirements.	**No impact:** • No hazardous materials or waste would be generated, stored, or disposed of because no redevelopment activities would occur. ***Mitigation*:** N/A
Radioactive Materials Sites	**No impact on the environment related to radioactive materials sites:** • The presence of radioactive contamination has not been confirmed. • Potential for radioactive contamination described in the scoping survey would be managed by the Navy likely under the ER program, and redevelopment would be compatible with the Navy's commitment to clean up any contaminated sites. ***Mitigation*:** • Management in accordance with federal, state, and Town of Horsham requirements.	**No impact on the environment related to radioactive materials sites:** • The presence of radioactive contamination has not been confirmed. • Potential for radioactive contamination discussed in the scoping survey would be managed by the Navy likely under the ER program, and redevelopment would be compatible with the Navy's commitment to clean up any contaminated sites. ***Mitigation*:** • Management in accordance with federal, state, and Town of Horsham requirements.	**No impact on the environment related to radioactive materials sites:** • The presence of radioactive contamination has not been confirmed. • Radioactive contamination discussed in the scoping survey would be managed by the Navy likely under the ER program, and redevelopment would be compatible with the Navy's commitment to clean up any contaminated sites. ***Mitigation*:** • Management in accordance with federal, state, and Town of Horsham requirements.	**No impact:** • The presence of radioactive contamination has not been confirmed. • Radioactive contamination discussed in the scoping survey would be managed by the Navy likely under the ER program. • Despite the lack of redevelopment, the Navy would continue to clean up any contaminated sites. ***Mitigation*:** • Management in accordance with federal, state, and Town of Horsham requirements.

Table 2-2 Comparison of Environmental Consequences

Resource	Alternative 1 (HLRA Plan - Preferred Alternative)	Alternative 2 (HLRA Plan with Increased Residential Development)	Alternative 3 (Airfield Reuse)	No Action Alternative
Environmental Restoration Program	**No impact on the environment related to the environmental restoration program:** • Redevelopment would be compatible with the Navy's program and commitment to clean up hazardous waste sites. ***Mitigation:*** • Management in accordance with federal, state, and Town of Horsham requirements.	**No impact on the environment related to the environmental restoration program:** • Redevelopment would be compatible with the Navy's program and commitment to clean up hazardous waste sites. ***Mitigation*:** • Management in accordance with federal, state, and Town of Horsham requirements.	**No impact on the environment related to the environmental restoration program:** • Redevelopment would be compatible with the Navy's program and commitment to clean up hazardous waste sites. ***Mitigation:*** • Management in accordance with federal, state, and Town of Horsham requirements.	**No impact on the environment related to the environmental restoration program:** • Despite the lack of redevelopment, the Navy would continue clean up hazardous waste sites. ***Mitigation:*** • Management in accordance with federal, state, and Town of Horsham requirements.

Table 2-2 Comparison of Environmental Consequences

Resource	Alternative 1 (HLRA Plan - Preferred Alternative)	Alternative 2 (HLRA Plan with Increased Residential Development)	Alternative 3 (Airfield Reuse)	No Action Alternative
Air Quality				
Construction and Operational Emissions	**Moderate impacts, and mitigation would further reduce adverse impacts:** Construction Emissions: • The generation of construction emissions would not be permanent. • Emissions could occur intermittently during the 20-year development period. Operational Emissions: • Operational emissions result from building energy use of fuel oil, natural gas, and electricity primarily for heating and cooling. • Increased vehicle traffic would result in increased vehicle emissions. ***Mitigation:*** • Construction emissions could be mitigated through best management practices (BMPs) for equipment management and dust control. • Emissions related to building use could be mitigated through energy-efficient design. • Transportation emissions could be mitigated through Smart Growth principles and public transportation.	**Moderate impacts, and mitigation would further reduce adverse impacts:** Construction Emissions: • The generation of construction emissions would not be permanent. • Emissions could occur intermittently during the 20-year development period. Operational Emissions: • Similar to Alternative 1; operational emissions from building energy use of fuel oil, natural gas, and electricity primarily for heating and cooling. • Increased vehicle traffic would result in increased vehicle emissions. ***Mitigation:*** • Construction emissions could be mitigated through BMPs for equipment management and dust control. • Emissions related to building use could be mitigated through energy-efficient design. • Transportation emissions could be mitigated through Smart Growth principles and public transportation.	**Moderate impacts, and mitigation would further reduce adverse impacts:** Construction Emissions: • The generation of construction emissions would not be permanent. • Emissions could occur intermittently during the 20-year development period. Operational Emissions: • Slightly less than under Alternatives 1 and 2; operational emissions from building energy use of fuel oil, natural gas, and electricity primarily for heating and cooling. • Increased vehicle traffic and aircraft operations associated with airfield reuse would result in increased mobile emissions. ***Mitigation:*** • Construction emissions could be mitigated through BMPs for equipment management and dust control. • Emissions related to building use could be mitigated through energy-efficient design. • Transportation emissions could be mitigated through Smart Growth principles and public transportation.	**No impact:** • No impact because no reuse or redevelopment would occur. ***Mitigation***: N/A

Table 2-2 Comparison of Environmental Consequences

Resource	Alternative 1 (HLRA Plan - Preferred Alternative)	Alternative 2 (HLRA Plan with Increased Residential Development)	Alternative 3 (Airfield Reuse)	No Action Alternative
Greenhouse Gas (GHG) Emissions	**Minor impacts, and mitigation would further reduce adverse impacts:** • The change in GHG emissions would be less than the standard of 25,000 metric tons recommended by the CEQ to warrant further analysis. ***Mitigation*:** • Energy efficiency, renewable energy, and Smart Growth principles would reduce GHG emissions.	**Minor impacts, and mitigation would further reduce adverse impacts:** • The change in GHG emissions would be less than the standard of 25,000 metric tons recommended by the CEQ to warrant further analysis. ***Mitigation*:** • Energy efficiency, renewable energy, and Smart Growth principles would reduce GHG emissions.	**Minor impacts, and mitigation would further reduce adverse impacts:** • The change in GHG emissions would be less than the standard of 25,000 metric tons recommended by the CEQ to warrant further analysis. ***Mitigation*:** • Energy efficiency, renewable energy, and Smart Growth principles would reduce GHG emissions.	**No impact.** • Emissions would not change because no reuse or redevelopment would occur. ***Mitigation*:** N/A
Noise				
Construction Noise	**Minor impacts, and mitigation would further reduce adverse impacts:** • Short-term noise impacts during construction. ***Mitigation:*** • If noise exceeds the maximum permitted sound pressure level (SPL), developers may need to implement noise-suppression measures to achieve the permitted SPL. • Conduct construction between the hours of 7:00 a.m. and 8:00 p.m., when the noise would be less disturbing for area residents.	**Minor impacts, and mitigation would further reduce adverse impacts:** • Short-term noise impacts during construction. ***Mitigation*:** • If noise exceeds the maximum permitted SPL, developers may need to implement noise-suppression measures to achieve the permitted SPL. • Conduct construction between the hours of 7:00 a.m. and 8:00 p.m., when the noise would be less disturbing for area residents.	**Minor impacts, and mitigation would further reduce adverse impacts:** • Short-term noise impacts during construction. ***Mitigation*:** • If noise exceeds the maximum permitted SPL, developers may need to implement noise-suppression measures to achieve the permitted SPL. • Conduct construction between the hours of 7:00 a.m. and 8:00 p.m., when the noise would be less disturbing for area residents.	**No impact.** • No impact because no reuse or redevelopment would occur. ***Mitigation:*** N/A
Operational Traffic Noise	**Minor impact on traffic noise:** • The largest estimated increase in traffic noise would be 5.4 dBA. • The noise increase would exceed the FHWA's noise abatement threshold, but not substantially exceed the threshold (i.e., by more than 15 dBA). ***Mitigation:*** None proposed.	**Minor impact on traffic noise:** • The largest increase in traffic noise would be 5.4 dBA. • The noise increase would exceed the FHWA's noise abatement threshold, but not substantially exceed the threshold (i.e., by more than 15 dBA). ***Mitigation:*** None proposed.	**Minor impact on traffic noise:** • The largest increase in traffic noise would be 4.9 dBA. • The increase noise would exceed the FHWA's noise abatement threshold, but not substantially exceed the threshold (i.e., by more than 15 dBA). ***Mitigation:*** None proposed.	**No impact.** • Although there would be a minor increase in traffic noise over existing conditions because of projected background traffic growth, this would be unrelated to the action. ***Mitigation*:** None proposed.

Table 2-2 Comparison of Environmental Consequences

Resource	Alternative 1 (HLRA Plan - Preferred Alternative)	Alternative 2 (HLRA Plan with Increased Residential Development)	Alternative 3 (Airfield Reuse)	No Action Alternative
Operational Aircraft Noise	**No impact:** • No proposed aircraft operations. ***Mitigation*:** N/A	**No impact:** • No proposed aircraft operations. ***Mitigation*:** N/A	**Minor impact:** • Noise from aircraft operations would be present; however, total acreage within the 65 dB DNL noise zone would decrease from 2010 conditions. ***Mitigation:*** None proposed.	**No impact.** • The airfield would not be reused and no proposed aircraft operations would occur. ***Mitigation*:** N/A
Infrastructure and Utilities				
Water Demand	**A significant increase in water demand would occur, but mitigation measures would reduce impacts to not significant:** • Demand of 668,649 gallons per day (gpd) would exceed the current capacity of the Horsham Water and Sewer Authority (HWSA). • The existing water distribution system would need to be expanded to accommodate redevelopment. ***Mitigation*:** • The developer may be required to estimate the potential impacts on the water system and identify a source of drinking water to accommodate the proposed development. • Water demand may be further reduced through the incorporation of the latest green and sustainable design principles.	**A significant increase in water demand would occur, but mitigation measures would reduce impacts to not significant:** • Demand of 765,298 gpd would exceed the current capacity of the HWSA. • The existing water distribution system would need to be expanded to accommodate redevelopment. ***Mitigation*:** • The developer may be required to estimate the potential impacts on the water system and identify a source of drinking water to accommodate the proposed development. • Water demand may be further reduced through the incorporation of the latest green and sustainable design principles.	**An increase in water demand would occur, but mitigation measures would reduce impacts:** • Demand of 201,937 gpd would exceed the current capacity of the HWSA. • The existing water distribution system would need to be expanded to accommodate redevelopment. ***Mitigation*:** • The developer may be required to estimate the potential impacts on the water system and identify a source of drinking water to accommodate the proposed development. • Water demand may be further reduced through the incorporation of the latest green and sustainable design principles.	**No impact.** • No impact on infrastructure and utilities would occur because reuse or redevelopment would not occur. ***Mitigation*:** N/A

Table 2-2 Comparison of Environmental Consequences

Resource	Alternative 1 (HLRA Plan - Preferred Alternative)	Alternative 2 (HLRA Plan with Increased Residential Development)	Alternative 3 (Airfield Reuse)	No Action Alternative
Wastewater	**A significant increase in wastewater generated would occur, but mitigation would reduce impacts to not significant:** • Demand of 586,457 gpd of generated wastewater would exceed the current capacity of the HWSA. • The existing wastewater collection system would need to be expanded to accommodate redevelopment. ***Mitigation*:** • Planned future expansion would be expected to accommodate the increased demand associated with redevelopment.	**A significant increase in wastewater generated would occur, but mitigation would reduce impacts to not significant:** • Demand of 663,970 gpd of generated wastewater would exceed the current capacity of the HWSA. • The existing wastewater collection system would need to be expanded to accommodate redevelopment. ***Mitigation*:** • Planned future expansion would be expected to accommodate the majority of the proposed redevelopment, but may not be adequate to accommodate the redevelopment in its entirety.	**An increase in wastewater generated would occur, but mitigation would reduce impacts:** • Demand of 191,588 gpd of generated wastewater would exceed the current capacity of the HWSA. • The existing wastewater collection system would need to be expanded to accommodate redevelopment. ***Mitigation*:** • Planned future expansion would be expected to accommodate the increased demand associated with redevelopment.	**No impact.**
Stormwater	**Increase in amount of impervious surface would occur, but mitigation would reduce impacts:** • Impervious surface area would increase by an estimated 103 acres (a 12 percent increase from baseline). • The existing stormwater collection system would require modification and expansion to accommodate redevelopment. ***Mitigation*:** • The developer would be required to draft a stormwater management plan and adhere to the Horsham Township's requirement for using a watershed approach.	**Increase in amount of impervious surface would occur, but mitigation would reduce impacts:** • Impervious surface area would increase by an estimated 102 acres (a 12 percent increase from baseline). • The existing stormwater collection system would require modification and expansion to accommodate redevelopment. ***Mitigation*:** • The developer would be required to draft a stormwater management plan and adhere to the Horsham Township's requirement for using a watershed approach.	**Increase in amount of impervious surface would occur, but mitigation would reduce impacts:** • Impervious surface area would increase by 52 acres (a 6 percent increase from baseline). • The existing stormwater collection system would require modification and expansion to accommodate redevelopment. ***Mitigation*:** • The developer would be required to draft a stormwater management plan and adhere to the Horsham Township's requirement for using a watershed approach.	**No impact.**

Table 2-2 Comparison of Environmental Consequences

Resource	Alternative 1 (HLRA Plan - Preferred Alternative)	Alternative 2 (HLRA Plan with Increased Residential Development)	Alternative 3 (Airfield Reuse)	No Action Alternative
Other Utility Systems	**Minor impact on other utility systems would occur:** Electric: • Annual demand of 48,515,031 kilowatt hours (kWh) would be provided by the Pennsylvania Electric Company (PECO). • No anticipated capacity constraints for the foreseeable future. • New electric connections/ infrastructure would be required. Natural Gas: • Annual demand of 179,935,948 cubic feet (cf) of natural gas. • No anticipated capacity constraints due to planned improvements to natural gas infrastructure within PECO Energy's service territory. • New gas connections/infrastructure would be required. ***Mitigation*:** None proposed.	**Minor impact on other utility systems would occur:** Electric: • Annual demand of 47,897,027 kWh would be provided by PECO. • No anticipated capacity constraints for the foreseeable future. • New electric connections/ infrastructure would be required. Natural Gas: • Annual demand of 196,425,488 cf of natural gas. • No anticipated capacity constraints due to planned improvements to natural gas infrastructure within PECO Energy's service territory. • New gas connections/infrastructure would be required. ***Mitigation*:** None proposed.	**Minor impact on other utility systems would occur:** Electric: • Annual demand of 23,306,943 kWh would be provided by PECO. • No anticipated capacity constraints for the foreseeable future. • New electric connections/ infrastructure would be required. Natural Gas: • Annual demand of 55,923,668 cf of natural gas. • No anticipated capacity constraints due to planned improvements to natural gas infrastructure within PECO Energy's service territory. • New gas connections/infrastructure would be required. ***Mitigation*:** None proposed.	**No impact.**

Table 2-2 Comparison of Environmental Consequences

Resource	Alternative 1 (HLRA Plan - Preferred Alternative)	Alternative 2 (HLRA Plan with Increased Residential Development)	Alternative 3 (Airfield Reuse)	No Action Alternative
Cultural Resources				
Archaeological	**Significant, negative, indirect impacts** on two National Register of Historic Places (NRHP)-eligible archaeological sites would potentially occur. These impacts would be mitigated to a finding of no adverse effect as discussed below for NRHP-eligible historic properties. ***Mitigation*:** • See NRHP-Listed or -Eligible Historic Properties for mitigation.	**Significant, negative, indirect impacts** on two NRHP-eligible archaeological sites would potentially occur. These impacts would be mitigated to a finding of no adverse effect as discussed below for NRHP-eligible historic properties. ***Mitigation*:** • See NRHP-Listed or -Eligible Historic Properties for mitigation.	**Significant, negative, indirect impacts** on two NRHP-eligible archaeological sites would potentially occur. These impacts would be mitigated to a finding of no adverse effect as discussed below for NRHP-eligible historic properties. ***Mitigation*:** • See NRHP-listed or -Eligible Historic Properties for mitigation.	**No impact:** • No impact on cultural resources or historic properties because no reuse or redevelopment would occur.
Architectural	**No significant direct or indirect impacts** on architectural resources would occur as none are NRHP-listed or eligible for listing. ***Mitigation*:** N/A	**No significant direct or indirect impacts** on architectural resources would occur as none are NRHP-listed or eligible for listing. ***Mitigation*:** N/A	**No significant direct or indirect impacts** on architectural resources would occur as none are NRHP-listed or eligible for listing. ***Mitigation*:** N/A	
NRHP-Listed or -Eligible Historic Properties	**No adverse effect with mitigation:** The Navy is proposing a finding of no adverse effect with mitigation (deed restrictions and covenants imposed on the property recipient). Consultation on the proposed finding of effect is ongoing. ***Mitigation*:** • The transferred property would have deed restrictions and covenants placed upon it where the future developer would be required to obtain written permission of the Pennsylvania SHPO prior to any ground disturbance at these two sites.	**No adverse effect with mitigation:** The Navy is proposing a finding of no adverse effect with mitigation (deed restrictions and covenants imposed on the property recipient). Consultation on the proposed finding of effect is ongoing. ***Mitigation*:** • The transferred property would have deed restrictions and covenants placed upon it where the future developer would be required to obtain written permission of the Pennsylvania SHPO prior to any ground disturbance at these two sites.	**No adverse effect with mitigation:** The Navy is proposing a finding of no adverse effect with mitigation (deed restrictions and covenants imposed on the property recipient). Consultation on the proposed finding of effect is ongoing. ***Mitigation*:** • The transferred property would have deed restrictions and covenants placed upon it where the future developer would be required to obtain written permission of the Pennsylvania SHPO prior to any ground disturbance at these two sites.	
Native American Resources	Consultation to determine potential impacts on Native American resources is ongoing. ***Mitigation*:** N/A	Consultation to determine potential impacts on Native American resources is ongoing. ***Mitigation*:** N/A	Consultation to determine potential impacts on Native American resources is ongoing. ***Mitigation*:** N/A	

Table 2-2 Comparison of Environmental Consequences

Resource	Alternative 1 (HLRA Plan - Preferred Alternative)	Alternative 2 (HLRA Plan with Increased Residential Development)	Alternative 3 (Airfield Reuse)	No Action Alternative
Topography, Geology, and Soils				
Topography	**Minor impact on topography would occur:** • Development would largely occur in areas that have been previously developed by the Navy. • Some alteration of the existing topography would be expected as a result of grading and associated cut-and-fill activities necessary to accommodate the new buildings. ***Mitigation*:** None proposed.	**Minor impact on topography would occur:** • Development would largely occur in areas that have been previously developed by the Navy. • Some alteration of the existing topography would be expected as a result of grading and associated cut-and-fill activities necessary to accommodate the new buildings. ***Mitigation*:** None proposed.	**Minor impact on topography would occur:** • Development would largely occur in areas that have been previously developed by the Navy. • Some alteration of the existing topography would be expected as a result of grading and associated cut-and-fill activities necessary to accommodate the new buildings. ***Mitigation*:** None proposed.	**No impact:** • No impact on topography, geology, and soils would occur, because no reuse or redevelopment would occur.
Geology	**No impact.** ***Mitigation*:** N/A	**No impact.** ***Mitigation*:** N/A	**No impact.** ***Mitigation*:** N/A	
Soils	**Minor impact on soils would occur, and mitigation would further reduce impacts:** • Development would largely occur in areas where soils have been previously disturbed by the Navy. • New construction could impact soils that have moderate erosion potential, are very dense, and have moderate frost action. ***Mitigation*:** • Implementation of appropriate erosion and sediment control measures in accordance with local and state laws and permits.	**Minor impact on soils would occur, and mitigation would further reduce impacts:** • Development would largely occur in areas where soils have been previously disturbed by the Navy. • New construction could impact soils that have moderate erosion potential, are very dense, and have moderate frost action. ***Mitigation*:** • Implementation of appropriate erosion and sediment control measures in accordance with local and state laws and permits.	**Minor impact on soils would occur, and mitigation would further reduce impacts:** • Development would largely occur in areas where soils have been previously disturbed by the Navy. • New construction could impact soils that have moderate erosion potential, are very dense, and have moderate frost action. ***Mitigation*:** • Implementation of appropriate erosion and sediment control measures in accordance with local and state laws and permits.	

Table 2-2 Comparison of Environmental Consequences

Resource	Alternative 1 (HLRA Plan - Preferred Alternative)	Alternative 2 (HLRA Plan with Increased Residential Development)	Alternative 3 (Airfield Reuse)	No Action Alternative
Water Resources				
Surface Water	**Potentially significant impacts on surface water would potentially occur, but mitigation would reduce impacts:** • Potential direct impact on 1,909 linear feet of stream. ***Mitigation*:** • The developer will consider the locations of surface waters in their final design. • The developer will comply with the requirements of Chapter 230-49(E) of the Horsham Township Code, which relate to waterbodies at the former installation. • Mitigation requirements for direct stream impacts will be determined through coordination with USACE and PADEP, and a site-specific management plan will be developed (to be completed following the final design phase and as part of the Section 401/404 permit process).	**Potentially significant impacts on surface water would potentially occur, but mitigation would reduce impacts:** • Potential direct impact on 1,687 linear feet of stream. ***Mitigation*:** • The developer will consider the locations of surface waters in their final design. • The developer will comply with the requirements of Chapter 230-49(E) of the Horsham Township Code, which relate to waterbodies at the former installation. • Mitigation requirements for direct stream impacts will be determined through coordination with USACE and PADEP, and a site-specific management plan will be developed (to be completed following the final design phase and as part of the Section 401/404 permit process).	**Potentially significant impacts on surface water would potentially occur, but mitigation would reduce impacts:** • Potential direct impact on 1,932 linear feet of stream. ***Mitigation*:** • The developer will consider the locations of surface waters in their final design. • The developer will comply with the requirements of Chapter 230-49(E) of the Horsham Township Code, which relate to waterbodies at the former installation. • Mitigation requirements for direct stream impacts will be determined through coordination with USACE and PADEP, and a site-specific management plan will be developed (to be completed following the final design phase and as part of the Section 401/404 permit process).	**No impact:** • No impact on water resources would occur, because no reuse or redevelopment would occur.

Table 2-2 Comparison of Environmental Consequences

Resource	Alternative 1 (HLRA Plan - Preferred Alternative)	Alternative 2 (HLRA Plan with Increased Residential Development)	Alternative 3 (Airfield Reuse)	No Action Alternative
Water Quality	**Potentially significant impacts on water quality would occur, but mitigation would reduce impacts:** • Impervious surface area would increase to 352 acres (an increase of 103 acres above existing conditions). • Full build-out would impact water quality, but the impact would be partially offset by the use of BMPs during construction and improvements to the stormwater collection system, as noted in mitigation. ***Mitigation*:** • The developer would be required to draft a stormwater management plan and adhere to Horsham Township's requirement for using a watershed approach. • Compliance with local and state permit requirements (permit from Town of Horsham and NPDES Construction Permit from state), as well as local stormwater and construction runoff ordinances. • Implementation of BMPs, as outlined in Section 6.2.	**Potentially significant impacts on water quality would occur, but mitigation would reduce the impacts:** • Impervious surface area would increase to 351 acres (an increase of 102 acres above existing conditions). • Full build-out would impact water quality, but the impact would be partially offset by the use of BMPs during construction and improvements to the stormwater collection system, noted in mitigation. ***Mitigation*:** • The developer would be required to draft a stormwater management plan and adhere to Horsham Township's requirement for using a watershed approach. • Compliance with local and state permit requirements (permit from Town of Horsham and NPDES Construction Permit from state), as well as local stormwater and construction runoff ordinances. • Implementation of BMPs, as outlined in Section 6.2.	**Potentially significant impacts on water quality would occur, but mitigation would reduce the impacts:** • Impervious surface area would increase to 301 acres (an increase of 52 acres above existing conditions). • Full build-out would impact water quality, but the impact would be partially offset by the use of BMPs during construction and improvements to the stormwater collection system, as noted in mitigation. ***Mitigation*:** • The developer would be required to draft a stormwater management plan and adhere to Horsham Township's requirement for using a watershed approach. • Compliance with local and state permit requirements (permit from Town of Horsham and NPDES Construction Permit from state), as well as local stormwater and construction runoff ordinances. • Implementation of BMPs, as outlined in Section 6.2.	

Table 2-2 Comparison of Environmental Consequences

Resource	Alternative 1 (HLRA Plan - Preferred Alternative)	Alternative 2 (HLRA Plan with Increased Residential Development)	Alternative 3 (Airfield Reuse)	No Action Alternative
Groundwater	**Minor impacts on groundwater would occur, and mitigation would further reduce adverse impacts:** • Temporary construction could extend below ground surface to a depth that would directly impact the underlying water table. • Potential spills of fuels or other chemicals and hazardous materials could occur during construction. ***Mitigation*:** • Use of standard dewatering techniques. • Compliance with stormwater permits, management plans, and erosion and sediment control plans. • Implementation of BMPs, as outlined in Section 6.2.	**Minor impacts on groundwater would occur, and mitigation would further reduce adverse impacts:** • Temporary construction could extend below ground surface to a depth that would directly impact the underlying water table. • Potential spills of fuels or other chemicals and hazardous materials could occur during construction. ***Mitigation*:** • Use of standard dewatering techniques. • Compliance with stormwater permits, management plans, and erosion and sediment control plans. • Implementation of BMPs, as outlined in Section 6.2.	**Minor impacts on groundwater would occur, and mitigation would further reduce adverse impacts:** • Temporary construction could extend below ground surface to a depth that would directly impact the underlying water table. • Potential spills of fuels or other chemicals and hazardous materials could occur during construction or during aircraft maintenance or operation. ***Mitigation*:** • Use of standard dewatering techniques. • Compliance with stormwater permits, management plans, and erosion and sediment control plans. • Implementation of BMPs, as outlined in Section 6.2.	
Floodplains	**No impact on floodplains would occur**: • No structures proposed in areas where floodplains would occur. ***Mitigation*:** N/A	**No impact on floodplains would occur**: • No structures proposed in areas where floodplains would occur. ***Mitigation*:** N/A	**No impact on floodplains would occur**: • No structures proposed in areas where floodplains would occur. ***Mitigation*:** N/A	

Table 2-2 Comparison of Environmental Consequences

Resource	Alternative 1 (HLRA Plan - Preferred Alternative)	Alternative 2 (HLRA Plan with Increased Residential Development)	Alternative 3 (Airfield Reuse)	No Action Alternative
Wetlands	**Potentially significant impacts on wetlands could occur, but mitigation would reduce impacts:** • Potential direct impact on 13 wetlands, encompassing 7.0 acres of wetlands. ***Mitigation*:** • The developer will consider the locations of surface waters in their final design. • If design cannot avoid impacts, mitigation requirements will be determined through coordination with USACE and PADEP, and a site-specific management plan will be developed (to be completed following the final design phase and as part of the Section 401/404 permit process).	**Potentially significant impact on wetlands could occur, but mitigation would reduce impacts:** • Potential direct impact on 12 wetlands encompassing 7.5 acres of wetlands. ***Mitigation:*** • The developer will consider the locations of surface waters in their final design. • If design cannot avoid impacts, mitigation requirements will be determined through coordination with USACE and PADEP, and a site-specific management plan will be developed (to be completed following the final design phase and as part of the Section 401/404 permit process).	**Potentially significant impact on wetlands could occur, but mitigation would reduce impacts:** • Potential direct impact on 10 wetlands encompassing 5.0 acres of wetlands. ***Mitigation:*** • The developer will consider the locations of surface waters in their final design. • If design cannot avoid impacts, mitigation requirements will be determined through coordination with USACE and PADEP, and a site-specific management plan will be developed (to be completed following the final design phase and as part of the Section 401/404 permit process).	
Biological Resources				
Vegetation	**Significant and unavoidable impacts on vegetation would occur with no feasible mitigation measures**: • Proposed construction could result in the long-term loss or alteration of approximately 68 acres of currently undeveloped land. ***Mitigation*:** None proposed.	**Significant and unavoidable impacts on vegetation would occur with no feasible mitigation measures**: • Proposed construction could result in the long-term loss or alteration of approximately 56 acres of currently undeveloped land. ***Mitigation*:** None proposed.	**Significant and unavoidable impacts on vegetation would occur with no feasible mitigation measures**: • Proposed construction could result in the long-term loss or alteration of approximately 47 acres of currently undeveloped land. ***Mitigation*:** None proposed.	**No impact on biological resources:** • No protected species or habitat is present, and no reuse or redevelopment would occur.

Table 2-2 Comparison of Environmental Consequences

Resource	Alternative 1 (HLRA Plan - Preferred Alternative)	Alternative 2 (HLRA Plan with Increased Residential Development)	Alternative 3 (Airfield Reuse)	No Action Alternative
Wildlife	**Minor impact on wildlife would occur**: • Wildlife species such as small mammals may be temporarily displaced in peripheral areas during construction when noise and human activity levels increase. **Mitigation:** None proposed.	**Minor impact on wildlife would occur**: • Wildlife species such as small mammals may be temporarily displaced in peripheral areas during construction when noise and human activity levels increase. **Mitigation:** None proposed.	**Minor impact on wildlife would occur**: • Wildlife species such as small mammals may be temporarily displaced in peripheral areas during construction when noise and human activity levels increase. • Given past aircraft operations at NAS JRB Willow Grove and the ability of wildlife to acclimate or habituate to noise exposure, noise generated from aircraft operations would not be expected to impact wildlife. **Mitigation:** None proposed.	***Mitigation*:** N/A
Threatened and Endangered Species	**No effect:** • No threatened or endangered species are known to occur on the property, and no designated critical habitat occurs on the property. ***Mitigation*:** N/A	**No effect:** • No threatened or endangered species are known to occur on the property, and no designated critical habitat occurs on the property. ***Mitigation*:** N/A	**No effect:** • No threatened or endangered species are known to occur on the property, and no designated critical habitat occurs on the property. ***Mitigation*:** N/A	

3 Affected Environment

This section summarizes the affected environment for each relevant human and natural environmental resource potentially impacted by the proposed action. Resource areas examined include land use (Section 3.1); socioeconomics and environmental justice (Section 3.2); community facilities and services (Section 3.3); transportation (Section 3.4); environmental management (Section 3.5); air quality (Section 3.6); noise (Section 3.7); infrastructure and utilities (Section 3.8); cultural resources (Section 3.9); topography, geology, and soils (Section 3.10); water resources (Section 3.11); and vegetation and wildlife (Section 3.12).

The study area examined includes the former NAS JRB Willow Grove property and, where applicable, the town of Horsham, Bucks and Montgomery counties, the Philadelphia metropolitan area, and the Commonwealth of Pennsylvania.

For the purposes of this EIS analysis, the year 2011 represents existing baseline conditions[2]. The year 2011 was used because it was the last year during which NAS JRB Willow Grove was fully operational. This baseline year represents conditions while NAS JRB was operating and provides a meaningful point from which to compare potential future environmental, social, and economic effects of the proposed action. The condition of the human and natural resources during this year serves as an environmental baseline against which the environmental consequences of the alternatives considered in this EIS are measured and compared. For certain resources, it was necessary for the baseline year to differ slightly from 2011 (i.e., availability of data) and in those instances, the rationale is explained within that resource description. In addition, per CEQ regulations, a No Action Alternative is evaluated to provide a point of comparison between the action (redevelopment) alternatives and the property being left in caretaker status. The environmental impacts on each resource are described in Section 4, Environmental Consequences.

3.1 Land Use

This section summarizes the land use conditions at and surrounding NAS JRB Willow Grove that existed when the installation was closed in September 2011. Zoning, municipal general or comprehensive planning documents, and other land use regulations applicable to land surrounding the installation are also summarized.

3.1.1 Baseline Land Use and Zoning

NAS JRB Willow Grove occupies approximately 861 acres in Horsham Township, Montgomery County, Pennsylvania, between Horsham Road (SR 463) and Easton Road (SR 611). The installation is divided into two distinct areas: support and runway with ancillary facilities.

Support – This 77-acre area is located between Easton Road, the runway, and ancillary facilities. The Horsham Air Guard Station is also located in this area; however, this parcel was previously transferred and it is not part of the Redevelopment Plan or included in the acreage. This area is dominated by facilities that formerly served residential and community support uses, including barracks, bachelor officer's quarters, a child development center, baseball field, thrift shop, and swimming pool. Administrative buildings, including the former Commanding Officer Naval Air Station Administration Building, are also located in this area.

[2] The No Action Alternative serves as a point of comparison for the potential environmental consequences from the action alternatives. Under the No Action Alternative, the installation would be retained by the federal government in caretaker status and there would be no redevelopment of the property. The baseline condition for this EIS consists of DOD operations in 2011 at the installation; however, data availability for certain resource areas necessitated using a different baseline condition year. In those cases, the baseline condition year is identified.

Runway and Ancillary Facilities – This 784-acre area comprises the largest area of NAS JRB Willow Grove. It includes an 8,000-foot-long runway and taxiway, parking aprons, and aircraft hangars. Aircraft and flight support facilities, including the FAA radar tower, are located adjacent to the taxiway, near Horsham Road. The airfield clear zones located at each end of the runway are undeveloped.

Three gated entry points controlled access onto the installation. The main gate (Gate 1) is located on Easton Road. Gate 4 is located at the southern end of the installation, at the intersection of Horsham Road and Maple Drive. Gate 5 is located at the intersection of Horsham Road and Precision Drive. Access at these gates was restricted to military personnel, military family members, retirees, contractors, and employees. From these five entry points, small collector roads provide access to individual buildings and areas throughout the installation.

The installation is located entirely within Horsham Township and is zoned I-1 (see Current Zoning in Section 3.1.2 for further explanation).

3.1.2 Surrounding Land Use and Zoning

The land adjacent to NAS JRB Willow Grove is predominantly in Horsham Township; small portions north of the installation are located in Warrington Township and Warminster Township (see Figure 3.1-1). Land use and development surrounding the installation is regulated by the following:

- Horsham Township Zoning Ordinance of 1995 (Horsham Township 1995)
- Horsham Township Comprehensive Plan Update 2011 (Horsham Township 2011)
- Warrington Township Zoning Ordinance of 1985 (Warrington Township 2012a)
- Warrington Township Comprehensive Plan Update (Warrington Township 2006)
- Warminster Township Zoning Ordinance (Warminster Township 2009)
- Warminster Township Comprehensive Plan (Warminster Township 2004)
- Connections – The Regional Plan for a Sustainable Future (Delaware Valley Regional Planning Commission 2009)

Baseline Land Use

Land uses adjacent to NAS JRB Willow Grove include transportation, agriculture, commercial, industrial, recreation, and undeveloped/open space (see Figure 3.1-2). County Line Road, Easton Road (SR 611), Maple Avenue, Horsham Road (SR 463), and Keith Valley Road are the primary arterial roads surrounding the installation. Undeveloped/open space (airfield clear zones) and small agricultural fields border the northwest side of the installation. Adjacent to the northeast and east sides, commercial land uses dominate along Easton Road, and there are small pockets of agriculture, undeveloped/open space, and recreational uses. Undeveloped/open space in the airfield clear zones and commercial land uses along Horsham Road are adjacent to the south side of the installation. In addition, a golf course, which surrounds a commercial business park, is adjacent to the installation to the southwest. Residential land uses are also present in the areas surrounding the former installation, although not immediately adjacent to the property.

The Transcontinental Pipeline is a natural gas mainline that spans several eastern states from the Gulf Coast to New York State. The pipeline crosses the installation east of the runway in a northeast direction. The pipeline does not provide natural gas service to the installation (see Figure 3.1-2) (RKG 2012).

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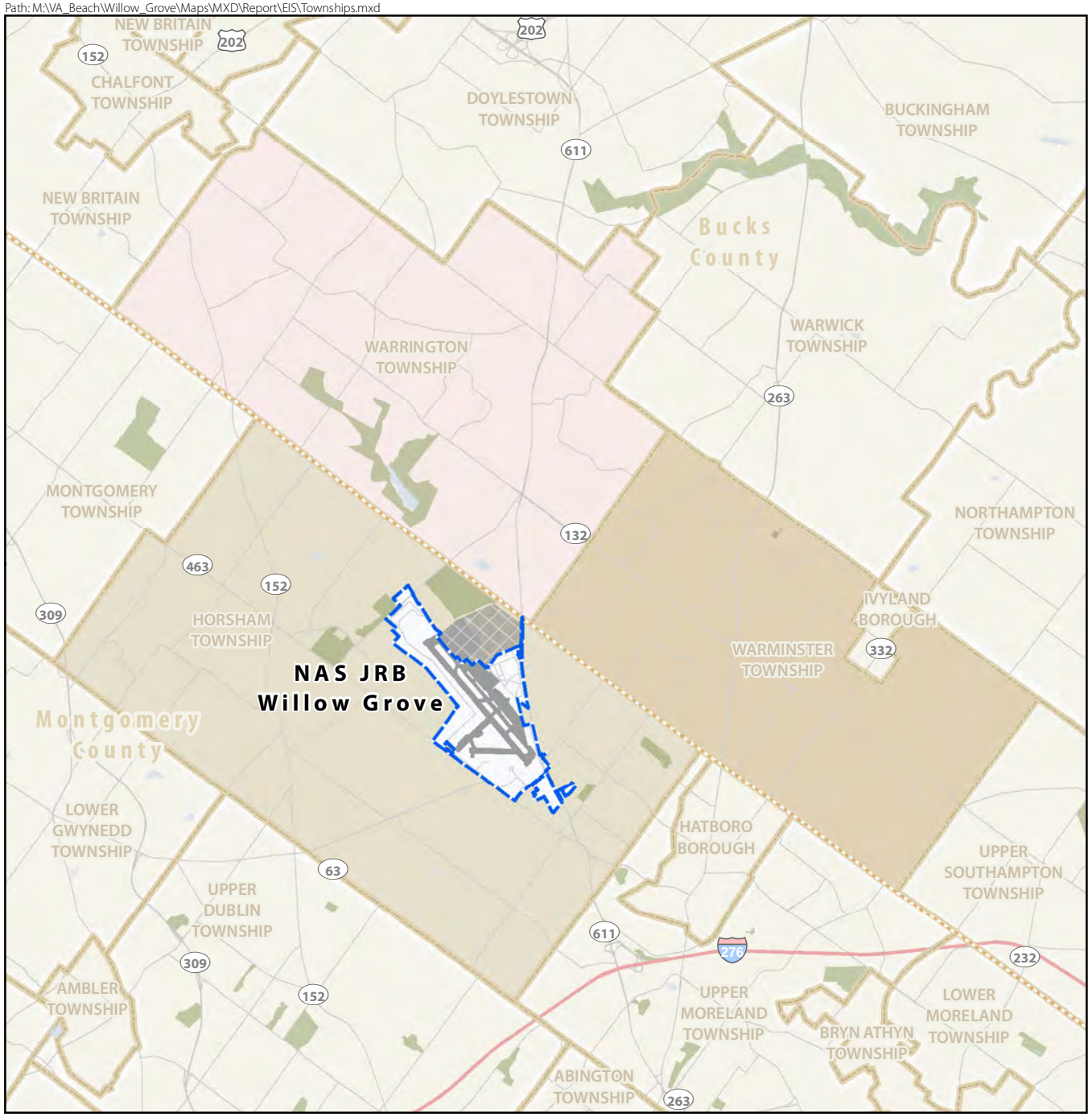

Figure 3.1-1

Townships Surrounding Former NAS JRB Willow Grove

NAS JRB Willow Grove

Horsham, PA

Legend

- County Boundary
- Freeway
- Major Road
- NAS JRB Willow Grove
- Runways, Taxiways, Parking Aprons
- Parks
- Township Boundary

Surrounding Townships

- Horsham Township
- Warminster Township
- Warrington Township
- FAA Tower and Horsham Air Guard Station (not included in redevelopment)

SCALE

0 1 2 Miles

SOURCE: Ecology and Environment 2013; ESRI 2010; RKG 2012; Tetra Tech 2012; USGS GNIS 2009.

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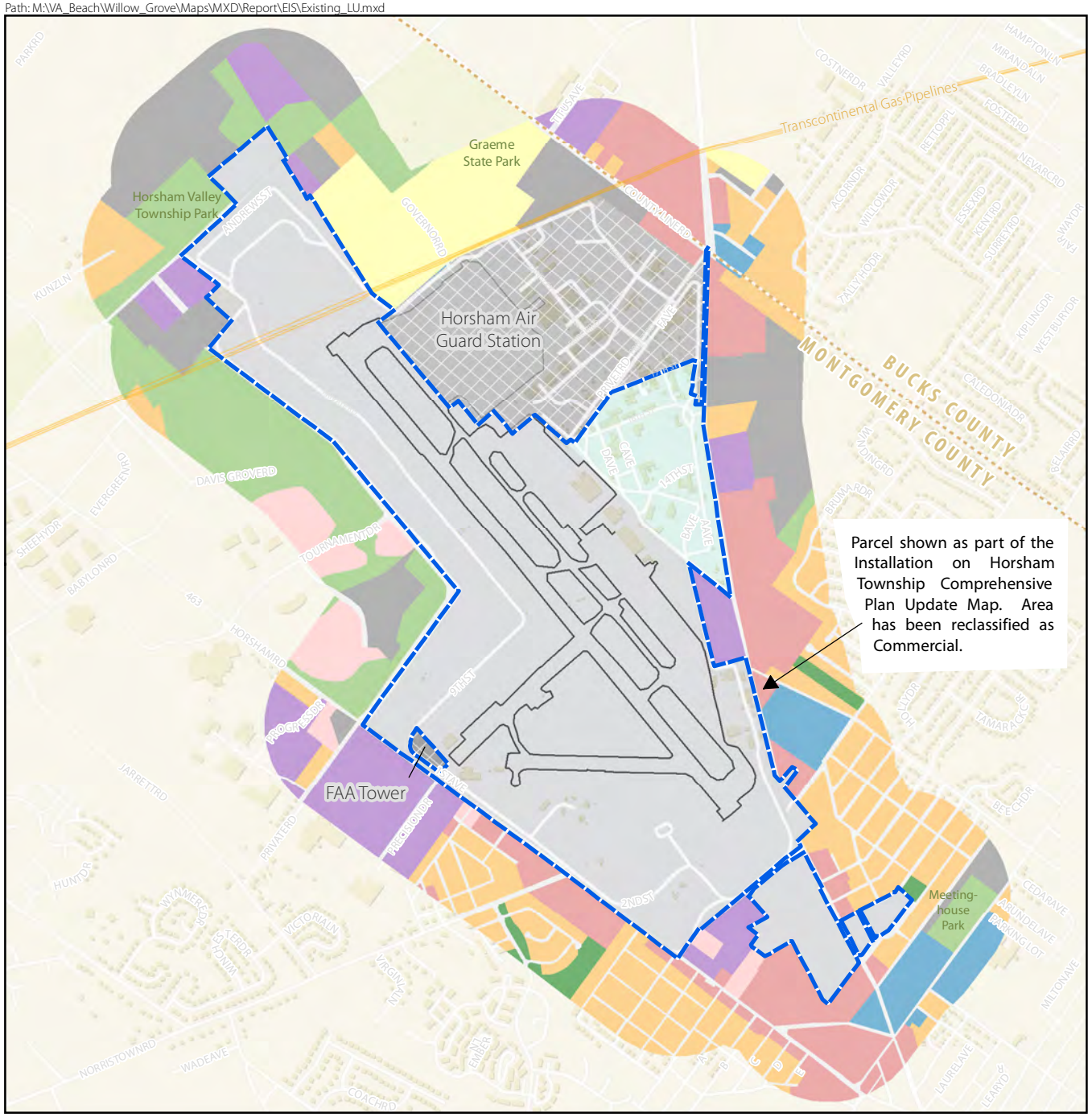

Figure 3.1-2

Baseline Land Use

Former NAS JRB Willow Grove

Horsham, PA

Legend

- County Boundary
- Transcontinental Gas Pipelines
- NAS JRB Willow Grove
- Runways, Taxiways, Parking Aprons
- FAA Tower and Horsham Air Guard Station (Not included in redevelopment)

Baseline Land Use

- Runway and Ancillary Facilities
- Support
- Agriculture
- Commercial
- Residential
- Industrial
- Institutional
- Office
- Preserved Open Space
- Recreation
- Roads
- Undeveloped

SCALE

0 0.25 0.5 Miles

SOURCE: Ecology and Environment 2013; ESRI 2010; RKG 2012; Tetra Tech 2012; Horsham Township Comprehensive Plan Update, 2011; National Pipeline Mapping System, 2007; Warrington Township Comprehensive Plan Update, 2006; Warminster Township Comprehensive Plan, 2003.

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Horsham Air Guard Station is located at the northeast corner of the installation and consists primarily of administrative and maintenance buildings. A concrete parking apron, surrounded by aircraft hangars and other aircraft support buildings, occupies a large portion of the Air Guard Station. The eastern side of the station consists of public works facilities, including a boiler house, and administrative building. The Horsham Air Guard Station is not included in the Navy's proposed action; however, it is discussed to provide context for the analysis and is considered in the cumulative impacts analysis.

Current Zoning

A majority of the installation is surrounded by properties within Horsham Township that are zoned commercial, industrial, and residential. Zoning designations adjacent to or in the vicinity of the installation and its intended purpose (Horsham Township 1995) include:

- *GC-2 (General Commercial and Highway Commercial)* – Provides for retail, wholesale, office, and highway-oriented commercial uses.
- *C-2 (General Commercial)* – Provides for convenience stores, wholesale, general service, and contractor's shops.
- *C-3 (Highway Commercial)* – Provides for a variety of highway, automobile-oriented retail commercial uses that cater to transient and local customers.
- *C-5 (Limited Commercial)* – Permits profitable uses of the land while limiting large groups of people in the airfield approach zone.
- *I-1 (Industrial)* – Permits large-scale industrial establishments that will not create a nuisance to adjacent landowners.
- *I-2 (Industrial*) – Allows industrial uses that will not constitute a hazard to people in adjacent areas.
- *I-3 (Industrial)* – Permits industrial establishments requiring small land areas that will not be a nuisance to adjacent areas.
- *PI (Planned Industrial)* – Provides for a variety of businesses and industries that require large areas and provides a process for developing industrial/business parks that incorporate open space and are aesthetically pleasing.
- *R-1 (Residential)* – Allows agricultural and residential uses and preserves open space.
- *R-2A (Residential)* – Allows agricultural and residential uses, including mobile home parks, and protects environmentally sensitive areas in the Park Creek watershed.
- *R-7 (Residential)* – Permits low-density residential developments and apartments that are consistent with the predominant character of single-family neighborhoods.

Portions of lands surrounding the former NAS JRB Willow Grove property were previously encumbered by an Airport Crash and Noise Overlay District (ACNOD). The ACNOD of the Horsham Township zoning ordinance was adopted in 1998 to recognize and implement recommendations of the Navy's Air Installations Compatible Use Zones (AICUZ) study that was prepared for the installation. The purpose of the overlay district was to protect the safety and welfare of the public from known hazards associated with air operations at NAS JRB Willow Grove in the accident potential zones (APZs), clear zones, and high noise exposure zones at each end of the runway. The overlay zone also limited building height, density, and floor area ratio, and prohibited incompatible land uses (e.g., single-family detached dwellings, churches, daycares, hotels, etc.) (Horsham Township 1995). Following the September 2011 closure of the installation and the fact that air operations no longer occur at NAS JRB Willow Grove, it

was proposed that the ACNOD be eliminated to remove the development restrictions surrounding the former installation. On February 13, 2013, the Horsham Township Council approved the regulation eliminating the ACNOD from the Township's zoning ordinance and zoning map (Horsham Township 2013).

The southeast corner of Warrington Township is adjacent to NAS JRB Willow Grove. This area is zoned commercial, residential, and industrial. Zoning designations adjacent to or in the vicinity of the installation and its intended purpose (Warrington Township 2012a) include:

- *R2 (Medium Density Residential)* – Provides for orderly, medium-density residential development.
- *CBD (Central Business District)* – Provides for a mixed-use area that includes residential and nonresidential uses, preserves existing natural amenities, and promotes interconnections with adjacent properties.
- *PI1 (Planned Industrial District)* – Permits industrial development that is consistent with the character of the township.

The southwest corner of Warminster Township is in the vicinity of, but not adjacent to, NAS JRB Willow Grove. The area northeast of the installation is zoned R2 (Residential), which provides for low-density, single-family dwellings (Warminster Township 2009).

3.1.3 Comprehensive Plans

Horsham Township Comprehensive Plan Update 2011

The *Horsham Township Comprehensive Plan Update 2011* (Horsham Township 2011) is an update of previous versions of the comprehensive plan that date back to 1969. The comprehensive plan is the principal document that guides long-range land use development and preservation of open space and natural resources within the township. The comprehensive plan also addresses the opportunity for redeveloping NAS JRB Willow Grove. The plan's goals and policies pertaining to NAS JRB Willow Grove are summarized below.

- **Naval Air Station Goal** – Develop a master plan for future use of the facility subsequent to the use by the military
- Objectives:
  - Eliminate future use as an airport
  - Evaluate the need of lands for through routing of traffic
  - Protect environmentally sensitive areas and important buffers along adjacent residential and recreation uses
  - Confirm that previous plan goals that stated restricted development at both ends of runway are no longer relevant

Chapter 9 of the *Horsham Township Comprehensive Plan Update 2011* (Horsham Township 2011) captures the township's vision for the future of NAS JRB Willow Grove and provides recommendations for future redevelopment plans. This vision is based on "smart growth" principles, which include incorporating mixed uses with a variety of housing options and a network of pedestrian and bicycle pathways that connect commercial areas with surrounding residential areas. The vision also emphasizes improving connectivity with the existing road network surrounding the installation by extending

Moreland Avenue, Norristown Road, Tournament Drive, Precision Road, Privet Road, and realigning Maple Avenue. Redevelopment of the installation should include areas for employment centers, future schools, recreation facilities, and a central location for retail and business services. In addition, the comprehensive plan states that flight operations shall not be included in the redevelopment of the installation.

In addition, the comprehensive plan recommends new commercial development be focused on the Easton Road (SR 611) corridor.

Warrington Township Comprehensive Plan Update

The *Warrington Township Comprehensive Plan Update* (Warrington Township 2006) addresses the local and regional issues facing the township. The comprehensive plan contains strategies, goals, and policies meant to manage future growth and maintain a high quality of life in the township. Although NAS JRB Willow Grove is not located in Warrington Township, the comprehensive plan identifies the disposal and redevelopment of the installation as a regional issue that could impact the township, specifically land use patterns along the SR 611 corridor. According to the plan, new commercial development at the southern end of SR 611 has resulted in an overabundance of retail space, which has caused several large stores to be abandoned throughout the township. Because of this, the comprehensive plan recommends that new commercial developments should not be added during the next decade and existing commercial space should be fully utilized before new space is added (Warrington Township 2006).

Warminster Township Comprehensive Plan

The Warminster Township Comprehensive Plan was adopted in 2004 to enhance the quality of life within the township. The comprehensive plan contains strategies, goals, and policies meant to manage future growth in the township. The plan emphasizes protecting the township's limited natural and historic resources through efficient use of land. Because the majority of the township is developed, future development will occur on infill properties, including developed areas, brownfields, and agricultural areas. Some of these areas may possess natural and historical resources which the township may want to preserve (Warminster Township 2004).

Connections – The Regional Plan for a Sustainable Future

The Delaware Valley Regional Planning Commission (DVRPC) is the metropolitan planning organization for the Greater Philadelphia region, which includes Montgomery County and Bucks County. The Planning Commission's purpose is to "build consensus on improving transportation, promoting smart growth, protecting the environment, and enhancing the economy" (DVRPC 2009). To fulfill its mission, the DVRPC prepares reports and plans and conducts studies to guide regional and transportation planning efforts. As part of this effort, the DVRPC prepared *Connections – The Regional Plan for a Sustainable Future* (*Connections*) (DVRPC 2009) to serve as the collective vision for the region through the year 2035.

The *Connections* plan identified land use challenges, including the loss of open space and agricultural lands and the lack of protection of undeveloped land from suburban sprawl. One of the goals of the plan is to manage growth and preserve open space. The plan encourages local communities to focus new development on infill areas (i.e., undeveloped or underutilized areas within a developed area) and redevelopment of existing developed areas, and promoting smart growth tools, including mixed-use, traditional neighborhood-type development. Chapter 7 of the *Connections* plan contains the following implementation strategies pertaining to land use (DVRPC 2009):

- Focus future development as infill and redevelopment in existing areas and target new development to designated future growth areas.

- Encourage compact, centers-based development through smart growth tools and techniques, such as transit-oriented development, traditional neighborhood design, transfer of development rights, and revitalization and stabilization of existing development.

HLRA Redevelopment Plan

The HLRA's Redevelopment Plan was prepared to analyze and document the public's proposed plan for redevelopment of the former NAS JRB Willow Grove property. The Redevelopment Plan, along with the goals, objectives, planning principles, process and public participation are discussed in Section 2.1. Ultimately, the HLRA's Redevelopment Plan identified Option F as the preferred final land use plan, which was submitted for approval. Option F was adapted into Alternative 1, the preferred alternative, for the purposes of this analysis.

3.2 Socioeconomics and Environmental Justice

This section discusses the socioeconomic conditions in the communities surrounding the former NAS JRB Willow Grove and presents an overview of the relevant regulatory authorities. For the purposes of projecting social and economic impacts, the study area is defined as Horsham Township, Montgomery County, and Bucks County. The following subsections also include the Philadelphia Metropolitan Statistical Area (MSA) for comparison. An MSA is defined by the U.S. Office of Management and Budget as an urban cluster with more than 50,000 persons with a high degree of social and economic integration and a high degree of commuting ties. The Philadelphia MSA extends across four states: Pennsylvania, New Jersey, Maryland, and Delaware. Montgomery County falls within the Philadelphia MSA.

Socioeconomics are defined as the demographic and economic characteristics of a defined geographic area such as a town, city, county, or state. Included in the resource analysis are population; economy, employment and income; housing and commercial property; and taxes and revenue. These are described below. The data presented in this resource section includes information from NAS JRB Willow Grove for the installation's final years of operation, as well as data for the period following closure, which were obtained from appropriate resources (e.g., U.S. Census Bureau).

- **Population.** The number of persons residing within a geographic area defined by the U.S. Census Bureau and included in the *2010 Census of Population and Housing* or in the *2007-2011 American Community Survey*.
- **Economy, employment, and income.** Employment by industry sector from the U.S. Census Bureau; annual labor force and unemployment statistics from the U.S. Bureau of Labor Statistics; and median household and per capita income data from the U.S. Census Bureau.

  Employment by industry sector refers to the way employment is distributed across companies producing similar products or providing similar services. Labor force is defined as the number of persons currently employed or actively searching for work within an area. Median household income is the total income a household receives from all sources where 50 percent of an area's households received have more total income and where 50 percent of an area's households receive less total income. Per capita income is a measure of the total income from all sources for all residents divided by the total number of residents in an area.
- **Housing and commercial property.** Number and characteristics of housing units within a defined geographic area such as recorded by the U.S. Census Bureau in *the 2010 Census of Population and Housing* and the *2007-2011 American Community Survey*.

- **Taxes and revenue.** Property taxes and other revenue sources for the municipalities were included in the resource analysis.

Environmental justice and the protection of children are closely aligned with socioeconomics. The U.S. Environmental Protection Agency (EPA) specifically defines environmental justice as "the fair treatment and meaningful involvement of all people regardless of race, color, sex, national origin, or income with respect to the development, implementation and enforcement of environmental laws, regulations, and policies" (EPA 2013a).

Executive Order (EO) 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, was signed by the president on February 11, 1994. This EO requires each federal agency to identify and address, as appropriate, disproportionately high and adverse human health or environmental impacts of its programs, policies, and activities on minority and low-income populations, including Native American populations. The U.S. Environmental Protection Agency (EPA) and CEQ emphasize the importance of incorporating environmental justice review in the analyses conducted by federal agencies under NEPA and of developing protective measures that avoid disproportionately high and adverse human health and environmental effects on minority and low-income populations.

The president issued EO 13045, Environmental Health Risks and Safety Risk to Children, on April 21, 1997. This order requires each federal agency to "make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children and shall . . . ensure that its policies, programs, activities, and standards address disproportionate risks to children". This order was issued because a growing body of scientific knowledge demonstrates that children may suffer disproportionately from environmental health risks and safety risks.

The Navy implements EO 12898 and EO 13045 through the Chief of Naval Operations Supplemental Environmental Planning Policy, signed on September 23, 2004, which is incorporated into OPNAVINST 5090.1C CH-1. This policy provides instructions for naval personnel to identify and assess stressors to, and disproportionately high and adverse human health and environmental effects upon, minorities, low-income populations, and children. A component of this policy institutes processes that result in consistent and efficient consideration of environmental impacts on Navy decision-making.

The CEQ has issued guidance to federal agencies on the terms used in EO 12898, as follows:

- **Low-income Population.** Low-income populations in an affected area should be identified using the annual statistical poverty thresholds from the U.S. Bureau of the Census.
- **Minority.** An individual who is a member of the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic.
- **Minority Population.** Minority populations should be identified where either: (a) the minority population of the affected area exceeds 50 percent, or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or another appropriate unit of geographic analysis.
- **Disproportionately High and Adverse Environmental Effects.** When determining whether environmental effects are disproportionately high and adverse, agencies are to consider the following three factors to the extent practicable:

1. Whether there is or will be an impact on the natural or physical environment that significantly (as employed by NEPA) and adversely affects a minority population, low-income population, or Indian tribe. Such effects may include ecological, cultural, human health, economic, or social impacts on minority communities, low-income communities, or Indian tribes when those impacts are interrelated to impacts on the natural or physical environment.
2. Whether environmental effects are significant (as employed by NEPA) and are or may be having an adverse impact on minority populations, low-income populations, or Indian tribes that appreciably exceed or are likely to appreciably exceed those on the general population or other appropriate comparison group.
3. Whether the environmental effects occur or would occur in a minority population, low-income population, or Indian tribe affected by cumulative or multiple adverse exposures from environmental hazards (CEQ 1997).

3.2.1 NAS JRB Willow Grove

Base Population

As of 2011, approximately 743 military personnel were stationed at NAS JRB Willow Grove (NAS JRB Willow Grove 2011). Military personnel and their family members resided in housing units in the surrounding socioeconomic study area or in the two housing annex properties associated with the former installation, the Jacksonville Road and Shenandoah Woods housing areas. In addition, active-duty military personnel, retired military personnel, and military family members live in proximity to NAS JRB Willow Grove. According to the Defense Eligibility Enrollment Reporting System (DEERS), in 2008 approximately 9,227 active-duty military personnel and their 19,302 family members, and 14,497 retired military personnel and their 15,960 family members were living within 20 miles of NAS JRB Willow Grove (see Table 3.2-1). The DEERS system is a database of military sponsors, families, and others worldwide who are entitled to military benefits. These personnel are not all associated with operations at NAS JRB Willow Grove and represent all major branches of the military service.

Table 3.2-1 Estimated Number of Active-duty Military Personnel, Retired Personnel, and Family Members Living within 20 miles of NAS JRB Willow Grove (2008)

	Active[1]	Retired
Army		
Military	1,425	4,487
Family Members	5,444	3,176
Air Force		
Military	210	2,915
Family Members	2,061	2,870
Marine Corps		
Military	316	1,206
Family Members	872	976
Navy		
Military	1,242	3,613
Family Members	3,630	3,848
U.S. Coast Guard		
Military	272	205
Family Members	249	171

Table 3.2-1 Estimated Number of Active-duty Military Personnel, Retired Personnel, and Family Members Living within 20 miles of NAS JRB Willow Grove (2008)

	Active[1]	Retired
Reserve		
Military	5,762	2,071
Family Members	7,046	4,379
Total		
Military	**9,227**	**14,497**
Family Members	**19,302**	**15,960**

Source: NAS JRB Willow Grove 2008a.

Note:
[1] Some ratios between military and family members may appear incorrect; however, this may represent situations where a service member is not co-located with family members (e.g., due to deployment, etc.) and the family members are accounted for in these figures while the military service member is not.

Base Employment

Since the 2005 BRAC decision, personnel numbers have been declining at NAS JRB Willow Grove as the base prepared for closure. In 2006, there were 7,366 personnel at NAS JRB Willow Grove consisting of 1,779 active duty members, 832 civilian personnel and 4,755 reservists. By 2009 this total number of personnel decreased to 4,110 (see Table 3.2-2).

As of the beginning of the baseline year of 2011, manpower on NAS JRB Willow Grove had decreased to 743 military personnel, 214 civilian personnel, and 13 contractors, and as of the fourth quarter of 2011 there were six military personnel, 52 civilian personnel, and eight contractors employed at the installation. Table 3.2-2 shows the number of military, civilian, and reserve personnel stationed at NAS JRB Willow Grove from 2006 to 2009.

Table 3.2-2 Estimated Number of Active Duty, Civilian and Reserve Personnel[1] Located at NAS JRB Willow Grove (2006-2009)

	Active Duty	Civilian Personnel	Reserves	Total
2006	1,779	832	4,755	7,366
2007	1,569	698	3,191	5,458
2008	1,561	367	2,065	3,993
2009	1,343	437	2,330	4,110

Source: NAS JRB Willow Grove 2006, 2007, 2008b, 2009.

Note:
[1] Personnel include Navy, Marine Corps, Air Guard, Army, Civil Service and Reservists.

Table 3.2-3 shows the manpower drawdown from the third quarter of 2009 to the fourth quarter of 2011 for military, civilian, and contractor employees at NAS JRB Willow Grove, which shows the gradual decline in the total employment at former NAS JRB Willow Grove.

Table 3.2-3 Estimated Manpower Drawdown from Third Quarter 2009 to Fourth Quarter 2011 at NAS JRB Willow Grove

	Military Personnel	Civilian Personnel	Contractors	Total Employment
2009 3rd Quarter	840	221	147	1,208
2009 4th Quarter	822	220	148	1,190
2010 1st Quarter	810	220	148	1,178
2010 2nd Quarter	802	215	153	1,170
2010 3rd Quarter	801	215	158	1,174
2010 4th Quarter	792	215	163	1,170
2011 1st Quarter	743	214	163	1,120
2011 2nd Quarter	584	154	136	874
2011 3rd Quarter	111	109	69	289
2011 4th Quarter	6	52	8	66

Source: NAS JRB Willow Grove 2011.

3.2.2 Economy, Employment, and Income

The Philadelphia MSA is the fifth largest metro area in the United States and is made up of eleven counties in three states. Within the last 50 years, the region's economy has transitioned from being driven mainly by manufacturing to a more diverse portfolio in both the city and the suburbs. As manufacturing employment has declined to its current share of 7.5 percent of total nonfarm employment in the region, knowledge-based industries, including life sciences, information technology, and professional services, have increased. Sectors such as education and health services, professional and business services, financial, and information technology emerged strongly as principal drivers of the economy. The largest employers in the region are health and educational institutions. A recent survey conducted by the Greater Philadelphia Chamber of Commerce and Select Greater Philadelphia found that half of the top ten private employers (including three of the top five) were either health or educational institutions, and that they accounted for 58 percent of the total jobs in the top ten private employers (DVRPC, Select Great Philadelphia, and Ben Franklin Technology PArtners 2009). Of the 50 leading employers in the Greater Philadelphia Area, nine are located in Montgomery County and one is located in Bucks County (Select Greater Philadelphia 2012).

Employment by industry sector in Horsham Township, Montgomery County, and Bucks County, is similar to that in the Greater Philadelphia Area. The educational services, health care, and social assistance sector employed the largest number of workers in the three municipalities in 2011. Almost a quarter of all employed civilian workers in these communities worked in this industry sector (see Table 3.2-4). Manufacturing is still important to the local economies, employing approximately 12.2 percent and 12.4 percent of the employed civilian workforce in Montgomery County and Bucks County, respectively. The manufacturing sector accounted for 10.4 percent of the employed workers in Horsham Township in 2011.

Table 3.2-4 Civilian Employment by Industry Sector (2011)

	Horsham Township		Montgomery County		Bucks County	
Sector	Employees	% of Total	Employees	% of Total	Employees	% of Total
Agriculture, forestry, fishing and hunting, and mining	34	0.2	1,048	0.3	1,568	0.5
Construction	851	6.2	24,707	6.0	21,621	6.7
Manufacturing	1,434	10.4	51,129	12.4	39,196	12.2

Table 3.2-4 Civilian Employment by Industry Sector (2011)

Sector	Horsham Township		Montgomery County		Bucks County	
	Employees	% of Total	Employees	% of Total	Employees	% of Total
Wholesale Trade	446	3.2	12,953	3.1	11,594	3.6
Retail trade	1,578	11.4	41,876	10.1	40,727	12.7
Transportation and warehousing, and utilities	374	2.7	13,113	3.2	13,153	4.1
Information	341	2.5	10,056	2.4	7,203	2.2
Finance and insurance, and real estate and rental and leasing	1,803	13.1	41,268	10.0	25,277	7.9
Professional, scientific, and management, and administrative and waste management services	1,929	14.0	58,318	14.1	39,469	12.3
Educational services, and health care and social assistance	3,274	23.7	102,991	24.9	73,512	22.9
Arts, entertainment, and recreation, and accommodation and food services	827	6.0	26,452	6.4	23,065	7.2
Other services, except public administration	604	4.4	18,187	4.4	13,597	4.2
Public administration	321	2.3	10,833	2.6	10,903	3.4

Source: U.S. Census Bureau 2011a.

As mentioned above, the communities surrounding Philadelphia have a diverse portfolio of employment sectors. In Horsham Township, the educational and health services and social assistance sector was the largest employment sector in 2011, accounting for 3,274 jobs, or 23.4 percent of the employed work force. The second largest employment sector in the township was professional, scientific, and management and administrative and waste management services, which employed 14.0 percent of the employed civilian workforce. The finance and insurance, and real estate and rental and leasing sector employed 13.1 percent of the county's employed civilian workforce, and retail trade employed 11.4 percent. Manufacturing was the fifth largest employment sector in the township in 2011 (see Table 3.2-4).

In Montgomery County, the second largest employment sector in 2011 was professional, scientific, and management and administrative and waste management services, which accounted for 14.1 percent of the employed civilian workforce, followed by manufacturing (12.4 percent), the finance and insurance, and real estate and rental and leasing sector (10.1 percent), and retail trade (10.0 percent) (see Table 3.2-4). The second largest employment sector in Bucks County in 2011 was retail trade (12.7 percent of the employed civilian workforce), followed closely by the professional, scientific, and management and administrative and waste management services sector, which employed 12.3 percent of the employed civilian workforce during the same time period. Manufacturing was the fourth largest sector in Bucks County (see Table 3.2-4).

The Philadelphia MSA as a whole experienced higher unemployment rates between 2009 and 2011 than Horsham Township and Bucks and Montgomery and counties during the same period. During this period, the highest unemployment rates in the region occurred in 2010. As shown in Table 3.2-5, the

average unemployment rates in Horsham Township and the two counties ranged from 6.5 percent in Horsham Township to 7.6 percent in Bucks County in 2010. These rates were less than the national rate of 8.9 percent for the same time period. In 2011, Bucks and Montgomery counties accounted for 25.8 percent of the Philadelphia MSA's workforce, and Horsham Township accounts for 4.1 percent of Montgomery County's workforce. While the workforce decreased in the Philadelphia MSA, Montgomery County, and Bucks County during the 2009 to 2011 period, it increased Horsham Township during the same time period (see Table 3.2-5).

Table 3.2-5 Annual Average Labor Force and Unemployment Rates in the Study Area (2009 to 2011)

Location	2009		2010		2011	
	Labor Force	Unemployment Rate	Labor Force	Unemployment Rate	Labor Force	Unemployment Rate
Horsham Township	14,195	6.5	14,777	6.5	17,781	6.3
Montgomery County	425,585	6.7	431,523	7.1	430,647	6.7
Bucks County	344,284	7.2	341,131	7.6	339,741	7.3
Philadelphia MSA	2,999,995	8.2	2,984,693	8.9	2,982,138	8.6

Source: U.S. Bureau of Labor Statistics 2013.

In 2011, the residents of Bucks County and Montgomery County were, on average, more affluent than residents in the Philadelphia MSA as a whole, and the residents of Horsham Township were, on average, more affluent than the residents in Montgomery County. In 2011, the per capita income was $36,601 in Bucks County, $41,163 in Montgomery County, and $42,018 in Horsham Township. In comparison, the MSA's per capita income was $32,046. Similarly, median household income for the three communities was higher than the Philadelphia MSA's median household income. In 2011, the median household income was estimated to be $76,019 in Bucks County, $78,446 in Montgomery County, and $83,185 in Horsham Township. These figures were greater than the Philadelphia MSA's median household income of $61,496 (see Table 3.2-6).

Table 3.2-6 Per Capita and Median Household Income in the Study Area (1999 and 2011)

Location	1999[1]		2011		Percent Change 1999 to 2011	
	Per Capita Income	Median Household Income	Per Capita Income	Median Household Income	Per Capita Income	Median Household Income
Horsham Township	$28,542	$61,998	$ 42,018	$ 83,185	47.2	34.2
Montgomery County	$30,898	$60,829	$ 41,163	$ 78,446	33.2	29.0
Bucks County	$27,430	$59,727	$ 36,601	$ 76,019	33.4	27.3
Philadelphia MSA	$23,801	$47,265	$ 32,046	$ 61,496	34.6	30.1

Source: U.S. Census Bureau 1999, 2011a.

Note:

[1] In 1999, the Philadelphia MSA had not yet been identified. The 1999 data presented above is for the Philadelphia, PA-NJ-DE-MD Urbanized Area.

Corresponding to the high per capita and median household income levels, the three communities also have had a smaller percentage of residents living below the poverty level, as defined by the U.S. Census Bureau, than the state as a whole. In 2011, an estimated 5.7 percent of the residents in Montgomery County and 5.4 percent of the residents in Horsham Township had incomes below the national poverty

level. During the same time period, approximately 5.2 percent of the total population in Bucks County had income levels below the national poverty level. In contrast, approximately 12.2 percent of all residents in the Philadelphia MSA had incomes below the national poverty level (see Table 3.2-7).

Table 3.2-7 Poverty Status in the Study Area (1999 and 2011)

Location	Persons Below Poverty Level in 1999[1] (% of Total)	Persons Below Poverty Level in 2011 (% of Total)	Percent Change 1999 to 2011
Horsham Township	2.4	5.4	125.0
Montgomery County	4.4	5.7	29.5
Bucks County	4.5	5.2	15.6
Philadelphia MSA	11.4	12.2	7.0

Source: U.S. Census Bureau 1999, 2011a.

Note:
[1] In 1999, the Philadelphia MSA had not yet been identified. The 1999 data presented above is for the Philadelphia, PA-NJ-DE-MD Urbanized Area.

3.2.3 Population

The total population of the region has been increasing for the past two decades. In 2010, the Philadelphia MSA had a total population of 5,965,343 residents, a 41.3 percent increase from its 1990 population. Table 3.2-8 shows total population levels from 1990 to 2010 for Horsham Township, Montgomery County, Bucks County and the Philadelphia MSA. Approximately 3.2 percent of the population of Montgomery County resides in Horsham Township and Montgomery County has a larger population than Bucks County (see Table 3.2-8). Horsham Township, Montgomery County, and Bucks County have increased in population since 1990, with greater increases occurring between 1990 and 2000 than between 2000 and 2010 (see Table 3.2-8).

Table 3.2-8 Total Population in the Study Area (1990 to 2010)

Location	1990[1]	2000[1]	2010	Percent Change 1990 to 2000	Percent Change 2000 to 2010
Horsham Township	21,896	24,332	26,147	11.1	6.9
Montgomery County	678,111	750,097	799,874	10.6	6.2
Bucks County	541,174	597,635	625,249	10.4	4.4
Philadelphia MSA	4,222,211	5,149,079	5,965,343	22.0	13.7

Source: U.S. Census Bureau 1990a, 1990b, 2000, 2010a.

Note:
[1] In 1990 and 2000, the Philadelphia MSA had not yet been identified. The 1990 and 2000 data presented above are for the Philadelphia, PA-NJ-DE-MD Urbanized Area.

In 2012, the DVRPC developed population forecasts for counties and municipalities in the region. These forecasts incorporate the findings of the *2010 Census of Population and Housing* and the impacts of the ongoing economic recession (DVRPC 2012a). County- and municipal-level forecasts were developed in five-year increments out to 2040. According to the forecasts, the total populations of Horsham Township, Montgomery County, and Bucks County are expected to grow: Horsham Township is forecasted to have a population of 31,611 persons by 2040, an increase of 20.9 percent over the 2010 level; Montgomery County is forecasted to have a population of 894,486 persons by 2040, an increase of 11.83 percent over the 2010 level; and Bucks County is forecasted to have a population of 727,150 persons by 2040, an increase of 16.3 percent over the 2010 population level. Table 3.2-9 summarizes the population forecasts as computed by the DVRPC.

Table 3.2-9 Population Forecast in the Study Area (2010 to 2040)

Location	2010 Actual	2015 Forecast	2020 Forecast	2025 Forecast	2030 Forecast	2035 Forecast	2040 Forecast	Percent Change (2010 to 2040)
Horsham Township	26,147	26,406	27,144	28,879	30,614	31,352	31,611	20.9
Montgomery County	799,874	808,531	823,564	848,463	873,361	887,364	894,486	11.8
Bucks County	625,249	634,879	654,140	673,290	692,440	709,795	727,150	16.3

Source: U.S. Census Bureau 2010a; DVRPC 2012a, Appendix A: County and Municipal Population Forecasts in Five-Year Increments, 2015-2040.

3.2.4 Housing and Commercial Property

According to the *American Community Survey* (U.S. Census Bureau 2011b), there were 10,074 housing units in Horsham Township, 324,427 housing units in Montgomery County, and 245,216 housing units in Bucks County in 2011. Table 3.2-10 shows the total number of housing units by type of structure.

Horsham Township accounts for 3.1 percent of the housing stock in Montgomery County. In Horsham Township, 23.9 percent of the housing stock is multi-unit. All traditional apartment units in Horsham Township are in low-rise buildings (4-stories or less), mixed-use retail/office/apartment buildings, or townhome-style buildings (RKG 2012). Montgomery County, which had the largest number of housing units, also had the largest number of multi-family units. Of the 324,427 housing units in the county, 55.0 percent were classified as single-family detached units, 19.6 percent were considered single-family attached units, 1.0 percent were mobile homes, and the remaining 24.4 percent of the units were considered multi-family units. In comparison, 19.1 percent of the housing units in Bucks County were multi-unit (see Table 3.2-10).

Table 3.2-10 Total Housing Stock by Type of Structure (2011)

Housing Units	Horsham Township	Montgomery County	Bucks County
Single family – detached	5,656	178,593	155,872
Attached – 1unit	1,932	63,687	37,238
Attached – 2 units	475	11,759	8,875
Attached – 3 to 9 units	835	22,098	15,946
Attached – 10 or more units	1,101	45,121	22,164
Mobile homes and others	75	3,169	5,121
Total Number of Housing Units	**10,074**	**324,427**	**245,216**

Source: U.S. Census Bureau 2011b.

Corresponding to the high number of multi-family units located in Montgomery County and Horsham Township, there were also a large number of renters. In 2011, approximately 26.2 percent and 23.3 percent of the occupied housing units in Montgomery County and Horsham Township, respectively, were rented accommodations. Montgomery County experienced a moderate increase in condominium development from 2006 to 2010, during which the total number of renter-occupied units increased by 9.4 percent (RKG 2012). In contrast, during the same time period, 17.8 percent of the occupied units in Bucks County were renter occupied.

However, within the past 10 years, a majority of housing units built in Horsham Township have been single-family homes. There has been little apartment development in Horsham Township, but a moderate amount of apartment development has occurred in Montgomery County (RKG 2012).

In 2011, the demand for owner-occupied units was strong throughout the region. All three communities experienced low homeowner vacancy rates, with Horsham Township experiencing the lowest rate, less than 0.1 percent. Montgomery County and Bucks County and had homeowner vacancy rates of only 1.0 percent and 1.5 percent, respectively, and each of the communities had a lower rate than the Philadelphia MSA as a whole, which had a 1.8 percent homeowner vacancy rate in 2011.

In contrast, rental vacancy rates were higher in Bucks County and Horsham Township than in the Philadelphia MSA, while Montgomery County experienced rental vacancy rates equivalent to the MSA's level. In 2011, Montgomery County had the lowest rental vacancy rate, 7.8 percent, while Horsham Township had a rate of 9.9 percent, and Bucks County had a rate of 8.7 percent (see Table 3.2-11).

Table 3.2-11 Housing Vacancy Rates, Median Value, and Median Contract Rent in the Study Area (2011)

	Owner-Occupied Units			Renter-Occupied Units		
Location	Number of Units	Vacancy Rate (%)	Median Value	Number of Units	Vacancy Rate (%)	Median Contract Rent
Horsham Township	7,344	< 0.1	$327,800	2,230	9.9	$1,129
Montgomery County	226,980	1.5	$297,900	80,618	7.8	$1,078
Bucks County	229,955	1.0	$319,600	49,828	8.7	$1,059
Philadelphia MSA	1,541,766	1.8	$245,000	683,721	7.8	$952

Source: U.S. Census Bureau 2011b.

Of the three communities in the study area, owner-occupied housing prices were highest in Horsham Township. In 2011, the median value of owner-occupied units in Horsham Township was $327,800, while the median value of owner-occupied housing units was $297,900 in Montgomery County and $319,600 in Bucks County. Likewise, the median contract rent was highest in Horsham Township, at $1,129, while the median contract rent was $1,078 in Montgomery County and $1,059 in Bucks County. Each of the communities in the study area had a higher 2011 median contract rent than the Philadelphia MSA, which was $952 (see Table 3.2-11).

Home sales in all counties in the region have declined since 2006, largely as a result of the nationwide mortgage and financial crisis (RKG 2012). In 2010, Montgomery County (including Horsham Township) reported 7,039 home sales, and Bucks County reported 5,109 home sales. Although little multi-unit development is occurring in Horsham Township, there is development in Bucks County and Montgomery County. As additional units are constructed, there could be positive absorption and an increase in asking rent prices through 2015 (RKG 2012).

The approximate square footage of existing office, industrial, and retail space in Horsham Township and Montgomery County are summarized in Table 3.2-12 (RKG 2012).

Horsham Township contains 11.6 percent of the office space, 3.0 percent of industrial space, and 2.0 percent of the retail space in Montgomery County (RKG 2012). In 2010, the vacancy rate for office space in the Horsham/Willow Grove market was 10.2 percent, 11.6 percent for industrial space, and 12.1 for retail space (RKG 2012).

Table 3.2-12 Office, Industrial, and Retail Space in Horsham Township and Montgomery County (2010)[1]

Location	Type of Space (in square feet)		
	Office	Industrial	Retail
Horsham Township	5.9 million	2.3 million	1.6 million
Montgomery County	50.9 million	77.2 million	74.2 million

Source: RKG 2012.

Note:
[1] The numbers in the table are taken from the source and are reported to be approximate.

3.2.5 Tax and Revenue

Counties, municipalities, school districts, and special taxing districts in Pennsylvania use ad valorem property taxes and earned income taxes, which are levied on both residents and non-residents to generate local revenue. In calendar year 2011, Horsham Township received approximately $14.0 million in total revenues. Real estate taxes generated $1.1 million, or 8.1 percent, of the township's total revenues, while earned income taxes/wage taxes generated $7.6 million, or 54.0 percent, of the township's revenue. An additional $1.6 million was raised through other taxes, and the remaining $3.7 million dollars was generated through permits, fines and forfeits, interest, rents and royalties, federal and state funding, and charges for services (PA DC&ED 2011a).

Montgomery County received approximately $385.4 million in total revenues in calendar year 2011. Approximately 40.2 percent, or $154.9 million, of the county's revenues were from real estate taxes. Intergovernmental revenues accounted for 44.6 percent of the county's revenues, while charges for services, interest earnings, and other miscellaneous fees and revenues (e.g., judiciary and licenses) accounted for the remaining 15.2 percent of revenue for the county (PA DC&ED 2011b). In calendar year 2011, Bucks County's total revenues were approximately $200.9 million. Real estate taxes ($147.5 million) accounted for more than 73.4 percent of this total. Intergovernmental revenues as well as interest earnings and other miscellaneous fees and revenues (e.g., judiciary and licenses) were other sources of revenue for the county. In calendar year 2011, other revenue sources generated $53.4 million, or 26.6 percent of total revenues in the county (PA DC&ED 2011c).

Table 3.2-13 provides ad valorem property tax and earned income tax information for 2013 in Horsham Township. In Horsham Township, taxes are collected on earned income (1 percent for nonresidents and 0.5 percent for residents) and real property. In addition, a local services tax, a realty transfer tax, and a tax on mechanical devices are levied. Community services such as fire protection, libraries, and recreation activities are funded through an ad valorem property tax.

Table 3.2-13 2013 Tax Rates for Horsham Township

Type of Tax	Tax Rates
Earned Income, Nonresident (percent)	1.00
Earned Income, Resident (percent)	0.50
Fire Equipment and Firehouses (mills)	0.31
Library (mills)	0.47
Local Services Tax (dollars)	52.00
Mechanical Devices (dollars)	150.00
Realty Transfer (percent)	0.500
Recreation (per $1,000 of assessed value)	0.22

Source: Municipal Stats 2013a.

Table 3.2-14 provides overall ad valorem property tax rates in Montgomery County and Bucks County for 2013. In Montgomery County, the ad valorem real estate general purpose tax was 2.6950 for every $1,000 of assessed value, while in Bucks County it was 23.2000 for every $1,000 of assessed value. In Pennsylvania, total assessed value is determined by using the fair market value of a property and then applying a Common Level Ratio, or equalization factor, to this market value. The Common Level Ratio for Bucks County was 10.8 percent, and the Common Level Ratio for Montgomery County was 62.0 percent (The Pennsylvania Bulletin 2012).

Table 3.2-14 2013 Tax Rates for Montgomery and Bucks County (expressed per $1,000 of assessed value)

County	Real Estate-General Purpose Tax
Montgomery	2.6950
Bucks	23.2000

Source: Municipal Stats 2013b; Bucks' County Board of Assessment 2013.

3.2.6 Environmental Justice

Table 3.2-15 presents demographic and economic data to characterize the communities in which the potential for disproportionately high and adverse human health or environmental effects will be assessed in accordance with EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations.

As shown on the table, minorities account for 31.8 percent of the Philadelphia MSA's total population, while Hispanics or Latinos account for 7.9 percent of the MSA's total population. In Horsham Township, minorities represent 14.0 percent of the total population and has a lower percentage of Hispanics or Latinos, 2.9 percent, than Montgomery County. In addition, Horsham Township has a lower percentage of individuals living below poverty level compared to Montgomery County.

Minorities accounted for 10.8 percent of the total population in Bucks County and 18.7 percent of the total population in Montgomery County. Montgomery County and Bucks County have lower percentages of Hispanics or Latinos than the overall Philadelphia MSA. In addition, the two counties and township have lower percentages of persons living below poverty level compared with the Philadelphia MSA (see Table 3.2-15).

Table 3.2-15 Environmental Justice Population Characteristics

	Total Population	Percent Minority	Percent Hispanic or Latino	Percent Children	Percent Below Poverty
Horsham Township	26,174	14.0	2.9	24.0	5.4
Montgomery County	799,874	18.7	4.3	22.9	5.7
Bucks County	625,249	10.8	4.3	23.0	5.2
Philadelphia MSA	5,965,343	31.8	7.9	23.3	12.2

Source: U.S. Census Bureau 2010a-d, 2011c.

Note: Total Population, Percent Minority, Percent Hispanic, Percent Children are all based on 2010 figures from the *2010 Census of Population and Housing;* Percent Below Poverty are based on 2011 figures from the *5 Year American Community Survey 2007-2011.*

3.3 Community Services

This section summarizes the baseline community services (i.e., educational facilities, public safety and emergency facilities, health care and medical facilities, and parks and recreational resources) located in

the study area. The study area includes the Hatboro-Horsham School District for schools, Horsham Township for police and fire protection, an approximately seven-mile radius area around the site of former NAS JRB Willow Grove installation for health services, and Horsham Township for recreational facilities.

3.3.1 Schools

3.3.1.1 Hatboro-Horsham School District

The study area for schools is the Hatboro-Horsham School District, which includes Horsham Township and Hatboro Borough (Pennsylvania Department of Education 2009a). The district includes seven schools: five elementary schools (Blair Mill, Crooked Billet, Hallowell, Pennypack, and Simmons) for grades kindergarten through 5, one middle school (Keith Valley) for grades 6 through 8, and one high school (Hatboro-Horsham) for grades 9 through 12 (Hatboro-Horsham School District 2013). The school district also shares a technical school, the Eastern Center for Arts and Technology, with eight other districts (Pennsylvania Department of Education 2009b). The locations of these schools are identified on Figure 3.3-1.

The last year that NAS JRB Willow Grove operated at full capacity was 2011. Public school enrollment in the five academic years leading up to and including 2011, along with the 2011-2012 and 2012-2013 school years, is shown in Table 3.3-1. During these academic years, there were no large changes in student enrollment rates.

Table 3.3-1 Hatboro-Horsham School District Public School Enrollment

School	Enrollment							Capacity[1] (2011)
	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	
Blair Mill Elementary	422	388	385	396	394	400	**436**	**444**
Crooked Billet Elementary	269	258	278	277	276	272	**265**	**304**
Hallowell Elementary	393	370	356	324	310	291	**279**	**406**
Pennypack Elementary	224	250	260	272	273	260	**254**	**304**
Simmons Elementary	824	829	795	759	760	747	**701**	**1,070**
Keith Valley Middle School	1,281	1,234	1,199	1,220	1,231	1,218	**1,214**	**1,363**
Hatboro-Horsham High School	1,888	1,872	1,801	1,743	1,723	1,655	**1,621**	**1,988**

Sources: Pennsylvania Department of Education 2006-2007, 2007-2012, 2012-2013; EI Associates 2011.

[1] "Capacity" refers to the Hatboro-Horsham School District Design Building Capacities.

The Pennsylvania Department of Education projects that, between the academic years 2010- 2011 and 2020-2021, the Hatboro-Horsham School District will have a slight increase of approximately 1.3 percent in enrollment at the elementary school level, a decrease of 13.1 percent in enrollment at the middle school level, and a decrease of 13.9 percent in enrollment at the high school level (Pennsylvania Department of Education 2011). These projections are based on a model that factors in actual enrollments, births, and retention rates, but it does not factor in potential changes in new residential building.

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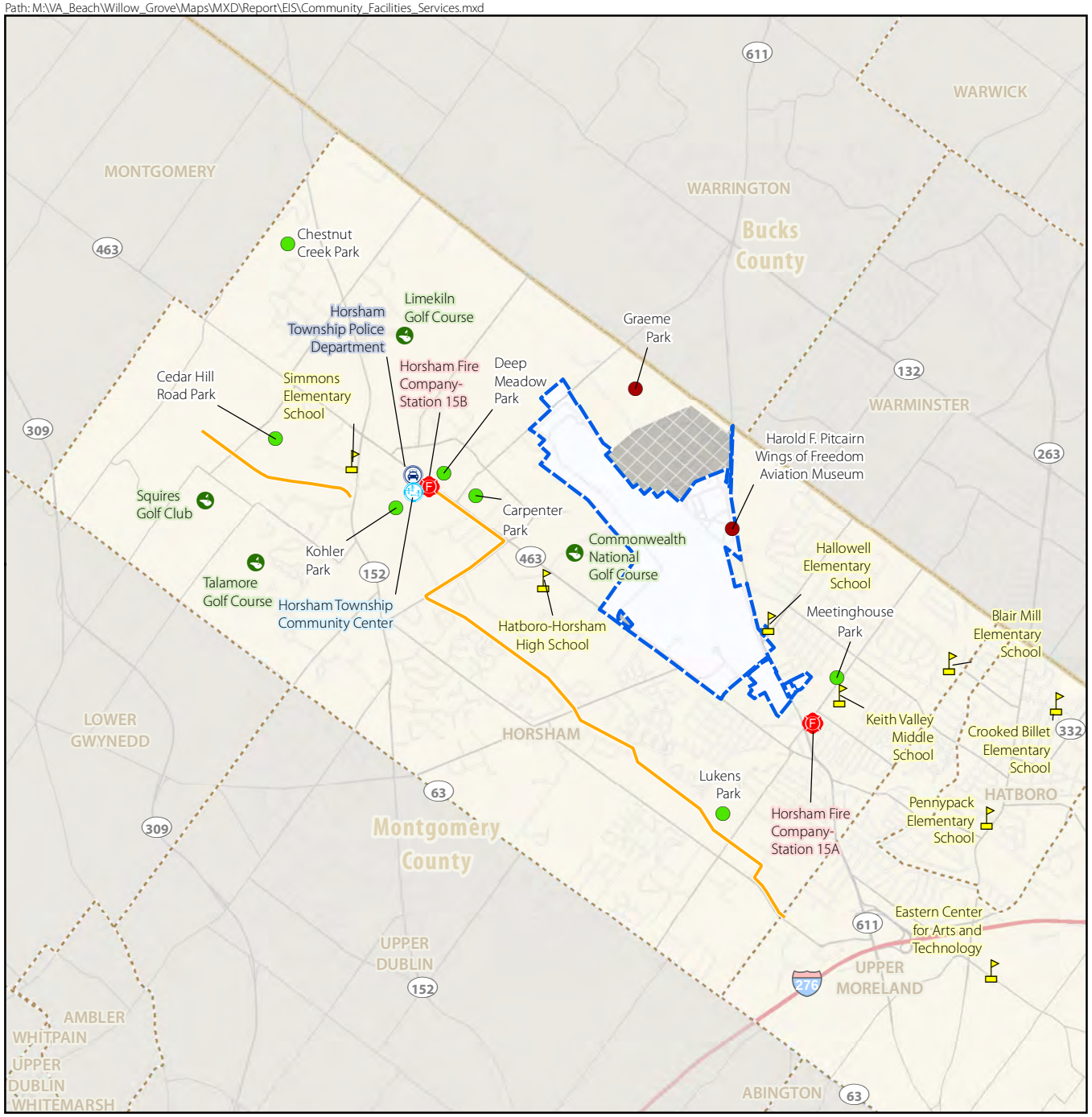

Figure 3.3-1

Community Facilities and Services

NAS JRB Willow Grove

Horsham, PA

NOTE: Study area is Horsham Township. However, Hatboro and Upper Moreland are included in study area for schools only.

Legend

- Fire Station
- Community Center
- Police Station
- School of Interest
- Historic/Museum Recreational Point of Interest
- Horsham Township Community Park
- Golf Course
- Freeway
- Major Road
- Power Line Trail
- NAS JRB Willow Grove
- FAA Tower and Horsham Air Guard Station (not included in redevelopment)
- County Boundary
- Town/City Boundary

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SOURCE: Ecology and Environment 2013; ESRI 2010; Horsham Township Parks and Recreation 2012; Tetra Tech 2012.

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Other local townships and boroughs offer other types of private primary-level academic schools (e.g., college preparatory schools, religious-affiliated schools, schools for at-risk children). Some additional private schools in Horsham that are mentioned in the township's Comprehensive Plan include the Quaker School of Horsham (preschool through eighth grade), the St. Catherine of Sienna School (kindergarten through eighth grade), and the Lakeside School (grades 7 through 12) (Horsham Township 2011).

3.3.1.2 NAS JRB Willow Grove

No DOD schools (elementary, middle, or high school) were located within the boundaries of the former NAS JRB Willow Grove installation or were run by the federal government for students from military families at the installation. Therefore, school-aged family members of military personnel stationed at NAS JRB Willow Grove attended local public or private schools. To compensate the Hatboro-Horsham School District for the costs incurred in providing educational services to the children of military personnel, the school district received approximately $650,000 per year under the Federal Impact Aid Program (Griffin 2012). Private schools did not receive any Federal Impact Aid as the tuition was paid by the child's family.

3.3.2 Police Protection

3.3.2.1 Horsham Township Police Department

The Horsham Township Police Department operates out of a single police station located at 1025 Horsham Road (Horsham Township 2008a) (see Figure 3.3-1). The 14,000-square-foot station, which was constructed in 2009 as part of the Horsham Road Municipal Campus, includes detention facilities (Horsham Township 2011). In addition to the Chief of Police, Deputy Chief of Police, and Lieutenant, the department has six sergeants, four detectives, 25 officers, and 10 civilian staff (dispatchers and clerks) (Horsham Township 2008b). Based on Horsham Township's population of approximately 26,000 (U.S. Census Bureau 2010a), there are approximately 1.46 sworn police officers for every 1,000 residents.

3.3.2.2 NAS JRB Willow Grove

The site of the former NAS JRB Willow Grove is a secure military facility. While it was operational, access was limited to military personnel, civilian employees, military retirees, and military family members. The installation had a police department that provided security within the fenceline.

3.3.3 Fire Protection

3.3.3.1 Horsham Fire Company

The Horsham Fire Company operates out of two fire stations. Station 15A, located at 315 Meetinghouse Road in the densely populated eastern portion of the township, is the headquarters of the company. This station has two fire engines, one ladder truck, one rescue truck, two ambulances, and the administrative offices. Station 15B, centrally located at 1023 Horsham Road (within the Horsham Road Municipal Campus), has one rescue engine, one ambulance, one special service vehicle, and one hazardous materials decontamination trailer (Horsham Fire Company n.d. [a]) (see Figure 3.3-1). The Fire Company lists 78 members as of 2011; 47 of these are listed as firefighters and the others are fire police, paramedics and emergency medical technicians, and auxiliary/life members (Horsham Fire Company 2011). Based on Horsham Township's population of approximately 26,000 (U.S. Census Bureau 2010a) and 47 firefighters, there are approximately 1.81 firefighters for every 1,000 residents.

3.3.3.2 NAS JRB Willow Grove

The former NAS JRB Willow Grove installation had a fire department that provided fire prevention and response services at the installation.

3.3.4 Health Services

3.3.4.1 Hospitals in and near Horsham Township

The Horsham Clinic is the only hospital in Horsham Township, but there are several hospitals in the surrounding area. Hospitals within seven miles of the former NAS JRB Willow Grove installation include Abington Memorial Hospital, Holy Redeemer Hospital, Doylestown Hospital, Abington Health-Lansdale Hospital, and Abington Health Center – Warminster (see Figure 3.3-2).

Abington Memorial Hospital is located approximately 4 miles south of the former installation, in Abington Township, Montgomery County. This is a 665-bed facility with over 5,400 employees (over 1,100 of which are physicians). This hospital has about 42,000 inpatient admissions and more than 500,000 outpatient visits annually. Abington Memorial Hospital is a major regional referral center for cancer care, cardiac care, and surgery, including orthopedic surgery and neurosurgery, and it has the only Level-2 trauma center[3] in Montgomery County (Abington Memorial Hospital n.d.[a]).

Holy Redeemer Hospital is located approximately 6 miles southeast of the former installation, in Meadowbrook, Montgomery County. This is a 242-bed facility with more than 500 physicians. It has an emergency room and specialty centers for maternity, cardiovascular care, and cancer treatment (Holy Redeemer n.d.[a]). Part of the Catholic Health System, the hospital practices holistic healing by providing emotional, spiritual, and social services to patients (Holy Redeemer n.d.[b]).

Doylestown Hospital is located approximately 6 miles north of the former installation in Doylestown Township, Bucks County. This is a 238-bed facility with 420 physicians (Doylestown Hospital n.d.[a]). Medical services offered include an emergency room, a maternity center, a heart institute, a cancer institute, and an orthopedic institute (Doylestown Hospital n.d.[b]).

Abington Health - Lansdale Hospital is located approximately 7 miles northwest of the former installation, in Lansdale Borough, Montgomery County. This is a 135-bed acute-care hospital with over 300 physicians. The hospital has nearly 6,000 inpatient admissions and almost 60,000 outpatient visits annually. Services include an emergency room, orthopedic and spine surgery, oral surgery, comprehensive diabetes treatment, oncology, physical rehabilitation, cardiology, and a sleep center. This hospital is affiliated with Abington Memorial Hospital (Abington Health - Lansdale Hospital n.d.).

Abington Health Center – Warminster is located approximately 3 miles east of the former installation in Warminster Township, Bucks County. It is a major satellite of Abington Memorial Hospital, offering many hospital services including radiology, surgical services, laboratory testing, dialysis, orthopedics, and hospice (Abington Memorial Hospital n.d.[b]).

Only one facility in Horsham Township, The Horsham Clinic, provides hospitalization for behavioral health. Located approximately 2 miles west of the former NAS JRB Willow Grove property, The Horsham Clinic is a private behavioral health care facility located on 55 acres on the western edge of Horsham Township (Horsham Township 2011; The Horsham Clinic n.d.). The clinic provides both outpatient services and 146 beds for inpatient care. The facility is currently undergoing expansion to provide additional hospital care facilities (Horsham Township 2011).

[3] Trauma centers in the United States are ranked from levels 1 (highest) to 5 (lowest). The higher the level of a trauma center, the more resources it has to treat various traumatic injuries (such as various specialized trauma surgeons). Lower levels of trauma centers may only be able to provide initial care and stabilization of a traumatic injury and arrange for transfer of the victim to a higher level of trauma care.

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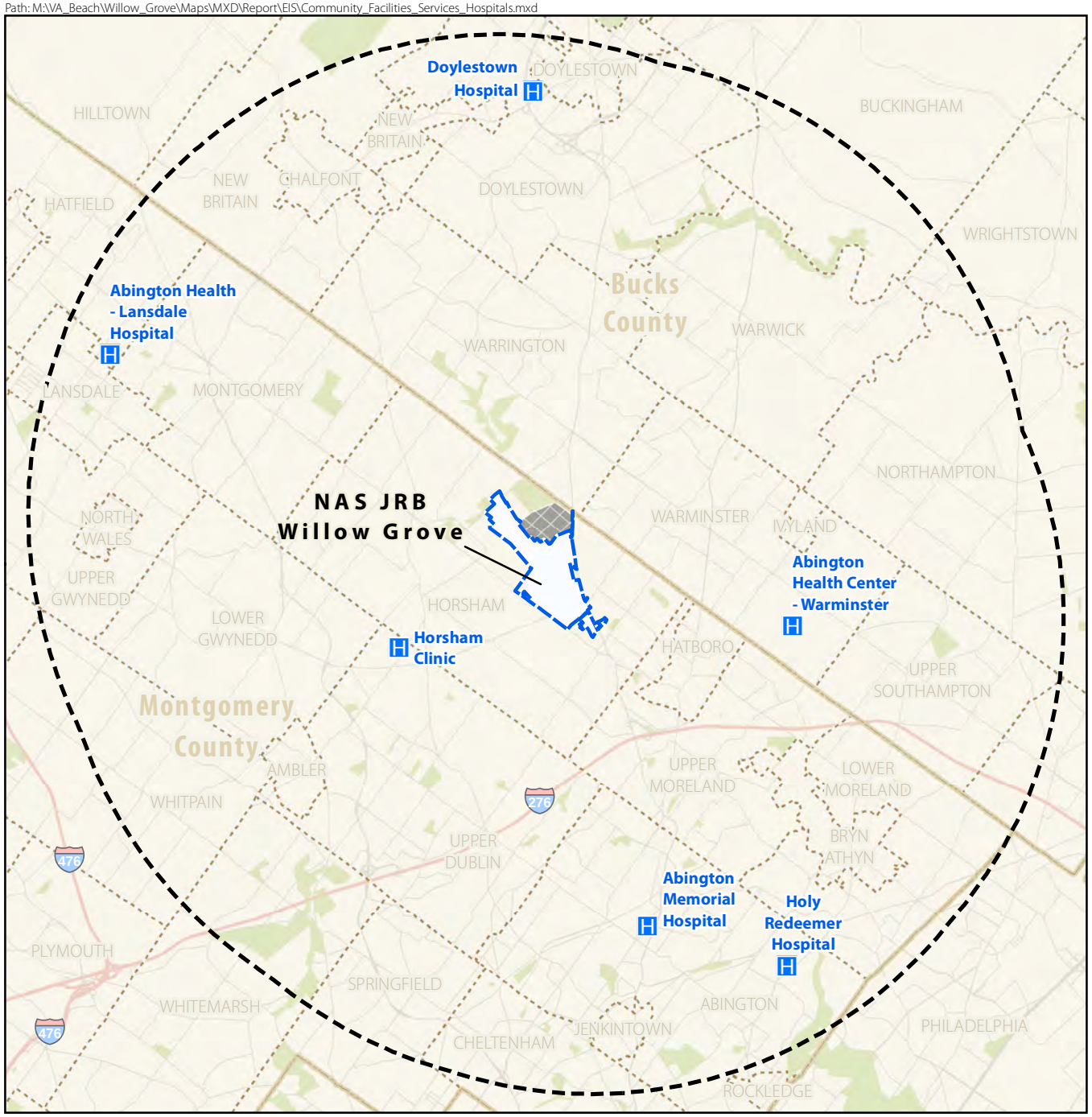

Figure 3.3-2

Community Hospitals

Former NAS JRB Willow Grove

Horsham, PA

Legend

- Hospital of Interest
- Freeway
- Major Road
- NAS JRB Willow Grove
- 7-Mile Buffer of NAS JRB Willow Grove
- FAA Tower and Horsham Air Guard Station (not included in redevelopment)
- County Boundary
- Town/City Boundary
- Park

N

SCALE

0 1 2 Miles

SOURCE: ESRI 2010; Ecology and Environment 2013; Tetra Tech 2012.

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3.3.4.2 NAS JRB Willow Grove

When NAS JRB Willow Grove was fully operational, it had a Branch Medical Clinic, which provided family medicine, obstetrics, and pediatrics. Medical care services were offered on a priority basis, with first priority of care to active duty personnel, second priority to family members of active duty personnel, and third priority to retired military personnel and their family members. The clinic offered classes on hypertension, tobacco cessation, nutrition, weight management, and cholesterol, and had a prescription service for active duty personnel and all eligible beneficiaries. Dental care services were provided to active duty personnel only (Powers 2013).

3.3.5 Recreational Facilities

3.3.5.1 Horsham Township

Horsham Township has 821 acres of parkland and open space, including seven community parks, eight neighborhood parks, an extensive trail system, a community center, and over 30 open space areas and township-owned water detention basins (Horsham Township 2008c).

Community parks are the larger parks in the township and offer the greatest range of recreational opportunities. The township's seven community parks are Cedar Hill Road Park, Chestnut Creek Park, Kohler Park, Deep Meadow Park, Lukens Park, Carpenter Park, and Meetinghouse Park. The types of amenities found at community parks include athletic fields (football, soccer, softball, and baseball), athletic courts (basketball, volleyball, tennis, and in-line street hockey), concession stands, playground apparatus, walking trails, pavilions with picnic tables and grills, horseshoe pits, and restrooms. Lukens Park has a handicap-accessible playground, and Kohler Park includes the Horsham Dog Park and a fishing pond (Horsham Township Parks and Recreation 2012a). Cedar Hill Road Park has a nature trail with three bird blinds, and there are plans to build an environmental studies area at the park (Horsham Township 2011).

Neighborhood parks are the smaller parks within the township. They are built within neighborhoods so that families can walk to them. The township's eight neighborhood parks are Sawyer's Way Park, Maple Park, Blair Mill Park, Hideaway Hills Park, Jarrett Road Park, Saw Mill Lane Tot-lot, Whetstone Tot-lot and Wayne Avenue Park. Each neighborhood park has playground apparatus; some have additional amenities such as basketball courts and picnic tables (Horsham Township Parks and Recreation 2012a).

The goal of Horsham Township's trail system is to establish a bicycle and pedestrian network to facilitate non-vehicular movement to locations such as parks, schools, the Horsham Township Library, neighborhoods, retail centers, and business parks. The Power Line Trail runs from north to south through the township and forms the backbone of the trail system. Many of the township's parks are directly adjacent to the Power Line Trail, and those that are adjacent to it have their own trail networks that connect to it (Horsham Township Parks and Recreation 2012b). Dogs are permitted on the Power Line Trail and the Horsham Road side of the Kohler Park Trail, and bicycles, in-line skates, and skateboards are permitted on asphalt trails, which include the Power Line Trail, Kohler Park Trail, and some of the smaller connecting trails (Horsham Township 2008d).

Horsham Township has a Community Center, which is located on the Horsham Road Municipal Campus. The Community Center has meeting rooms and cooking facilities. The Horsham Township Parks and Recreation Department offers classes for all ages (youth, teen, adult, and senior) at the Community Center, including classes in art, music, cooking, yoga, and self-defense. The Department also offers ice skating lessons at the Wintersport Ice Arena in Willow Grove, as well as special events, including bus trips to places such as New York City, craft shows, and the annual Horsham Day Festival. The Community Center is also available for rent (Horsham Township Parks and Recreation 2013).

In addition to the proposed environmental studies area at Cedar Hill Road Park, Horsham Township already provides some environmental and farm educational/recreational opportunities. The 115-acre College Settlement Farm, an environmental education center and campground, provides camping and recreational activities for disadvantaged youth. The 24-acre Pennypack Farm and Education Center is a non-profit facility dedicated to making local sustainable agriculture an important part of the community (Horsham Township 2011).

Horsham Township currently has four golf courses: Limekiln Golf Club, Squires Golf Club, Commonwealth National Golf Club, and Talamore Country Club (Horsham Township 2011; Commonwealth National Golf Club n.d.; Talamore Country Club n.d.). A fifth golf club, the Horsham Valley Golf Club, went out of business and was shut down on July 3, 2012 (Prince 2012). The communities surrounding Horsham Township also offer multiple golf courses.

One of the historic and museum recreational points of interest in the township is the Harold F. Pitcairn Wings of Freedom Aviation Museum, which is a non-profit, all-volunteer organization dedicated to the preservation and display of aviation history. The museum currently contains aircraft and artifacts of military equipment, as well as hand-crafted scale models of aircraft from a variety of time periods and countries (Wings of Freedom Aviation Museum 2011a). The museum is located along Easton Road, adjacent to the former NAS JRB Willow Grove (Wings of Freedom Aviation Museum 2011b).

3.4 Transportation

This section describes the background traffic and transportation conditions present in the region, as well as the current local road network and traffic conditions surrounding the former NAS JRB Willow Grove installation. The information presented in this section is based on reports, studies, and plans prepared by the DVRPC and the *Traffic Assessment Study: Naval Air Station Joint Reserve Base (NAS JRB) Willow Grove* completed in support of this analysis (TechniQuest 2013) (see Appendix C). Information on public transportation was gathered from the Southeastern Pennsylvania Transportation Authority (SEPTA).

3.4.1 Regional Background

The DVRPC is the federally designated Metropolitan Planning Organization, responsible for transportation policy making and planning for the Greater Philadelphia region. It has developed a number of plans addressing transportation, including a long-range land use and transportation plan (Connections 2035: The Regional Plan for a Sustainable Future) that identifies areas for appropriate future growth and infrastructure, and a well-connected system of targeted protected natural resource areas (DVRPC 2012b). Currently, work is being done on the Connections 2040 Plan for Greater Philadelphia update to the regional long-range plan. This plan, scheduled to be released in mid-2013, will address land use, environmental, economic competitiveness, and transportation policies (DVRPC 2012b).

With over 23,000 miles of roadways, the Delaware Valley experiences more than 110 million vehicle miles of travel (VMT) on the highways per day (DVPRC 2011). From 2000 to 2008, the VMT in the region slowly, but steadily increased. Montgomery County has the highest VMT in the region and has experienced steady growth from approximately 17 million VMT in 2000 to nearly 19 million in 2008 (DVRPC 2011).

Congestion Management Process (CMP) corridors

The Congestion Management Process (CMP) is a systematic process that works to further the goals of the DVRPC's long-range plan, and to strengthen the bond between the long-range plan and the local Transportation Improvement Plan (TIP). This process is used to identify congested corridors, manage

congestion concerns for the area, and make strategy recommendations to minimize congestion and enhance mobility. With a current and expected growth in volume/capacity ratio in peak period traffic, strategies such as new bus routes and general purpose lanes are being considered to alleviate some of this congestion. The CMP identifies congested corridors and breaks them down into sub-corridors to focus on appropriate strategies for each particular sub-corridor (DVRPC 2013a). The 2012 CMP recognizes 30 congested corridors in the Delaware Valley, 14 in New Jersey, and 16 in Pennsylvania. From these, over 100 sub-corridors were identified (DVRPC 2012c).

The local study area used for this analysis (i.e., the vicinity of the former installation) is overlapped by or affected by the CMP's congested corridors 1, 12, and 14. The following paragraphs discuss each of these corridors and their unique issues in greater detail.

Corridor 1 is located along I-76/I-276 (Pennsylvania Turnpike) from PA 29 to the New Jersey border. The former installation is located approximately 1.5 miles north of I-276. Currently, traffic volumes are high in this corridor, and volume and capacity are expected to increase in the future. There are also high crash rates and areas of high environmental significance along this corridor. Strategy recommendations include growth management, smart growth strategies, access management and revisions to existing land use/transportation regulations (DVRPC 2012c).

Corridor 12 is concentrated around three parallel arterials (PA 132, PA 63, and County Line Road) that facilitate movement between Montgomery and Bucks counties and connect several major north-south arterials (U.S. 202, PA 309, and SR 611) to each other. PA 132 (Street Road) and PA 63 (Woodhaven Road) also connect to I-95. The former installation is located in Sub-Corridors A and B of Corridor 12. Safety improvements, signal improvements, and enhancements in pedestrian safety are recommended for Sub-Corridor A as part of the CMP. Enhancing routes to facilitate evacuations is recommended due to the high population in the area. The environmental significance of the area should be considered while planning future road expansion (DVRPC 2012c). The CMP identifies the widening and reconstruction of County Line Road from Easton Road (SR 611) to PA 309 west of NAS JRB Willow Grove as a Major Regional Project (DVRPC 2012c). For Sub-Corridor B, signal improvements, infrastructure improvements, and improved circulation are identified as appropriate improvement strategies for the area. In addition to the widening and reconstruction of County Line Road, major construction projects for this sub-corridor include constructing a new road from PA 309 to Sumneytown Pike and the Quakertown Line, which is a new passenger rail line from Landsdale to Shelly (DVRPC 2012c).

Corridor 14 is located along Broad Street in Center City extending north along PA 309 to Quakertown Borough and SR 611 to Doylestown. The former installation property is located along Sub-Corridor F of Corridor 14. Recommended future improvements to this sub-corridor include improvements to facilitate better walking and biking accessibility, access management, and context-sensitive design (DVRPC 2012c). A project to widen and reconstruct County Line Road was also identified for this sub-corridor.

Planned Transportation Projects

The TIP contains a list of priority transportation projects for the area, including all projects that intend to use federal funding, as well as non-federally funded projects that are significant to the region (DVRPC 2013b). The DVRPC 2013 TIP for Pennsylvania was adopted in June of 2012 and became effective later that year (DVRPC 2013b). According to the 2013 TIP for Pennsylvania, no projects are located in the immediate vicinity of the former installation; the closest TIP project is over 1.5 miles to the southeast (DVRPC 2013b). This project is identified as the York Road Hatboro Revitalization and proposes streetscape improvements along York Road between Horsham Road and Summit Avenue. Basic improvements such as gateway signage, street lighting, street trees, and brick crosswalks are proposed as part of this revitalization project (DVRPC 2013b).

Public Transportation

According to the May 2013 SEPTA Revenue and Ridership Report (SEPTA 2013a), year-to-date ridership total trips for fiscal year 2013 are down 2.21 million, or 0.7 percent, compared to last year. The decline is attributed to the impacts of Superstorm Sandy, the below budget performance recorded by the City Transit division from November 2012 to March 2013, and two fewer days in the fiscal period. When you exclude the fiscal calendar differences and the impacts of Superstorm Sandy, average daily ridership is up 0.6 percent from last year (SEPTA 2013a).

Numerous public transportation construction projects are underway in the Delaware Valley. In the Long-Range Vision for Transit plan, the DVRPC notes that by expanding transportation options in the region will make travel easier for the public and reduce traffic congestion (DVRPC 2008). Major rail extensions in congested, high-traffic areas are expected to greatly improve the transit connections to and from this part of the region (DVRPC 2008).

3.4.2 Study Area and Methodology

The traffic study area for describing baseline transportation conditions consisted of 14 major intersections and three roadway segments in the vicinity of the former installation. The intersections and roadways were identified based on their proximity to the former NAS JRB Willow Grove and potential use by redevelopment of the former installation. These intersections and roadways are depicted on Figure 3.4-1.

Information on the baseline conditions of roadway networks and intersection operations was obtained by a review of field data, a review of regional planning documents and transportation studies, such as the Connections 2035 – The Regional Plan for a Sustainable Future (DVRPC 2009), and discussions with the local planning departments.

Physical characteristics of nearby roads and intersections were obtained primarily through visual inspection. Traffic volume data, in the form of manual turning movement counts and automatic traffic recorder (ATR) counts, for the study area were collected during the week of May 6, 2013. Manual turning movement counts were performed from 7 a.m. to 9 a.m. and from 4 p.m. to 6 p.m. The locations of the manual turning movement and ATR counts are shown on Figure 3.4-1.

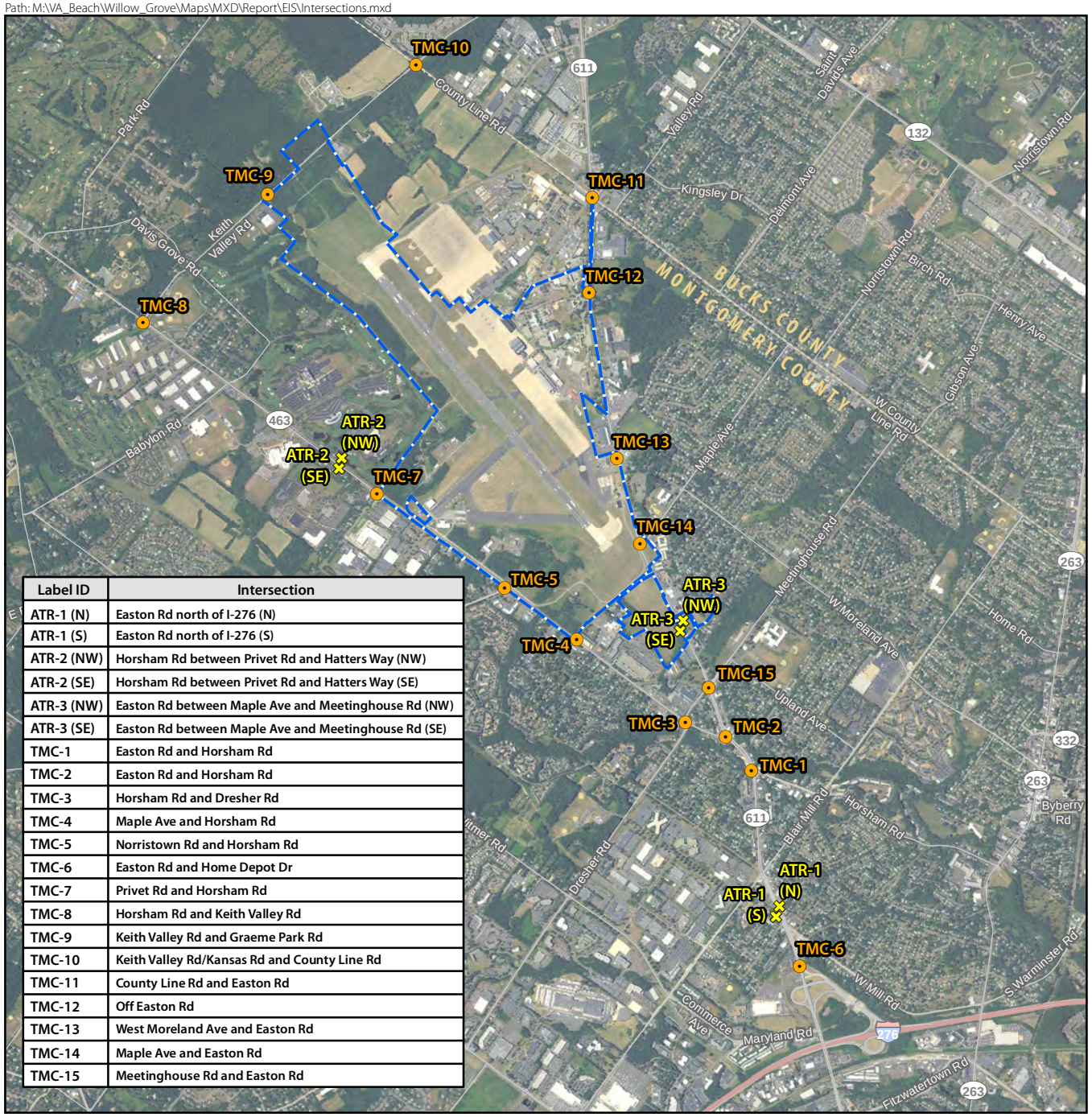
Safety was addressed by evaluating crash data obtained from Horsham Township for the most recent three-year period, and speed studies that were conducted on the key roadways near the former installation.

3.4.3 Road Network and Access

The former installation is located between Horsham Road and Easton Road, Pennsylvania State Routes (SR) 463 and 611, respectively. Horsham Road borders the southwestern boundary of the former installation, Easton Road borders the eastern boundary of the former installation, County Line Road borders the northeastern edge of the former installation, and Keith Valley Road borders a short section of the northwestern edge of the former installation. The main gate is located on Easton Road, and seven additional gates provide access to the former installation. The principal roadways and intersections in the vicinity of the former installation are described below.

Pennsylvania Turnpike (Interstate 276). I-276 is the primary regional highway serving Horsham Township and the former installation. Exit 343 is approximately 2.5 miles south of the former installation. I-276 provides connections to I-95 to the east and I-76 and I-476 to the west. Most of this highway has six lanes, and the speed limit is 65 miles per hour (mph).

Path: M:\VA_Beach\Willow_Grove\Maps\MXD\Report\EIS\Intersections.mxd



Label ID	Intersection
ATR-1 (N)	Easton Rd north of I-276 (N)
ATR-1 (S)	Easton Rd north of I-276 (S)
ATR-2 (NW)	Horsham Rd between Privet Rd and Hatters Way (NW)
ATR-2 (SE)	Horsham Rd between Privet Rd and Hatters Way (SE)
ATR-3 (NW)	Easton Rd between Maple Ave and Meetinghouse Rd (NW)
ATR-3 (SE)	Easton Rd between Maple Ave and Meetinghouse Rd (SE)
TMC-1	Easton Rd and Horsham Rd
TMC-2	Easton Rd and Horsham Rd
TMC-3	Horsham Rd and Dresher Rd
TMC-4	Maple Ave and Horsham Rd
TMC-5	Norristown Rd and Horsham Rd
TMC-6	Easton Rd and Home Depot Dr
TMC-7	Privet Rd and Horsham Rd
TMC-8	Horsham Rd and Keith Valley Rd
TMC-9	Keith Valley Rd and Graeme Park Rd
TMC-10	Keith Valley Rd/Kansas Rd and County Line Rd
TMC-11	County Line Rd and Easton Rd
TMC-12	Off Easton Rd
TMC-13	West Moreland Ave and Easton Rd
TMC-14	Maple Ave and Easton Rd
TMC-15	Meetinghouse Rd and Easton Rd

Figure 3.4-1

Traffic Intersections Analyzed

Former NAS JRB Willow Grove

Horsham, PA

Legend

- Automatic Traffic Recorders (ATR)
- Turning Movement Counts (TMC)
- County Boundary
- Freeway
- Major Road
- NAS JRB Willow Grove

SCALE

0 0.25 0.5 Miles

SOURCE: Ecology and Environment 2013; ESRI 2010; National Aerial Imagery Program 2010; Tetra Tech 2012.

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Easton Road (SR 611). Easton Road is a predominantly four-lane, undivided, major arterial. The highway follows the western edge of the former installation in a generally north-south direction. Easton Road connects the area to Philadelphia, where the road becomes Broad Street. The speed limit is 45 mph, and there are two-way center left turn lanes along the length of Easton Road in the vicinity of the former installation. Traffic signals are present at the major intersections.

Horsham Road (SR 463). Horsham Road is a multi-lane, undivided highway that connects to cities located to the north, such as Allentown. This major arterial follows the southern edge of the former installation in a northwesterly-southeasterly direction. The speed limit is 45 mph, and two-way center left turn lanes are present along the length of Horsham Road. Traffic signals are present at the major intersections.

County Line Road. County Line Road is a multi-lane, undivided highway that generally runs parallel to Horsham Road. This major arterial connects Keith Valley Road with Easton Road (SR 611). The speed limit ranges from 25 to 35 mph, and turn lanes and shoulders are present.

Keith Valley Road. Keith Valley Road is a two-lane, undivided roadway that connects County Line Road with Horsham Road. The speed limit ranges from 25 to 35 mph, and minimal shoulders present.

Easton Road and Horsham Road Intersections. Easton Road and Horsham Road intersect twice. The first intersection occurs were the two routes merge just southeast of the former installation. The roads are co-located for approximately 0.18 miles, after which the routes separate, creating the second intersection. Both intersections are signaled, and a solid median divides opposing traffic lanes along Easton Road. Left turn only lanes are present in both directions on Horsham Road; left turn only lanes are present northbound on Easton Road at the first intersection and southbound at the second intersection.

Horsham Road and Dresher Road. Horsham Road and Dresher Road create a four-way signalized intersection at the southeastern corner of the former installation. Left turn only lanes are present in each direction, and channelized right turn lanes are present on the southbound Dresher Road and eastbound Horsham Road.

Easton Road and Home Depot Drive. The Easton Road and Home Depot Drive signalized intersection includes the off ramp of Exit 343 of I-276, directly opposite of Home Depot Drive. Left turn lanes are present northbound on Easton Road and eastbound on Home Depot Drive. Channelized right turn lanes are present southbound from Easton Road and northbound from Exit 343. Left turns cannot be made from Exit 343 at this intersection.

3.4.4 Baseline Traffic Volume

Traffic volume data for the study area were collected during peak traffic hours for 14 intersections, and total daily traffic counts were conducted at three locations (see Figure 3.4-1). Morning peak hours generally occurred between 7:00 a.m. and 9:00 a.m. for all the intersections, and evening peak hours typically occurred between 4:00 p.m. and 6:00 p.m. A system peak hour for all intersections was determined to be between 7:15 a.m. and 8:15 a.m. for the morning and between 5:00 p.m. and 6:00 p.m. for the evening. Peak hour volumes were different for intersection and evening peak hour volumes were higher than morning peak hour volumes. The highest morning peak hour volume (3,630 trips) was recorded at the intersection of Horsham Road and Dresher Road. Approximately a third of all trips were vehicles traveling eastbound on Horsham Road. The highest evening peak hour volume was recorded at the intersection of Easton Road and Home Depot Drive, with 5,002 trips. Approximately 44 percent of the trips at this intersection were traveling southbound on Easton Road, and 35 percent were traveling westbound off of the I-276 ramp. Table 3.4-1 shows the morning and evening peak hour traffic volumes

for all of the intersections. Cars comprised a majority of the vehicles recorded, with light and heavy trucks accounting for less than 4 percent of trips at most intersections.

Table 3.4-1 Peak-Hour Traffic Volumes

Label ID	Intersection	Morning Peak Hour Volume	Evening Peak Hour Volume
TMC-1	Easton Road/SR 611 and Horsham Road/SR 463	3,140	3,856
TMC-2	Easton Road/SR 611 and Horsham Road/SR 463	3,106	3,885
TMC-3	Horsham Road/SR 463 and Dresher Road	3,630	4,558
TMC-4	Maple Avenue and Horsham Road/SR 463	3,190	3,677
TMC-5	Norristown Road and Horsham Road/SR 463	3,072	3,432
TMC-6	Easton Road/SR 611 and Home Depot Drive	3,523	5,002
TMC-7	Privet Road and Horsham Road/SR 463	2,176	2,513
TMC-8	Horsham Road/SR 463 and Keith Valley Road	1,758	2,080
TMC-9	Off Keith Valley Road	N/A[1]	N/A[1]
TMC-10	Keith Valley Road/Kansas Road and County Line Road	1,879	2,260
TMC-11	County Line Road and Easton Road/SR 611	3,333	3,508
TMC-12	Off Easton Road/SR 611	2,752	2,785
TMC-13	West Moreland Avenue and Easton Road/SR 611	2,715	2,726
TMC-14	Maple Avenue and Easton Road/SR 611	2,980	3,574
TMC-15	Meetinghouse Road and Easton Road/SR 611	3,528	4,269

Source: TechniQuest 2013.

Note:
[1] The intersection point at TMC-9 does not currently exist as it is a proposed new intersection as part of the redevelopment of the former installation under two of the proposed alternatives.

ATRs were placed in three locations to record traffic volumes in 15-minute intervals over a one-week period. Counts were recorded in both traffic directions at each location (see Table 3.4-2). Easton Road between Blair Mill Road and Mill Road had the highest traffic volume, with an average of 41,758 vehicles counted during the one-week period. These counts were recorded just north of the on-ramps for I-276. At the other Horsham Road location, between Privet Road and Hatters Way, just under 17,000 vehicles were recorded. The traffic recorder on Easton Road counted over 24,000 vehicles.

Table 3.4-2 Baseline Average Daily Traffic

Label ID	Roadway	Average Daily Traffic
ATR-1	Easton Road/SR 611 north of I-276 interchange	41,758
ATR-2	Horsham Road between Privet Road and Hatters Way	16,991
ATR-3	Easton Road between Maple Avenue and Meetinghouse Road	24,578

Source: TechniQuest 2013.

3.4.5 Roadway Intersection Level of Service

A capacity analysis was conducted to evaluate the ability of each roadway to handle current traffic volumes. The analysis characterized intersections based on their level of service (LOS). LOS is a qualitative measure that describes a roadway or intersection's general operating conditions based on factors such as speed, travel times, and delays. LOS is reported on a scale of 'A' to 'F.' 'A' represents adequate operating conditions with free-flowing traffic, and 'F' represents the worst operating conditions

with significant delays. The analysis determined LOS for multiple intersections near the former installation (see Table 3.4-3).

A majority of intersections had an LOS of D or worse during peak hours, suggesting moderate to severe congestion around much of the former installation. The LOS was better during morning peak hours at several intersections, indicating traffic congestion is worse during the evening. Exceptions include the Horsham Road and Keith Valley Road intersection (TMC-8) and the Easton Road and Gate 1 intersection (TMC-12). The intersection of Horsham Road and Dresher Road and the intersection of Norristown Road and Horsham Road both had a morning and evening peak hour LOS of F.

Table 3.4-3 Baseline Levels of Service

Label ID	Intersection	LOS Morning Peak Hour	LOS Evening Peak Hour
TMC-1	Easton Road/SR 611 and Horsham Road/SR 463	D	E
TMC-2	Easton Road/SR 611 and Horsham Road/SR 463	C	C
TMC-3	Horsham Road/SR 463 and Dresher Road	F	F
TMC-4	Maple Avenue and Horsham Road/SR 463	E	F
TMC-5	Norristown Road and Horsham Road/SR 463	F	F
TMC-6	Easton Road/SR 611 and Home Depot Drive	D	F
TMC-7	Privet Road and Horsham Road/SR 463	B	C
TMC-8	Horsham Road/SR 463 and Keith Valley Road	D	C
TMC-9	Off Keith Valley Road	N/A[1]	N/A[1]
TMC-10	Keith Valley Road/Kansas Road and County Line Road	C	C
TMC-11	County Line Road and Easton Road/SR 611	E	E
TMC-12	Off Easton Road/SR 611	E	C
TMC-13	West Moreland Avenue and Easton Road/SR 611	B	C
TMC-14	Maple Avenue and Easton Road/SR 611	C	F
TMC-15	Meetinghouse Road and Easton Road/SR 611	D	F

Source: TechniQuest 2013.

Note:
[1] LOS not available. The intersection point at TMC-9 does not currently exist as it is a proposed new intersection as part of the redevelopment of the former installation under two of the proposed alternatives.

3.4.6 Safety Conditions

A summary of vehicle accidents was requested from the Horsham Police Department from the period of January 1, 2010 to July 11, 2013 for the following roadways near the former NAS JRB Willow Grove property and their associated intersections:

- Horsham Road
- Keith Valley Road
- Easton Road
- County Line Road

There were 266 accidents reported near NAS JRB Willow Grove during this time period. The majority of accidents reported (233) took place at an intersection. A total of 237 accidents were recorded on Horsham Road for this time period. Sixty-three occurred in 2010, 71 in 2011, 65 in 2012 and 38 have been recorded during the first six and a half months of 2013. Of the 237 accidents on Horsham Road, 92 accidents involved an injury or vehicle towing and were reported to PennDOT. The intersection of

Horsham Road and Norristown Road had a total of 37 accidents. The intersection of Horsham Road and Maple Road recorded 33 accidents and the intersection of Horsham Road and Dresher Road had 30 accidents during this time period (Horsham Township Police Department 2013).

Easton Road experienced ten accidents during this time period. Of these, four involved injury or vehicle towing and were reportable to PennDOT. Three accidents occurred in 2010, one in 2011, four in 2012 and two in 2013. Keith Valley Road experienced 14 accidents. Six of these involved injury or vehicle towing and were reported to PennDOT. The intersection of Keith Valley Road and Graeme Park Road had five reported accidents. Three accidents occurred in 2010, two in 2011, nine in 2012. A total of five accidents were recorded on Keith Valley Road, three of which involved injury or vehicle towing and were reported to PennDOT. Three accidents occurred in 2010, and two in 2012 (Horsham Township Police Department 2013). The complete accident summary can be found as part of Appendix C.

3.4.7 Public Transportation

SEPTA provides bus, trolley, subway, and commuter rail service in and around Philadelphia (SEPTA 2013b). Fixed route bus and commuter rail services are available near the former installation and are described below.

- **Route 55 (fixed-route bus)** – Route 55 provides bus service between Philadelphia and Doylestown, north of the former installation. The route runs along Easton Road adjacent to the former installation (SEPTA 2013c).
- **Route 80 (fixed-route bus)** – Route 80 provides express bus service between Philadelphia and Horsham. Bus stops are located approximately one half mile south of the former installation (SEPTA 2013d).
- **Route 310 (fixed-route bus)** – Route 310 provides bus service between the Willow Grove Regional Rail Station and Horsham. Bus stops are located approximately one half mile south of the former installation (SEPTA 2013e).
- **Warminister Line (commuter rail)** – The Warminister line provides regional rail service between the Philadelphia city center and Warminister, Pennsylvania. The Hatboro Station is located approximately 1.7 miles southeast of the former installation and includes a total of 268 SEPTA and non-SEPTA parking spaces (SEPTA 2013f). The Warminister Station is located approximately 2 miles east of the former installation and includes 800 daily and monthly parking spaces (SEPTA 2013g). The Willow Grove Station is located approximately 3 miles southeast of the former installation and includes 190 daily and monthly parking spaces (SEPTA 2013h).

3.5 Environmental Management

This section discusses ongoing environmental management, including hazardous waste management, hazardous materials and substances, and restoration programs at the former NAS JRB Willow Grove property. Environmental management and restoration programs are ongoing; therefore, this section presents the most current data available during the preparation of this report.

3.5.1 Regulatory Overview

The Navy is managing hazardous wastes, materials, and substances and is remediating all contamination resulting from past operations at the former NAS JRB Willow Grove in accordance with applicable or relevant and appropriate requirements, which may include:

- The **Resource Conservation and Recovery Act (RCRA)**, first enacted in 1976, regulates the treatment, storage, transportation, handling, labeling, and disposal of hazardous waste. The Hazardous and Solid Waste Amendments of 1984 added the requirement for treatment, storage, and disposal facilities to permits issued after November 8, 1984, to include corrective actions. Under these amendments, the EPA can issue administrative orders requiring corrective actions to remediate releases of hazardous waste or hazardous waste constituents from solid waste management units.

- The **Pennsylvania Waste Management Act**, first enacted in 1980 by the Pennsylvania Legislature, directed the Pennsylvania Department of Environmental Protection (PADEP) to issue state regulations for the safe management and transportation of hazardous wastes. The resulting rules (Pennsylvania Hazardous Waste Management Regulations, Chapters 260 through 270) incorporated the federal rules.

  The **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)**, first enacted in 1980, created the legal mechanism for cleaning up abandoned or uncontrolled hazardous waste sites. CERCLA requires a response, where necessary to protect human health and the environment, when there is a release or threat of release of a hazardous substance into the environment, or when there is a release of any pollutant or contaminant that may present an imminent and substantial danger to public health or welfare. Under CERCLA, the EPA developed a National Priorities List (NPL) of sites that present the greatest risk to public health and the environment.

  CERCLA remedy selection takes into account reasonably anticipated future land use to determine the appropriate extent of remediation, which must be protective of human health and the environment.

- The **Superfund Amendments and Reauthorization Act (SARA)**, first enacted in 1986, is an amendment to CERCLA which mandates that DOD, including the Navy, follow the same cleanup regulations that apply to private entities. Under the provisions of CERCLA §120(h) (part of the amendment pertaining to federal facilities), any transfer of federal real property owned by the United States to a nonfederal entity is subject to the following requirements:

  – A notice of hazardous substance activity must be given to the grantee;

  – A covenant must be included in the deed that "all remedial action necessary to protect human health and the environment with respect to any such substance remaining on the property has been taken before the date of such transfer;"

  – The deed covenant must also include a provision that the federal government will return and perform any additional response action that may be required in the future; and

  – The government retains a perpetual right of access necessary to perform such additional response actions.

  The requirement to provide these covenants shall not apply in any case in which the person or entity to whom the real property is transferred is a potentially responsible party with respect to such property. These requirements apply only to fee conveyances of real property out of federal ownership. They do not apply to interagency federal real property transfers or to leases, licenses, or easements granted for the use of federal land.

  SARA also established the Defense Environmental Restoration Program (DERP). Through the DERP, the DOD conducts environmental restoration activities at sites on

active installations, installations undergoing BRAC, and formerly utilized defense sites (FUDS).

- The **Environmental Restoration (ER) Program** was established by the Navy to meet DERP requirements and to reduce the risk to human health and the environment from past waste disposal operations and hazardous substance spills, including certain oil spills that are not addressed by the CERCLA regulatory framework. The program goal is to provide for cost-effective and timely site assessment, planning, and remediation of identified releases consistent with DERP requirements.
- The **Military Munitions Restoration Program (MMRP)** is one of two restoration programs under the Navy's ER Program. The MMRP addresses the potential safety, health, and environmental issues caused by past DOD munitions-related activities. The program addresses the potential explosives safety hazards presented by munitions and explosives of concern (MEC), which include unexploded ordnance (UXO), discarded military munitions (DMM), and munitions constituent (MC) concentrations high enough to pose an explosive hazard and potential environmental contamination.
- The **Installation Restoration (IR) Program** is one of two restoration programs under the Navy's ER Program. The IR Program addresses releases of hazardous substances, pollutants, or contaminants that pose toxicological risks to human health or the environment. IR Program (IRP) cleanup activities are performed under CERCLA except at those sites subject to the PADEP Underground Storage Tank (UST) Program or the Pennsylvania Land Recycling Program (Act 2).
- **Applicable Underground Storage Tank (UST) Regulations.** The operation of USTs is regulated under 40 CFR Part 280 (Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks) and 40 CFR Part 281 (Approval of State Underground Storage Tank Programs). The State of Pennsylvania's UST Program is approved under 40 CFR Part 282.69, under Subtitle 1 of RCRA. USTs are regulated by the Pennsylvania Storage Tank and Spill Prevention Act, 25 Pennsylvania Code (PA Code) Chapter 245.
- **Applicable Aboveground Storage Tank (AST) Regulations.** The operation of ASTs is regulated under 40 CFR 112 (Oil Pollution Act), which establishes requirements to prevent the discharge of oil from aboveground containers (40 CFR 112.1(a)(1)) including oil pollution prevention regulations such as Spill Prevention, Control, and Countermeasure (SPCC) plans. Under Pennsylvania Law 169, No. 32 (Storage Tank and Spill Prevention Act), the PADEP has the authority to oversee compliance with the federal requirements for any one or combination of aboveground oil storage facilities with capacities exceeding 250 gallons. Aboveground storage tanks are regulated by the Pennsylvania Storage Tank and Spill Prevention Act, 25 PA Code Chapter 245.
- The **Pennsylvania Land Recycling Program (Act 2)** establishes the environmental remediation standards for cleanups required under certain environmental laws, as well as statewide health standards for regulated substances in each environmental medium. Act 2 encourages voluntary clean-up and reuse of contaminated commercial and industrial sites in exchange for liability relief. As a state law, Act 2 does not waive or supersede the procedural requirements of the federal law; therefore, the Act 2 liability relief cannot automatically confer release from CERCLA liability. However, the Act 2 remediation standards are considered applicable standards for remediation conducted at CERCLA sites. Administration of the Land Recycling Program is governed by 25 PA Code Chapter 250.

- The **Toxic Substances Control Act (TSCA)**, first enacted in 1976, addresses the production, importation, use and disposal of specific chemicals. TSCA authorizes the EPA to require reporting, record keeping, and testing of certain chemicals. Polychlorinated biphenyls (PCBs) are regulated under Title I (Control of Toxic Substances), asbestos is regulated under Title II (Asbestos Hazard Emergency Response), radon is regulated under Title III (Indoor Radon Abatement), and lead-based paint (LBP) is regulated under Title IV (Lead Exposure Reduction).
- The **Residential Lead-Based Paint Hazard Reduction Act (Title X)**, first enacted in 1992, addresses lead hazards on residential properties. The act requires that all federally owned target housing constructed between 1960 and 1977 be inspected for LBP and LBP hazards when transferring the property. As directed by Title X, HUD enacted the Lead Safe Housing Rule in 2004, which requires LBP inspections, risk assessments, interim controls, and abatement of LBP hazards in federally owned target housing and target housing receiving federal assistance when transferring property.
- The **Asbestos Hazard Emergency Response Act (AHERA)** requires schools to inspect for asbestos-containing material, prepare management plans, and take action to prevent or reduce asbestos hazards. Regarding the former NAS JRB Willow Grove property, the AHERA requirements apply only to the removal of lead-based paint in housing and other areas frequented by children, such as day care centers (Navy 2006).
- The **Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)** provides the basis for the regulation, sale, distribution, and use of pesticides in the United States. FIFRA was first passed in 1947, substantially rewritten in 1972, and since amended.

3.5.2 Management of RCRA Hazardous Waste

The former NAS JRB Willow Grove property was classified by the PADEP as a Large Quantity Generator (No. PA4170000158). A Large Quantity Generator is defined as a facility that generates more than 2,200 pounds (lbs) (1,000 kilograms [kg]) of hazardous waste, or over 2.2 lbs (1 kg) of acutely hazardous waste, per month (EPA 1996). Hazardous waste generated at the former NAS JRB Willow Grove property was generated by aircraft, ground vehicles, and facility maintenance, and included solvents, waste paints, adhesives, sealants, contaminated fuel, rags, and various acids.

Hazardous waste was formerly managed under the NAS JRB Willow Grove Hazardous Waste Management Plan, which described procedures to be followed for the generation, storage, and disposal of hazardous and nonhazardous chemical wastes, universal wastes, used oil, and unused JP-8 aviation fuel (Navy 2006). The NAS JRB Willow Grove Hazardous Waste Contingency Plan described response actions in the event of an unplanned release of hazardous material or hazardous waste. Hazardous waste generated at the former NAS JRB Willow Grove property was accumulated in Building 633 for less than 90 days prior to contractor collection for off-site treatments, recycling, and disposal (Navy 2006).

Hazardous wastes have been removed from Building 633 and RCRA wastes are no longer generated at the installation.

3.5.3 Management of Hazardous Materials and Substances

This section describes hazardous materials at NAS JRB Willow Grove and their management, including storage tanks, oil/water separators (OWSs), asbestos, lead, PCBs, radon, and pesticides.

3.5.3.1 Underground Storage Tanks

As of 2006, two active USTs were located at NAS JRB Willow Grove (Navy 2006). Prior to April 2002, there was an additional UST at NAS JRB; however, it was reclassified as an OWS, as recommended by the PADEP (Navy 2006). UST regulations apply to OWSs that do not have permission to discharge to a sanitary sewer system. As of 2006, there were three OWSs that discharged to the storm drainage system and for which UST regulations apply (there were 11 OWSs in total; however, eight are considered wastewater treatment tanks). All active USTs and applicable OWSs on the former NAS JRB Willow Grove property were registered with the PADEP, and the Navy notified the PADEP if any USTs were removed, repaired, or installed. All USTs at the former NAS JRB Willow Grove property have since been cleaned, closed, or removed.

Although numerous USTs historically existed on the former NAS JRB Willow Grove property, only three of these USTs have been subject to investigation and remediation because of known releases. The IR Program addressed releases from one UST at Site No. 8 (Building 118, Abandoned Fuel Tank) and two USTs at Site No. 10 (Navy Fuel Farm). Past releases at these sites have been investigated. The current status of IRP sites on the former NAS JRB Willow grove property is provided in Section 3.5.4.

3.5.3.2 Aboveground Storage Tanks

Table 3.5-1 lists the ASTs at the former NAS JRB Willow Grove installation along with their respective location, capacity, content, and status. All regulated ASTs on the property are registered with the PADEP, and the Navy notifies the PADEP if any ASTs are removed, repaired, or installed.

Table 3.5-1 Aboveground Storage Tanks at the Former NAS JRB Willow Grove Property

Identification Number	Location	Capacity (gallons)	Contents	Use	Status[1]
002DIE01	Building 2	350	Diesel	Base-mounted generator	Closed[2]
003DIE01	Building 3	315	Diesel	Base-mounted generator	Closed[2]
005DIE01	Building 5	400	Diesel	Base-mounted generator	Closed[2]
024DIE01	Building 24	300	Diesel	Generator	Closed
024DIE02	Building 24	150	Diesel	Generator	Closed
024DIE03	Building 24	200	Diesel	Generator	Closed
070DIE01	Building 70	1,000	Empty	None	Closed
080AFF01	Building 80	1,500	AFFF	Fire suppression	Closed
080AFF02	Building 80	1,500	AFFF	Fire suppression	Closed
080AFF03	Building 80	1,500	AFFF	Fire suppression	Closed
080AFF04	Building 80	1,500	AFFF	Fire suppression	Closed
080DIE01	Building 80	300	Diesel	Generator	Closed
080DIE03	Building 80	120	Diesel	Generator	Closed
080DIE04	Building 80	120	Diesel	Generator	Closed
080DIE01	Building 80	130	Diesel	Base-mounted generator	Closed
118DIE01	Building 118	275	Diesel	Generator	Closed
126DIE01	Building 126	500	Diesel	Generator	Closed
137DIE01	Building 137	230	Diesel	Base-mounted generator	Closed[2]
139DIE01	Building 139	500	Diesel	Generator	Closed
139DIE02	Building 139	75	Diesel	Generator	Closed
174DIE01	Building 174	400	Diesel	Base-mounted generator	Closed[2]
177AFF03	Building 177	1,600	AFFF	Fire suppression	Closed
177AFF04	Building 177	1,600	AFFF	Fire suppression	Closed

Table 3.5-1 Aboveground Storage Tanks at the Former NAS JRB Willow Grove Property

Identification Number	Location	Capacity (gallons)	Contents	Use	Status[1]
180DIE01	Building 180	315	Diesel	Base-mounted generator	Closed[2]
181GLY01	Building 181	1,500	Propylene glycol	AST	Closed[2]
181KAC01	Building 181	1,500	Potassium acetate	AST	Closed[2]
183AFF01	Building 183	6,000	AFFF	Fire suppression	Closed
183AFF02	Building 183	6,000	AFFF	Fire suppression	Closed
183DIE01	Building 183	1,400	Diesel	Multi-compartment generator	Closed
183DIE02	Building 183	350	Diesel	Multi-compartment generator	Closed
183DIE03	Building 183	275	Diesel	Generator	Closed
183DIE04	Building 183	50	Diesel	Makeup tank	Closed
608DIE01	Building 608	500	Diesel	Generator	Closed
633WSO01	Building 633	1,000	Waste Oil	AST	Closed
647DIE01	Building 647	100	Diesel	Base-mounted generator	Closed[2]
649DIE01	Building 649	200	Diesel	Base-mounted generator	Closed[2]
650DIE01	Building 650	127	Diesel	Base-mounted generator	Closed[2]
650AFF01	Building 650	400	AFFF	Fire suppression	Closed[2]
650AFF02	Building 650	400	AFFF	Fire suppression	Closed[2]
681AFF01	Building 681	2,500	AFFF	Fire suppression	Closed
681AFF02	Building 681	2,500	AFFF	Fire suppression	Closed
681DIE01	Building 681	150	Diesel	Generator	Closed
681DIE02	Building 681	500	Diesel	Generator	Closed
681DIE03	Building 681	500	Diesel	Generator	Closed
681DIE04	Building 681	500	Diesel	Generator	Closed
681DIE05	Building 681	500	Diesel	Generator	Closed
681DIE06	Building 681	500	Diesel	Generator	Closed
AG1GLY01	RN (N)	300	Ethylene glycol	Arrester gear	Closed
AG2GLY01	RN (N)	300	Ethylene glycol	Arrester gear	Closed
AG3GLY01	RN (S)	300	Ethylene glycol	Arrester gear	Closed
AG4GLY01	RN (S)	300	Ethylene glycol	Arrester gear	Closed

Source: Navy 2006 and NAVFAC 2013.

Notes:
[1] Status was determined by review of the Naval Facilities Engineering Command database unless noted otherwise.
[2] Status determined from communication with Navy BRAC personnel on September 23, 2013.
Key:
AFFF = Aqueous Film-Forming Foam (Fire Suppression Agent).
AST = aboveground storage tank.

3.5.3.3 Oil/Water Separators

Table 3.5-2 lists the OWSs located at the former NAS JRB Willow Grove property along with their location, type of storage, capacity, discharge location, and status. After processing in the OWS, wastewater was discharged into the sanitary sewer system or storm drainage system. Three of the OWSs were registered with the PADEP pursuant to PADEP UST regulations and are also included on Table

3.5-2. The remaining OWSs are considered wastewater treatment tanks and were not required to be registered.

Table 3.5-2 Oil Water Separators at the Former NAS JRB Willow Grove Property

OWS Number	Location	Type	Capacity (gallons)	Discharge Location	Status[1]
26939	Building 80	UST	1,000	Storm system	Closed
89343	Building 175	OWS pit	500/500	Sewer system	Closed
35096	Building 177	OWS	350	Sewer system	Closed
178	Building 178	OWS	350	Sewer system	Closed
180	Building 180	OWS	500	Sewer system	Closed
608	Building 608	OWS	500	Sewer system	Closed
639	Building 639	OWS	1,000	Sewer system	Closed
645OWS01	Building 645	OWS	8,000	Sewer system	Closed[2]
680OWS01	Building 680	OWS pit	2,500	Sewer system	Closed

Source: Navy 2006 and NAVFAC 2013.

Notes:
[1] Status was determined by review of the Naval Facilities Engineering Command database unless noted otherwise.
[2] Status determined from communication with Navy BRAC personnel on September 23, 2013.

Key:
OWS = Oil/water separator.
UST = Underground storage tank.

3.5.3.4 Asbestos Containing Materials

Asbestos fibers are strong and heat-resistant. Because of these qualities, it was commonly used—before the discovery of its health effects on the lungs—in the building construction industry (e.g., for roofing shingles, ceiling and floor tiles, cement, textiles, coatings, etc.). Several surveys were conducted to determine whether asbestos-containing materials (ACM) and presumed asbestos-containing materials (PACM) are present in non-housing buildings at the former NAS JRB Willow Grove property, and if present, to what extent. In 1996, 89 of the approximately 150 buildings were surveyed, of which 52 contained either ACM or PACM (Navy 2006). In 2011, 108 on-base, non-housing buildings were surveyed, of which 49 contained either ACM or PACM (Michael Baker, Jr., Inc. 2011a). At the same time, six on-base housing buildings were surveyed, of which two contained either ACM or PACM (Michael Baker, Jr., Inc. 2011a).

Of the buildings surveyed in 2011, 19 buildings contained no material that warranted sampling (building 54, 55, 117, 165, 166, 173, 190, 193, 630, 631, 632, 633, 634, 644, 649, 652, 654, 658, and 686). In 47 building, samples were collected but none contained ACM (13, 15B, 30, 49, 56, 63, 65, 68, 139, 160, 167, 177, 178, 179, 199, 604, 609, 610, 611, 612, 613, 624, 625, 626, 635, 638, 639, 642, 643, 645, 648, 650, 651, 653, 655, 660, 661, 662, 666, 680, 109 Quarters A, 110A, 112 Quarters D, 112A, 113 Quarters E, 113A, and 114 Quarters F). Table 3.5-3 summarizes the results for the remainder of the buildings surveyed.

Table 3.5-3 Summary of 2011 ACM and PACM Sampling Results for the Former NAS JRB Willow Grove Property

Building	Total No. of Samples	Total No. of Samples Containing ACM	ACM Hazard
1	31	1	None identified
2	126	19	Pipe insulation, cement wall and ceiling panels, pipe insulation
3	114	5	Cement wall panels
5	76	2	Cement wall and ceiling panels
6	39	3	None identified
7	8	1	None identified
8	40	1	None identified
15A	16	2	None identified
21	4	1	None identified
22	29	5	None identified
24	14	1	None identified
29	45	5	Cement wall and ceiling panels, window glazing
31	4	1	None identified
32	4	1	None identified

Source: Michael Baker, Jr. Inc. 2011a.

3.5.3.5 Lead-Based Paint/Lead

At the former NAS JRB Willow Grove property, LBP hazards have been inspected and hazard levels have been assessed for areas with the greatest potential for exposure. According to the 2011 summary report prepared by Michael Baker, Jr., Inc. (2011b), a lead hazard exists when one or more of the following conditions exist:

- LBP on a component is deteriorated;
- LBP is present on a friction surface, the LBP shows signs of abrasion, and lead levels in dust on the nearest horizontal surface underneath the friction surface exceeds dust-lead hazard standards (40 grams per square foot [gm/ft^2] for floors; 250 gm/ft^2 for windowsills);
- LBP is present on an impact surface, the LBP is damaged or deteriorated, and the damage is caused by the impact of a related building component;
- LBP is present on a chewable surface and teeth marks are evident;
- Lead in floor dust wipe samples equals or exceeds 40 micrograms per square foot ($\mu g/ft^2$);
- Lead in interior window sill dust wipe samples equals or exceeds 250 $\mu g/ft^2$;
- Lead in bare soil play area samples equals or exceeds 400 part per million (ppm); or
- Lead in bare soil samples equals or exceeds 1,200 ppm as a yard average.

All of the Naval Family Housing buildings were initially constructed when LBPs were commonly used (Navy 1999). According to site personnel, LBP was removed from on-base housing and other buildings frequented by children; however, no documentation of this action exists (Navy 2006).

In 2011, LBP hazards were inspected and risks were assessed in 14 on-base housing buildings at NAS JRB Willow Grove (Michael Baker, Jr., Inc. 2011b). Sampling locations were selected to comply with Title X and AHERA requirements (see Section 3.5.1 for a description of applicable regulations). Table 3.5-4 summarizes the results of the 2011 LBP inspection. A LBP hazard was identified in Building 5.

Table 3.5-4 Summary of LBP in On-base Housing at the Former NAS JRB Willow Grove Property

Building	LBP Components	LBP Hazard
3	Ladder, ladder support, window trim, window sill	None identified
5	Window casing, window sill, window trim	Deteriorated paint on window sills
56	None identified	None identified
109	Ceilings, door trim, walls	None identified
110	None identified	None identified
111	Access panel, access panel trim, balustrade, baseboard, ceilings, door, door casing/jamb, door trim, newel post, shelf support, stair stringer, trim, walls, window casing, window sill, window trim	None identified
112	Access panel, baseboard, ceilings, ceiling beams, door, door casing/jamb, door trim, shelf, shelf support, stair stringer, stair riser, stair tread, walls, window sill, window trim	None identified
113	Baseboard, ceilings, door, door casing/jamb, door trim, shelf support, stair stringer, stair tread, walls, window casing, window sill, window trim	None identified
114	Exterior door trim, exterior window sills, windows, window casing, window sill, window trim	None identified
160	None identified	None identified
172	None identified	None identified
609	None identified	None identified
648	None identified	None identified
660	None identified	None identified

Source: Michael Baker, Jr., Inc. 2011b.

Prior to base closure, drinking water at NAS JRB Willow Grove Naval Family Housing was provided by two on-base drinking water wells. According to the draft Environmental Baseline Survey of the Naval Family Housing (Navy 1999), water quality sampling was performed as required by the Safe Drinking Water Act (SDWA) requirements, and the results indicated that lead levels in the water were non-detect or below the action levels set by the SDWA (Navy 1999).

Two IRP sites at the former NAS JRB Willow Grove property (Site Nos. 6 and 7, Abandoned Rifle Range No. 1 and No. 2, respectively) were presumed to contain lead-contaminated soil, groundwater, and/or leachate due to the nature of their use as a rifle range (RKG 2012). However, site screening indicated no apparent threat to health or the environment based on unrestricted use/unrestricted exposure (UU/UE) and No Action Decision Consensus Agreements were reached by the Navy, EPA, and PADEP for Site No. 7 in 2007 and for Site No. 6 in 2008 (Tetra Tech 2007a, 2008.) IRP sites are discussed in Section 3.5.4.

3.5.3.6 Polychlorinated Biphenyls

Transformers used in the delivery of electrical service are a potential source of PCB contamination. Historically, transformers containing PCBs had been used at the former NAS JRB Willow Grove property (Navy 2006). Per TSCA regulations, transformers or other equipment that contain oil with PCB

concentrations greater than 50 ppm are considered to contain PCBs. No PCB-containing materials or equipment are reported to be located at the former NAS JRB Willow Grove property; however, no documentation exists regarding removal and/or management of PCBs or PCB-containing material, except at IRP sites (Navy 2006).

Two IRP sites at the former NAS JRB Willow Grove property (Site No. 1 – Privet Road Compound, and Site No. 3 – Ninth Street Landfill) were determined to contain PCB-contaminated soil (RKG 2012). PCB contamination at Site No. 1 resulted from a spill from a transformer; the contaminated soil was excavated and disposed of off-site (RKG 2012). PCB-containing transformers were stored and serviced at Site No. 3 (Navy 2006). The current status of IRP sites is provided in Section 3.5.4.

3.5.3.7 Radon

The EPA has established an action level of 4.0 picoCuries per liter (pCi/L) for indoor radon concentrations. This action level is applicable to residences; no standards have been established for commercial structures.

Several radon surveys have been conducted at the former NAS JRB Willow Grove property. Surveys conducted in 1991 were limited to Quarters E in Building 113 and Building 601. The sample collected from Quarters E in Building 113 contained radon at a concentration of 6.9 pCi/L, which is above the EPA action level. Three radon detectors were installed in 1999 as a result of the radon samples collected in 1991. Quarters E in Building 113 was screened twice more in 1999 and 2001; however, the radon concentrations were below the EPA action level (Navy 2006).

In 1999, radon concentrations in Building 601 were identified as being above the EPA action level; however, no abatement was conducted (Navy 2006).

In 2001, the U.S. Navy Radon Assessment and Mitigation Program (NAVRAMP) conducted a preliminary screening study in 14 buildings at NAS JRB Willow Grove (Navy 2006). Of the 200 samples analyzed in 2001, only two samples contained radon at concentrations at or above the EPA action level (Navy 2006). A sample containing 6.0 pCi/L radon was collected from Room 122 in Building 137, the Medical Dental Building (Navy 2006), and a sample collected from the Dental Conference Room in Building 137 contained 4.0 pCi/L radon (Navy 2006).

Select results of the 1991, 1999, and 2001 radon surveys presented in the 2006 Environmental Condition of Property Report are reproduced in Table 3.5-5.

Table 3.5-5 Radon Results Summary

Building	Sample Location Description	Year Sampled	Average Radon Level (pCi/L)
3	Child Development Center and Library (“A” Wing)	2001	0.0
3	Child Development Center and Library (“B” Wing)	2001	0.2
6	Boiler house	2001	0.0
49	Subway Restaurant	2001	0.1
113	Quarters E	1991	6.9
113	Quarters E	1999	<4.0
113	Quarters E	2001	<4.0
137	Medical Dental Building	2001	0.4
159	Fuel farm office	2001	1.1

Table 3.5-5 Radon Results Summary

Building	Sample Location Description	Year Sampled	Average Radon Level (pCi/L)
171	Supply warehouse	2001	0.0
174	Pitcarin Club	2001	0.0
175	Hanger (VP 64 Wing)	2001	0.0
175	Hanger (VP 64 Wing)	2001	0.1
192	Bowling alley	2001	0.0
601	Reserve Programs	1999	>4.0
606	Mag warehouse	2001	1.3
608	Firehouse	2001	0.4
635	AIMD Ground Support	2001	0.0
677	Personnel Support Detachment	2001	0.2
780	Passenger OPS	2001	0.0

Source: Navy 2006.

Key:
AIMD = Aircraft Intermediate Maintenance Department.
OPS = Operations.

3.5.3.8 Pesticides/Herbicides

Pesticide applications were made in accordance with the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA - 7 U.S.C. Sec. 136, et seq.), its implementing regulations, and in accordance with the labeling provided with such substances. Pest management at the installation has been conducted in accordance with the 2001 Draft Pest Management Plan, which relies on Integrated Pest Management (IPM) to keep pest numbers low enough to prevent intolerable damage or annoyance (Navy 2006). IPM procedures include regular monitoring to determine if and when treatments are needed and employs physical, mechanical, cultural, biological, and educational tactics. Records relating to the actual use, spills, or misuse of pesticides and herbicides at NAS JRB Willow Grove are not available (RKG 2012). However, there is a potential for residual concentrations of pesticides and herbicides from past use.

Dieldrin, a pesticide, has been detected at various times in groundwater, surface water, and sediment at IRP Site No. 4 (Navy 1991). Concentrations in sediment ranged from 140 to 230 µg/kg, which is less than the PADEP Act 2 standard for dieldrin in residential soil (1,100 µg/kg) (see Section 3.5.1 for a description of PADEP Act 2). The Decision Document for No-Further Action concluded that the detection of dieldrin was likely related to stormwater runoff events (Navy 1991).

Pesticide contamination from past disposal activities is present at IRP Site No. 3 – Ninth Street Landfill (Tetra Tech 2009), and Site No. 12 – South Landfill (RKG 2012). Remediation at these two sites is ongoing. The current status of IRP sites is provided in Section 3.5.4.

Pesticides and herbicides may contain arsenic. The Redevelopment Plan suggests that additional soil sampling for arsenic may be needed because elevated arsenic concentrations could limit land use, especially in areas with a high risk of ingestion exposure, such as parks and children's play areas (RKG 2012); however, if needed, this would be completed following transfer of the former installation property out of federal government ownership. Arsenic-containing pesticides were typically a component of pesticides used in agriculture, especially in orchards, and arsenic also occurs naturally in some soils. Since historic land uses on the former NAS JRB Willow Grove property did not include orchards or other forms of agriculture, the levels of arsenic in site soils would be expected to be similar to background concentrations. A human health risk screening at IRP Site No. 7 was prepared in January 2008 (Tetra

Tech 2012b). Concentrations of arsenic in soil exceeded the EPA Region 3 risk-based concentration at most sampling locations, but were within background levels for soil (Tetra Tech 2012b).

3.5.3.9 Radioactive Materials Sites

In 2013 the Naval Sea Systems Command Detachment prepared a historical radiological assessment (HRA) for the Main Station of NAS JRB Willow Grove in support of CERCLA and the Navy ER Program (Naval Sea Systems Command 2013). The HRA presents a comprehensive history of the Navy's use of general radioactive material (G-RAM) at the former NAS JRB Willow Grove property, in Horsham, Pennsylvania. G-RAM is defined as any radioactive material used by the U.S. Department of the Navy (DON) (including the Marine Corps), or DON contractors that is not associated with the Naval Nuclear Propulsion Program (NNPP). To prepare the HRA, the Navy examined historical activities involving the use of G-RAM at the former NAS JRB Willow Grove property. The HRA fulfills the requirements for a preliminary assessment per CERCLA. The format and content are consistent with the guidance for a Historical Site Assessment (HSA) as set forth in the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM).

According to the HRA, radioactive materials were used, stored, and disposed of within the Main Station at the former NAS JRB Willow Grove property. A total of 18 sites are considered impacted from these activities. The HRA has not determined whether radioactive contamination is actually present at these sites; therefore, further investigations are recommended. Designating a site as "impacted" does not confirm the presence of radioactive material but indicates that there is a possibility for residual radioactive contamination. The use of the term "impacted" in the HRA is not necessarily analogous with the NEPA concept of impacts as addressed in this EIS.

The 18 impacted sites identified by the HRA are listed below and shown on Figure 3.5-1:

- Fifteen buildings:
  - Buildings 20, 80, 175, 180, and 680, which were aircraft storage/maintenance hangars;
  - Buildings 4, 140, and 601, which were training/instruction buildings;
  - Buildings 22, 29, and 77, which housed aircraft/aviation supply areas;
  - Building 18, Operations and Control Tower;
  - Building 23, Parachute Shop;
  - Building 177, Army Aviation and Support Facility;
  - Building 118, Ground Electronics Maintenance Division; and
- Three former landfills, which are designated as IRP sites 1, 3, and 12.

The HRA concluded that "low to moderate potential for radioactive contamination" exists at the 18 impacted sites. Potentially contaminated media include structures and their interiors, drainage systems, and surface and subsurface soils. The HRA noted that at nine of the buildings, the potential for contamination was "unlikely." These include buildings 4, 18, 22, 77, 140, 175, 177, 180, and 680. Of the remaining buildings, where the contamination potential was rated "likely," only buildings 20 and 80 were ranked as having potential for moderate contaminant levels in soils; the other buildings were rated as having potential for "low" contaminant levels in all media. The potential for contamination at the landfill sites was rated as "unknown," with potential levels rated as "moderate" in the HRA. No evidence has

been found that a migration pathway exists for contaminants to move off base, and the HRA did not recommend emergency action for any impacted site (Naval Sea Systems Command 2013).

The HRA recommended scoping surveys for all 18 sites, and the Navy will initiate the surveys in 2014. The results of the scoping surveys will be discussed at Restoration Advisory Board (RAB) meetings.

3.5.4 Environmental Restoration Program

Through the ER Program, the Navy conducts environmental restoration activities at sites on active installations, installations undergoing BRAC and FUDS. Two restoration programs are under the Navy's ER Program: the IR Program for hazardous contaminants of concern, and the MMRP for munitions and explosives of concern. According to site personnel, no MECs have been identified at the former NAS JRB Willow Grove property (Navy 2006); therefore, this section focuses on the IRP.

Past resource and waste management practices at DOD facilities have resulted in the presence of hazardous waste contamination at some installations, including the former NAS JRB Willow Grove property. Cleanup of these hazardous waste sites is being conducted under the Navy's IRP and meets the requirements of CERCLA and SARA, and applicable PADEP regulations.

The Navy entered into a Federal Facility Agreement (FFA) with the EPA and PADEP on June 29, 2005 (Navy 2006). The FFA establishes goals and responsibilities among the Navy and the regulatory agencies and sets enforceable cleanup schedules for IR sites at the former NAS JRB Willow Grove property. The FFA established a site screening process to determine whether hazardous substances, pollutants, contaminants, hazardous wastes, or hazardous constituents have been released to the environment. The screening program enables the Navy and regulators to determine whether a site should be recommended for No Further Action or for further investigation according to CERCLA.

CERCLA specifies a number of sequential procedures for initiating and carrying out the remedial process under the IR Program. The EPA, PADEP, and the public have opportunities to review and comment on assessments/studies and proposals for removal/remedial actions throughout the remedial process. A ROD is prepared after public review of the Proposed Remedial Action Plan. The ROD explains the remedy selection process and identifies the remedy selected based on information and technical analysis presented in the Remedial Investigation/Feasibility Study (RI/FS) report. A site may be removed from the NPL when the final ROD requirements are attained and the site is operational and functional. No site may be deleted from the NPL without an EPA-approved Close Out Report.

The former NAS JRB Willow Grove property was placed on the NPL in 1995, bringing the installation under the Federal Facilities provisions of CERCLA Section 120(e). The former NAS JRB Willow Grove property is listed on the NPL under EPA ID PAD987277837. Eleven IRP sites have been identified at the former NAS JRB Willow Grove property since 1994 (see Figure 3.5-2). One additional site (Potential "Site No. 11") was studied but never added to the list of IRP sites or the NPL. The IRP sites are located on both the surplus property and the property owned and/or transferred to establish the Horsham Air Guard Station.

Path: M:\VA_Beach\Willow_Grove\Maps\MXD\Report\EIS\Radiological_Sites.mxd

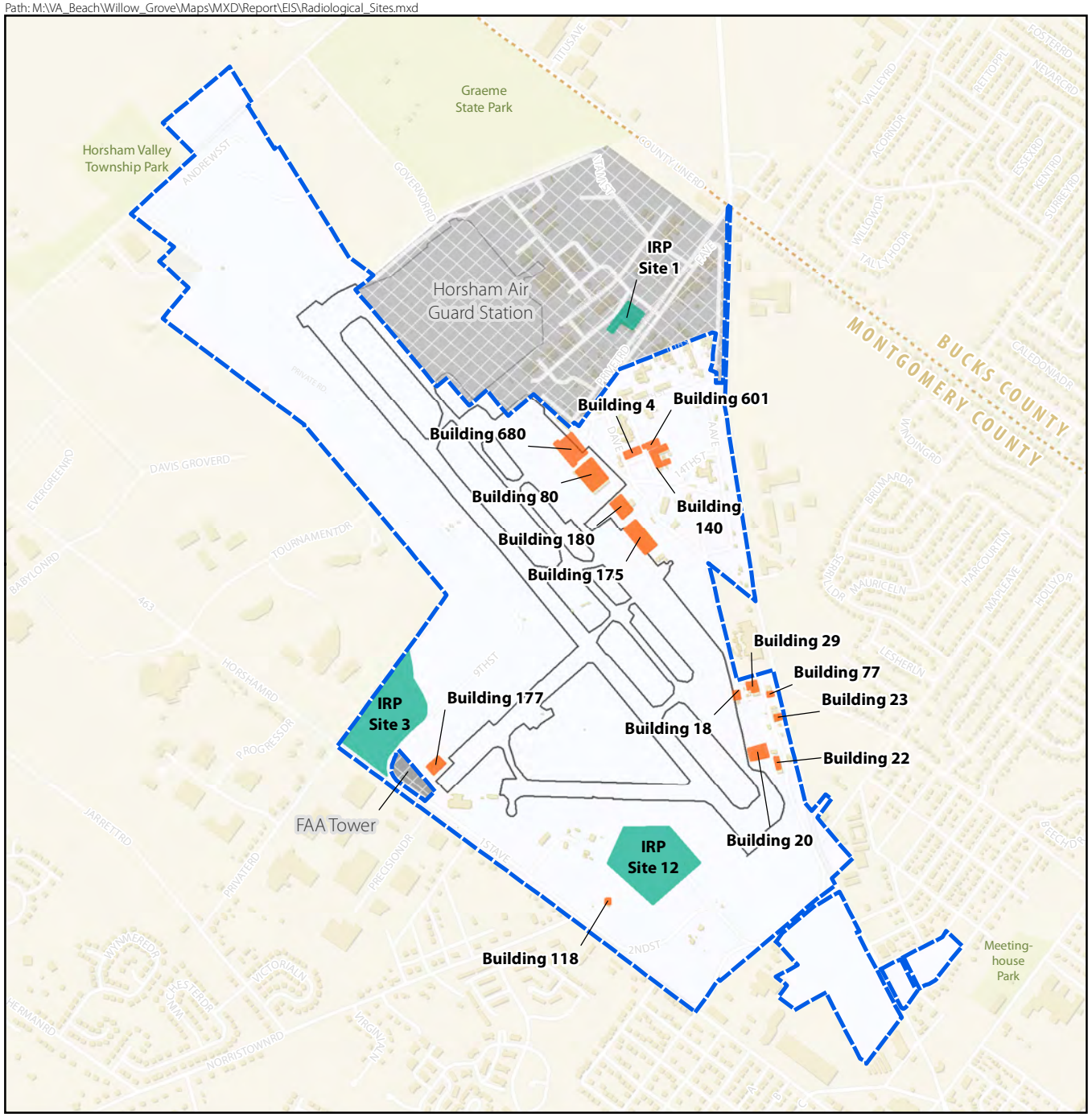

Figure 3.5-1

Potential Radiological Sites

Former NAS JRB Willow Grove

Horsham, PA

Legend

- County Boundary
- NAS JRB Willow Grove
- Impacted Building
- Impacted Site
- Runways, Taxiways, Parking Aprons
- FAA Tower and Horsham Air Guard Station (Not included in redevelopment)

SCALE

0 0.25 0.5 Miles

SOURCE: Ecology and Environment 2013; ESRI 2010; Tetra Tech 2012.

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Path: M:\VA_Beach\Willow_Grove\Maps\MXD\Report\EIS\IRP_LUcontrols_aerial_11x17.mxd

Figure 3.5-2
IRP Sites
Former NAS JRB Willow Grove
Horsham, PA

Legend

- County Boundary
- NAS JRB Willow Grove
- FAA Tower and Horsham Air Guard Station (not included in redevelopment)
- IRP Sites - Eliminated from Consideration (no action needed)
- IRP Sites - Investigations Underway
- IRP Sites - Records of Consensus Agreement No Action Decision

SCALE

0 0.25 0.5 Miles

SOURCE: Ecology and Environment 2013; ESRI 2010; RKG 2012; Tetra Tech 2012.

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The current status of the IRP sites at the former NAS JRB Willow Grove property that have been or are being investigated is summarized on Table 3.5-6. The most current data regarding the cleanup activities are published as part of the environmental restoration process and can be found in the local information repository at the Horsham Township Library and online at http://www.horshamlibrary.org/WillowGroveNASindex.html.

Table 3.5-6 Current Status of IRP Sites at the Former NAS JRB Willow Grove Property

Site	Brief Description	Current Status[1]
Site No. 1 - Privet Road Compound	**Soil:** This former waste transfer station operated from 1967 to 1975. Wastes were burned and/or buried on-site. Approximately 1,100 tons of PCB-contaminated soil was removed in 1999. **Groundwater:** VOC-contaminated groundwater plume.	**Soil:** 2006 ROD selected No Further Action. **Groundwater:** 2008 Interim ROD selected land use controls. The EPA is investigating off-site contamination.
Site No. 2 - Antenna Field Landfill	This approximately 4-acre, inactive landfill operated from 1948 to1960. The landfill was regraded with vegetated soil cover upon closure. Very little waste material was found buried in test pits. Potential COCs included PAHs and metals. Risk assessment indicated no apparent threat to health or the environment based on unrestricted use and unrestricted exposure (Tetra Tech 2010).	2010 ROD selected No Further Action.
Site No. 3 - Ninth Street Landfill	This approximately 9-acre, inactive landfill operated from 1960 to 1967. It was used as a transformer storage and salvage yard after 1967.	RI/FS in process.
Site No. 4 - North End Landfill	This approximately 3.5-acre, inactive landfill is believed to have received overflow from the Privet Road Compound. A black, tarry mass was observed, but sampling of soil and groundwater in 1989 revealed no COCs originating from the landfill (Navy 1991). Tar-like mass and soil were removed in 2008.	2009 No Further Action consensus agreement.
Site No. 5 - Fire Training Area	A VOC-contaminated groundwater plume resulting from firefighting exercises that occurred between 1942 and 1975.	**Soil:** 2007 ROD selected No Further Action. **Groundwater**: ROD selected in-situ anaerobic bio-remediation of groundwater, monitored natural attenuation, and land use controls (Tetra Tech 2012b).

Table 3.5-6 Current Status of IRP Sites at the Former NAS JRB Willow Grove Property

Site	Brief Description	Current Status[1]
Site No. 6 - Abandoned Rifle Range No. 1	Lead contamination is presumed to be present based on past use as a rifle range. Constructed in 1942 and presumably used until 1965 (RKG 2012).	2007 No Further Action consensus agreement.
Site No. 7 - Abandoned Rifle Range No. 2	Lead contamination is presumed to be present based on past use as a rifle range. Constructed in 1965 and used until 1977.	2008 No Further Action consensus agreement.
Site No. 8 - Building 118 - Abandoned Fuel Tank	Fuel oil released from a leaking UST was discovered seeping into the basement of Building 118 in 1980. Seeped oil was removed as needed, and leaking UST was abandoned in place.	2006 No Further Action consensus agreement.
Site No. 9 - Steam Plant Building 6 Tank Overfill	Site of a fuel oil release in 1978. Spill response flushed oil with water and directed it toward a detention basin with oil spill containment devices.	2006 No Further Action consensus agreement.
Site No. 10 - Navy Fuel Farm	Site of a fuel oil release in 1986. Buried fuel tanks and diesel/water USTs removed in 1991 along with approximately 6,500 cubic yards of soil (RKG 2012; EA 2004). An LNAPL recovery system was installed in 1998 and operated until 2003.	2006 No Further Action consensus agreement. However, this is based on continued use as a commercial/industrial property (RKG 2012; EA 2004).
Potential Site No. 11 - Aircraft Parking Apron	Potential contamination was suspected due to organic odors.	Eliminated from consideration as an IRP site.
Site No. 12 - South Landfill	Formerly part of Site 2. Drums were removed from a wooded area in 2003. The extent of buried waste was investigated in 2008 and 2010.	RI/FS in process.

Source: RKG 2012 (unless otherwise indicated).

Note:
[1] Current status is as of 2012.

Shading = undergoing remediation or investigation.

Key:
COC = contaminant of concern.
IRP = Installation Restoration Program.
LNAPL = light non-aqueous phase liquid.
PAH = polychlorinated aromatic hydrocarbon.
RI/FS = Remedial Investigation/Feasibility Study.
ROD = Record of Decision.
VOC = volatile organic compound.

3.6 Air Quality

3.6.1 Air Quality Regulations

Air quality is regulated by the EPA through implementation of the Clean Air Act of 1970, 42 U.S.C. 7401 et seq., amended in 1977 and 1990 (CAA). The PADEP is also responsible for implementing federal and state regulations, including air permitting.

3.6.1.1 National Ambient Air Quality Standards

Air quality is defined by ambient air concentrations of specific pollutants determined by the EPA to be of concern regarding the health and welfare of the general public and the environment and which are widespread across the United States. The CAA designates standards for the following criteria pollutants: particulate matter (PM_{10} and $PM_{2.5}$), carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), lead (Pb), and ozone (O_3). National Ambient Air Quality Standards (NAAQS) for these criteria pollutants have been promulgated to protect public health and welfare (see Table 3.6-1) (EPA 2013b).

Areas that do not meet the NAAQS are designated as "nonattainment" for the specific criteria pollutant standard(s). Nonattainment status is further defined by the extent the standard is exceeded. There are six classifications of ozone nonattainment status—transitional, marginal, moderate, serious, severe, and extreme—and two classifications of CO and PM_{10} nonattainment status—moderate and serious. The remaining criteria pollutants have designations of either attainment, nonattainment, or unclassifiable. Areas redesignated from nonattainment to attainment are commonly referred to as maintenance areas, indicating the area is in attainment but subject to an EPA-approved maintenance plan for a specific pollutant. In areas that exceed the NAAQS, the CAA requires preparation of a State Implementation Plan (SIP). The CAA prohibits federal agencies from engaging in, supporting, providing financial assistance for licensing, permitting, or approving any activity that does not conform to an applicable SIP.

The former NAS JRB Willow Grove property is located in Montgomery County, Pennsylvania. This location is within the Philadelphia-Wilmington Air Control Region, which is in moderate nonattainment for the 8-hour ozone standard, and basic nonattainment for both the 1997 and 2006 $PM_{2.5}$ standards. In addition, Pennsylvania as a whole is included in the North East Ozone Transport Region (EPA 2013c).

In addition to the ambient air quality standards for criteria pollutants, national standards exist for hazardous air pollutants (HAPs), which are regulated under Section 112(b) of the 1990 CAA Amendments. In February 2007, the EPA issued a second Mobile Source Air Toxics (MSAT) Rule, which generally supported the findings in the first rule and provided additional recommendations of compounds having the greatest impact on health. Unlike the criteria pollutants, there are no NAAQS for benzene and other HAPs. For mobile sources, the primary control methods for these pollutants involves reducing their content in fuel and altering the engine operating characteristics to reduce the volume of pollutants generated during combustion.

3.6.1.2 The General Conformity Rule

The General Conformity Rule was promulgated by the EPA to ensure that the actions of federal departments or agencies conform to applicable SIPs. The General Conformity Rule applies to federal actions occurring in nonattainment or maintenance areas and regulates direct and indirect emissions of criteria pollutants or their precursors that are caused by a federal action, are reasonably foreseeable, and can be controlled practicably by the federal agency through its continuing program responsibility.

Table 3.6-1 National Ambient Air Quality Standards

Pollutant [final rule citation]		Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide (CO) [76 FR 54294, August 31, 2011]		Primary	8 hours	9 ppm	Not to be exceeded more than once per year
			1 hour	35 ppm	
Lead (Pb) [73 FR 66964, November 12, 2008]		Primary and Secondary	Rolling 3-month average	0.15 μg/m^3(1)	Not to be exceeded
Nitrogen Dioxide (NO_2) [75 FR 6474, Feb 9, 2010] [61 FR 52852, Oct 8, 1996]		Primary	1 hour	100 ppb	98th percentile, averaged over 3 years
		Primary and Secondary	Annual	53 ppb(2)	Annual Mean
Ozone (O_3) [73 FR 16436, Mar 27, 2008]		Primary and Secondary	8 hour	0.075 ppm(3)	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particle Pollution [78 FR 3086, January 15, 2013](4)	$PM_{2.5}$	Primary	Annual	12 μg/m^3	Annual mean, averaged over 3 years
		Secondary	Annual	15 μg/m^3	Annual mean, averaged over 3 years
		Primary and Secondary	24 hour	35 μg/m^3	98th percentile, averaged over 3 years
	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
Sulfur Dioxide (SO_2) [75 FR 35520, Jun 22, 2010] [38 FR 25678, Sept 14, 1973]		Primary	1 hour	75 ppb(5)	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

Source: EPA 2013b.

Notes:

(1) Final rule signed October 15, 2008. The 1978 lead standard (1.5 μg/m^3 as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

(2) The official level of the annual NO_2 standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of comparison to the 1-hour standard.

(3) Final rule signed March 12, 2008. The 1997 ozone standard (0.08 ppm, annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years) and related implementation rules remain in place. In 1997, the EPA revoked the 1-hour ozone standard (0.12 ppm, not to be exceeded more than once per year) in all areas, although some areas have continued obligations under that standard ("anti-backsliding"). The 1-hour ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is less than or equal to 1.

(4) The EPA is revising the annual primary $PM_{2.5}$ standard by lowering the level to 12.0 micrograms per cubic meter (μg/m^3), and maintaining the 15.0 (μg/m^3) $PM_{2.5}$ standard as a secondary standard. The final rule is effective on March 18, 2013.

(5) Final rule signed June 2, 2010. The 1971 annual and 24-hour SO_2 standards were revoked in that same rulemaking. However, these standards remain in effect until one year after an area is designated for the 2010 standard, except in areas designated nonattainment for the 1971 standards, where the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standard are approved.

Key:

μg/m^3 = Micrograms per cubic meter.
PM_{10} = Particulate matter less than 10 microns in diameter.
$PM_{2.5}$ = Particulate matter less than 2.5 microns in diameter.
ppb = Parts per billion.
ppm = Parts per million.

A conformity applicability analysis is the first step of a conformity evaluation and assesses whether a federal action must be supported by a conformity determination. A federal action is exempt from applicability of the General Conformity Rule requirements if the action's total net emissions are below the *de minimis* levels (see Table 3.6-2) specified in the rule, for transfers of interest in real or personal property, or are otherwise exempt per 40 CFR 93.153 and no further action is necessary. Total net emissions include direct and indirect emissions from all stationary point and area sources, construction sources, and mobile sources caused by the federal action.

Table 3.6-2 *De Minimis* Levels for Exemption from General Conformity Rule Requirements

Pollutant	Tons/Year
Ozone (VOCs and NO_X)	
Serious nonattainment areas	50
Severe nonattainment areas	25
Extreme nonattainment areas	10
Marginal and moderate ozone nonattainment and ozone maintenance areas outside an ozone transport region	
Volatile organic compounds (VOCs)	100
Nitrogen oxides (NO_X)	100
Marginal and moderate nonattainment and ozone maintenance areas inside an ozone transport region	
Volatile organic compounds (VOCs)	50
Nitrogen oxides (NO_X)	100
CO	
All nonattainment and maintenance areas	100
SO_2 and NO_2	
All nonattainment and maintenance areas	100
Particulate Matter (PM_{10})	
Moderate nonattainment and maintenance areas	100
Serious nonattainment areas	70
Particulate Matter ($PM_{2.5}$) (and its precursors)	
Direct Emissions	100
SO_2	100
NO_X (unless determined to not be a significant precursor)	100
VOCs or ammonia (if determined to be significant precursors)	100
Lead	
All nonattainment and maintenance areas	25

Source: 40 CFR 93.

Key:
CO = Carbon monoxide.
NO_X = Nitrogen oxides.
NO_2 = Nitrogen dioxide.
PM_{10} = Particulate matter less than 10 microns in diameter.
$PM_{2.5}$ = Particulate matter less than 2.5 microns in diameter.
SO_2 = Sulfur dioxide.
VOCs = Volatile organic compounds.

3.6.1.3 Pennsylvania Department of Environmental Protection (PADEP) Regulations

Air quality at the state level is managed by the PADEP Bureau of Air Quality, which is responsible for implementing the CAA and the Pennsylvania Air Pollution Control Act. The PADEP is responsible for the design and implementation of the EPA-approved SIP. The Pennsylvania SIP addresses compliance with and maintenance of the NAAQS, as well as regional haze, vehicle emissions, and toxic emissions (PADEP 2013a). The PADEP is also responsible for implementing the State's Title V air quality permitting program. NAS JRB Willow Grove operated under a Title V permit since 2001, and the former installation continues to maintain this permit, which was last updated in April 2009 (AECOM 2011).

3.6.2 Baseline Air Quality Conditions

As mentioned above, the former installation is located within the Philadelphia-Wilmington Air Control Region, which is in moderate nonattainment for the 8-hour ozone standard and in basic nonattainment for both the 1997 and 2006 $PM_{2.5}$ standards. While implementation of the state's air control programs have resulted in improvements in air quality throughout the state, the region still exceeds the NAAQS standards.

According to the EPA's Air Quality Index (AQI) report for Montgomery County (EPA 2013d), between 2010 and 2012, the county experienced 22 days of air quality considered to be unhealthy for sensitive groups, which represents exceedances of one or more of the NAAQS (see Table 3.6-3). The AQI is an indicator of overall air quality because it takes into account all of the criteria air pollutants measured within a geographic area (EPA 2013e).

Table 3.6-3 Montgomery Country AQI Report Summary (2010-2012)

	Number of Days per Year				
Year	Good	Moderate	Unhealthy for Sensitive Groups	Unhealthy	Very Unhealthy
2012	246	118	2	0	0
2011	217	140	8	0	0
2010	244	109	12	0	0

Source: EPA 2013d.

3.6.3 Baseline Air Emissions

3.6.3.1 Stationary Emissions

Annual emissions at the former installation have decreased in recent years as a result of reduced operations related to installation closure. Stationary sources regulated by the Title V air permit include boilers, generators, fire pumps, jet engine test cells, paint booths and other surface coating operations, storage tanks and fuel dispensing, metal cleaning agents and degreasers, and maintenance of motor vehicles and aircraft. In 2010, the blast booth did not operate, and paint booths P5 and P3 and the jet engine test cell were taken out of service. Table 3.6-4 provides a summary of stationary source emissions from previous annual emission reports, which represents the baseline for annual direct, stationary emissions for this action.

Table 3.6-4 Reported Annual Direct Emissions, NAS JRB Willow Grove (2005-2010)

Year	Emissions of Pollutants (tons per year)						
	CO	NO_X	VOCs	SO_2	PM_{10}	$PM_{2.5}$	HAPs
2010[1]	4.63	3.55	3.90	0.18	0.60	0.59	0.46
2009[2]	5.00	4.00	6.00	-	1.00	1.00	-
2008[2]	6.00	6.00	5.00	1.00	1.00	1.00	-
2007[2]	7.00	6.00	4.00	2.00	1.00	1.00	-
2006[2]	7.00	6.00	6.00	-	1.00	1.00	-
2005[2]	9.00	8.00	6.00	1.00	1.00	1.00	-

Sources:
[1] AECOM 2011 (rounded to nearest hundredth decimal).
[2] PADEP 2013b. HAPs are not included in summary, SO_2 not reported in 2009 and 2006.

Indirect emissions from the use of electricity at the installation are not included in the site's emission report. They have been estimated using U.S. averages for energy use per square foot obtained from the U.S. Department of Energy's Energy Information Agency (EIA) for specific types of building use (EIA 2003) and EIA's Pennsylvania average emissions per kilowatt-hour (kWh) of electricity were used to estimate total emissions resulting from operation of the proposed residential and commercial spaces (EIA 2013). Table 3.6-5 summarizes the estimated direct and indirect emissions from stationary sources (buildings and facilities) at the former installation in 2010.

Table 3.6-5 Direct and Indirect Stationary Emissions at NAS JRB Willow Grove (2010)

Emission Source	Emissions per Year (tons)[1]					
	CO	NO_x	VOC	SO_2	PM_{10}	$PM_{2.5}$[2]
Baseline, 2010: 1.02 million sq. ft.						
Electricity	-	9.56	-	27.21	-	-
Total Reported Operational Emissions	4.63	3.55	3.90	0.18	0.60	0.60
Total Annual Baseline Building Emissions	**4.63**	**13.12**	**3.90**	**27.39**	**0.60**	**0.60**

Note:
[1] Totals may be different than sum of numbers in column due to rounding.
[2] $PM_{2.5}$ emissions conservatively assumed to be the same as PM_{10} emissions.

3.6.3.2 Mobile Emissions

Non-stationary, or mobile, emissions are not reported to the PADEP. These emissions are primarily from aircraft operations, truck deliveries to the installation, and personally owned vehicles (POV) used by commuting employees. These emissions were estimated to provide a baseline comparison for this analysis. Table 3.6-6 provides a summary of total aircraft and POV emissions estimated for the baseline year (2010). POV emissions were estimated based on baseline employee numbers and emission factors from the EPA. Baseline aircraft emissions were estimated using the FAA's Emissions and Dispersion Modeling System (EDMS), version 5.1.3 (FAA 2010) and total operations for the various aircraft that were in use at NAS JRB Willow Grove during the baseline year of 2010. Total emissions consider departures, arrivals, touch-and-go operations, and ground taxi times and use of ground-support equipment.

Table 3.6-6 Baseline Mobile Emissions at NAS JRB Willow Grove (2010)

Emission Source	Emissions per Year (tons)[1]					
	CO	NO_x	VOC	SO_2	PM_{10}	$PM_{2.5}$
POV emissions	158.44	12.26	16.84	0.19	46.70	5.16
Deliveries	0.15	1.11	0.04	0.02	0.45	0.07
Aircraft operation emissions	98.94	6.45	14.45	1.21	4.02	0.78
Total	**257.53**	**19.81**	**31.33**	**1.42**	**51.18**	**6.01**

Note:
[1] Totals may be different than sum of numbers in column due to rounding.

Total estimated baseline emissions from the former installation in 2010 from direct and indirect, stationary and mobile sources are summarized in Table 3.6-7.

Table 3.6-7 Total Baseline Emissions at NAS JRB Willow Grove (2010)

Emission Source	Emissions per Year (tons)[1]					
	CO	NO_x	VOC	SO_2	PM_{10}	$PM_{2.5}$
Baseline, 2010						
Stationary (Building and Facility) Emissions	4.63	13.12	3.90	27.39	0.60	0.60
Mobile Emissions	257.53	19.81	31.33	1.42	51.18	6.01
Total Baseline Emissions	**262.16**	**32.93**	**35.22**	**28.81**	**51.78**	**6.61**

Note:
[1] Totals may be different than sum of numbers in column due to rounding.

3.6.4 Climate Change, Global Warming and Greenhouse Gas Emissions

Climate change refers to any significant change in measures of climate lasting for an extended period. Global climate change threatens ecosystems, water resources, coastal regions, crop and livestock production, and human health (EPA 2012a). Many scientific studies correlate the observed rise in global annual average temperature and the resulting change in global climate patterns with the increase in greenhouse gases (GHGs) in Earth's atmosphere. Worldwide use of fossil fuels is the primary cause of that increase (EPA 2012a).

Federal agencies are required to address emissions of GHG emissions with analysis and emission-reduction planning. EO 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*, and EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, requires federal agencies to increase energy efficiency; measure, report, and reduce GHG emissions; protect waterways with stormwater management; control waste; and support sustainable technology and efficient building practices.

The EPA issued the Final Mandatory Reporting of Greenhouse Gases Rule on September 22, 2009. Under the rule, suppliers of fossil fuels or industrial GHGs, manufactures of mobile sources and engines, and facilities that emit 25,000 metric tons or more per year of GHG emissions (as CO_2 equivalents) are required to submit annual reports to the EPA. In October 2010, the CEQ issued *Guidance on Federal Greenhouse Gas Accounting and Reporting* to establish federal requirements for GHG reporting for compliance with EO 13514, guidance that affirms the requirements of NEPA and CEQ regulations and their applicability to GHGs and climate change impacts (CEQ 2010a). Compliance with these CEQ guidelines requires making an inventory of energy use and related GHG emissions, including evaluating the effects of GHG emissions of the proposed and alternative actions on EO 13514 goals and the relationship of climate change effects to the proposed action or alternatives. GHG emissions are discussed in Cumulative Impacts (see Section 5).

3.7 Noise

Noise can be defined as any unwanted sound. Sound becomes noise when it interferes with normal activities such as sleep and conversation. Several metrics are available to quantify the physical characteristics of a sound produced by an operation or an event, and to relate these physical characteristics to the potential human responses to them. These metrics are related to the type of operation or event that generates the sound.

The baseline sound environment on and near the former installation is largely influenced by motor vehicle traffic on area roadways, and, prior to its closure, aircraft operations at the installation. This section presents an overview to understanding noise metrics and a description of the baseline sound environment at the former installation.

3.7.1 Noise Fundamentals

Human response to noise can vary according to the type and source of the noise, the distance between the source and the human receptor, the perceived importance of the noise, its appropriateness in the setting, and the sensitivity of the person receiving the noise (the receptor).

A noise-sensitive receptor is defined as a location or facility where people involved in indoor or outdoor activities may be subject to stress or considerable interference from noise. Such locations or facilities often include residential dwellings, hospitals, nursing homes, educational facilities, and libraries. Noise-sensitive receptors may also include supporting habitat for certain wildlife species or noise-sensitive cultural practices.

The measurement and human perception of sound involves three basic physical characteristics: intensity, frequency, and duration. Intensity is a measure of the acoustic energy of the sound vibrations and is expressed in terms of sound pressure. As sound pressure increases, the energy carried by the sound increases, and the perception of loudness of that sound increases as well. Frequency is the number of times per second the air vibrates, or oscillates. Low-frequency sounds are characterized as rumbles or roars, while sirens or screeches typify high-frequency sounds. Duration is the length of time the sound can be detected.

The loudest sounds that can be detected comfortably by the human ear have intensities that are a trillion times higher than those of sounds that can barely be detected. Because of this vast range, using a linear scale to represent the intensity of sound becomes very unwieldy. Therefore, a logarithmic unit known as the decibel (dB) is used to represent the intensity of a sound, or the sound level. Noise measurements assessed relative to human exposure are usually expressed using an “A-weighted” scale that filters out very low and very high frequencies in order to replicate human sensitivity. It is common to add the letter “A” to the unit of measurement (dBA) in order to identify that the measurement has been made with this filtering process.

A sound level of zero dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB, and a garbage disposal has a sound level of about 80 dB; sound levels above 120 dB begin to be felt inside the human ear as discomfort. Sound levels between 130 and 140 dB are felt as pain (Berglund and Lindvall 1995).

Table 3.7-1 list some typical sources and levels of noise and corresponding human responses to the noise.

Table 3.7-1 Decibel Level of Some Common Sounds

Sound Source	dB(A)	Perception/Response
	150	
Carrier Deck Jet Operation	140	
	130	Uncomfortable
Jet Takeoff (200 feet) Discotheque	120	
Auto Horn (3 feet) Riveting Machine	110	
Jet Takeoff (2,000 feet) shout (0.5 feet)	100	
N.Y. Subway Station Heavy Truck (50 feet)	90	Very Annoying Hearing Damage (8 hours, continuous exposure)
Pneumatic Drill (50 feet)	80	Annoying
Freight Train (50 feet) Freeway Traffic (50 feet)	70	Telephone Use Difficult Intrusive
Air Conditioning Unit (20 feet)	60	
Light Auto Traffic (50 feet)	50	Quiet
Living Room Bedroom	40	
Library Soft Whisper (15 feet)	30	Very Quiet
Broadcasting Studio	20	
	10	Just Audible
	0	Threshold of Hearing

Source: modified from NYSDEC 2001.

Human response to changes in sound levels depends on a number of factors, including the quality of the sound, the magnitude of the changes, the time of day at which the changes take place, whether the noise is continuous or intermittent, and the individual's ability to perceive the changes. Human ability to perceive changes in noise levels varies widely. As the change in dBA increases, the individual perception is greater, as shown in Table 3.7-2.

Table 3.7-2 Subjective Response to Sound

Change (dBA)	Relative Loudness
+/- 3	Barely perceptible change
+/- 5	Readily perceptible change
+/- 10	Half or twice as loud

Source: FHWA 1995.

Because of the logarithmic nature of the dB unit, sound levels cannot be arithmetically added or subtracted and are somewhat cumbersome to handle mathematically. However, some simple rules are useful in dealing with sound levels. First, if a sound's intensity is doubled, the sound level increases by 3 dB, regardless of the initial sound level (Berglund and Lindvall 1995). For example:

60 dB + 60 dB = 63 dB
80 dB + 80 dB = 83 dB

Second, the total sound level produced by two sounds of different levels is usually only slightly more than the higher of the two. For example:

60 dB + 70 dB = 70.4 dB

The minimum change in the sound level of individual events that an average human ear can detect is about 3 dB. On average, a person perceives a change in sound level of about 10 dB as a doubling (or halving) of the sound's loudness, and this relation holds true for loud and quiet sounds. A decrease in sound level of 10 dB actually represents a 90 percent decrease in sound intensity but only a 50 percent decrease in perceived loudness because of the nonlinear response of the human ear (similar to most human senses) (Wyle 2012).

The sound pressure level (SPL) that humans experience typically varies from moment to moment. Therefore, various descriptions are used to evaluate noise levels over time. Commonly used descriptors include the continuous equivalent sound level (Leq), used to describe traffic noise, and the DNL, used to describe aircraft noise. These noise descriptors are discussed in more detail in Sections 3.7.1 and 3.7.2, respectively.

3.7.1 Traffic Noise

Noise from motor vehicle traffic, which relates to the sound of engines, exhaust, and tires on pavement, is dependent upon the volume and speed of traffic and the number of trucks in the flow of the traffic. Due to all these variables, traffic noise levels will vary with time of day, as well as weather conditions.

To account for this variability, traffic noise is described in this analysis using the Leq noise metric. Leq is the continuous sound level that would be present if all of the variations in sound level occurring over a specified time period were smoothed out so as to contain the same total sound energy (Wyle 2012).

Noise levels from vehicle traffic in the vicinity of the former installation were modeled using Traffic Noise Model (TNM) version 2.5, which was developed by the Federal Highway Administration (FHWA). This model was used to estimate noise levels at representative residential receptor locations selected along the main roadways around the former installation property. The peak afternoon traffic volume, vehicle speed, and vehicle mix data were selected from the *Traffic Assessment Study: Naval Air Station Joint Reserve Base (NAS JRB) Willow Grove* (TechniQuest 2013) (see Section 3.4 and Appendix C) and used as inputs to the model.

Table 3.7-3 presents the modeled noise levels at the residential locations, which are shown on Figure 3.7-1.

Table 3.7-3 Baseline Peak-Hour (p.m.) Traffic Noise Levels

Receptor	Location	Modeled Existing Leq (dBA)
1	Horsham Road between Evergreen Road and Babylon Road (north side of road)	71.1
2	Horsham Road between Hatters Way and Progress Drive (south side of road)	71.8
3	Easton Road and Johnson Avenue (west corner)	73.7
4	Girard Avenue between Easton Road and Washington Avenue (north side of road)	66.0
5	Easton Road across from existing Main Gate	64.1
6	Kansas Road between County Line Road and Tulip Drive (north side of road)	63.7
7	Keith Valley Road between Horsham Road and Davis Grove Road (north side of road)	63.2

The FHWA provides policies and guidance for the analysis of and abatement of highway traffic noise that were adopted by PennDOT. FHWA-established criteria that represent the upper limit of acceptable traffic noise levels in areas based on defined land use are identified in Table 3.7-4. These noise abatement criteria (NAC) levels are to be used to assess the highway traffic noise impact of a proposed highway project and are, therefore, not directly applicable to the analysis of baseline traffic conditions. The NAC are absolute values which, when approached or exceeded, require the consideration of highway traffic noise abatement measures. For this analysis of traffic conditions, the NAC levels provide context for the estimated traffic noise levels around the former NAS JRB Willow Grove.

Table 3.7-4 Traffic Noise Abatement Criteria, Hourly A-weighted Sound Level in dBA

Activity Code	Leq (h)[1]	Description of Activity Category
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose
B[2]	67 (Exterior)	Residential
C[2]	67 (Exterior)	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings
D	52 (Interior)	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios
E[2]	72 (Exterior)	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.
F	---	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities,

Table 3.7-4 Traffic Noise Abatement Criteria, Hourly A-weighted Sound Level in dBA

Activity Code	Leq (h)[1]	Description of Activity Category
		shipyards, utilities (water resources, water treatment, electrical), and warehousing
G	---	Undeveloped lands that are not permitted

Source: FHWA 1995.

Notes:
[1] Hourly A-weighted sound level – decibels (dBA). Activity criteria values are for impact determination only, and are not design standards for noise-abatement measures.
[2] Includes undeveloped lands permitted for this activity category.

The modeling indicates that the ambient noise levels at receptor locations 1 through 3 exceed the FHWA's NAC of 67 dBA for activity code B (residential). According to the FHWA, for a highway project, impacts occur when the predicted future traffic noise levels approach or exceed the NAC.

Table 3.7-5 presents typical ambient noise levels based on land use. As indicated in the table, high-density residential areas (Category III) are typically 50 to 60 dBA during the daytime, and lower-density residential areas (Categories I and II) are typically 40 to 55 dBA during the daytime. Sound levels in and around the former installation property associated with traffic are more typical of commercial areas (Category IV), with sound levels ranging from 50 to 70 dBA.

Table 3.7-5 Typical Noise Levels by Land Use Category

Category	Description	Typical Ambient Noise Level (L50)[1]	
		Daytime	Nighttime
I	Low-density urban residential, open space park, suburban	40 - 50	35 - 45
II	Average urban residential, quiet apartment and hotels, open space, suburban residential, or occupied outdoor area near busy streets	45 - 55	40 - 50
III	High-density urban residential, average semi-residential/commercial areas, parks, museums, and noncommercial public building areas	50 – 60	45 – 55
IV	Commercial areas with office buildings, retail stores, etc., primarily daytime occupancy; central business district	50 - 70	
V	Industrial areas or freeway and highway corridors	Over 60	

Source: Cowan 1994.

Note:
[1] Levels are based on typical L50 data. L50 is the sound level exceeded 50 percent of the time during a measurement period.

3.7.2 Aircraft Noise

Aircraft operations were the main source of noise at the former installation and included flight operations and ground engine maintenance "run-ups." Table 3.7-6 presents the historic number of annual flight operations conducted at NAS JRB Willow Grove since the late 1970s. The number of annual flight operations gradually declined from nearly 70,000 in 1978. In 2010, the last full year of operations, a total of 12,781 flight operations were conducted at NAS JRB Willow Grove (Silcox 2013). During 2010, approximately 24 percent of all flight operations were Navy or Marine Corps aircraft, 17 percent were

other military aircraft, and 58 percent were civilian air carrier and general aviation aircraft (see Table 3.7-7).

Table 3.7-6 Historic Annual Aircraft Operations at NAS JRB Willow Grove

Year	Annual Aircraft Operations
1978	69,076
1981	65,076
1987	64,674
1989	52,281
1991	41,788
1995	40,862
1998	33,529
2007	19,232
2008	17,612
2009	15,215
2010	12,781

Source: The Onyx Group 1999 (1978 – 1998); Silcox 2013 (2007-2010).

Table 3.7-7 Annual Flight Operations by Aircraft Type (2010)

Type of Aircraft	Navy/Marine Corps	Other Military	Air Carrier	General Aviation	Total
Number of Flight Operations	3,098	2,216	22	7,445	12,781

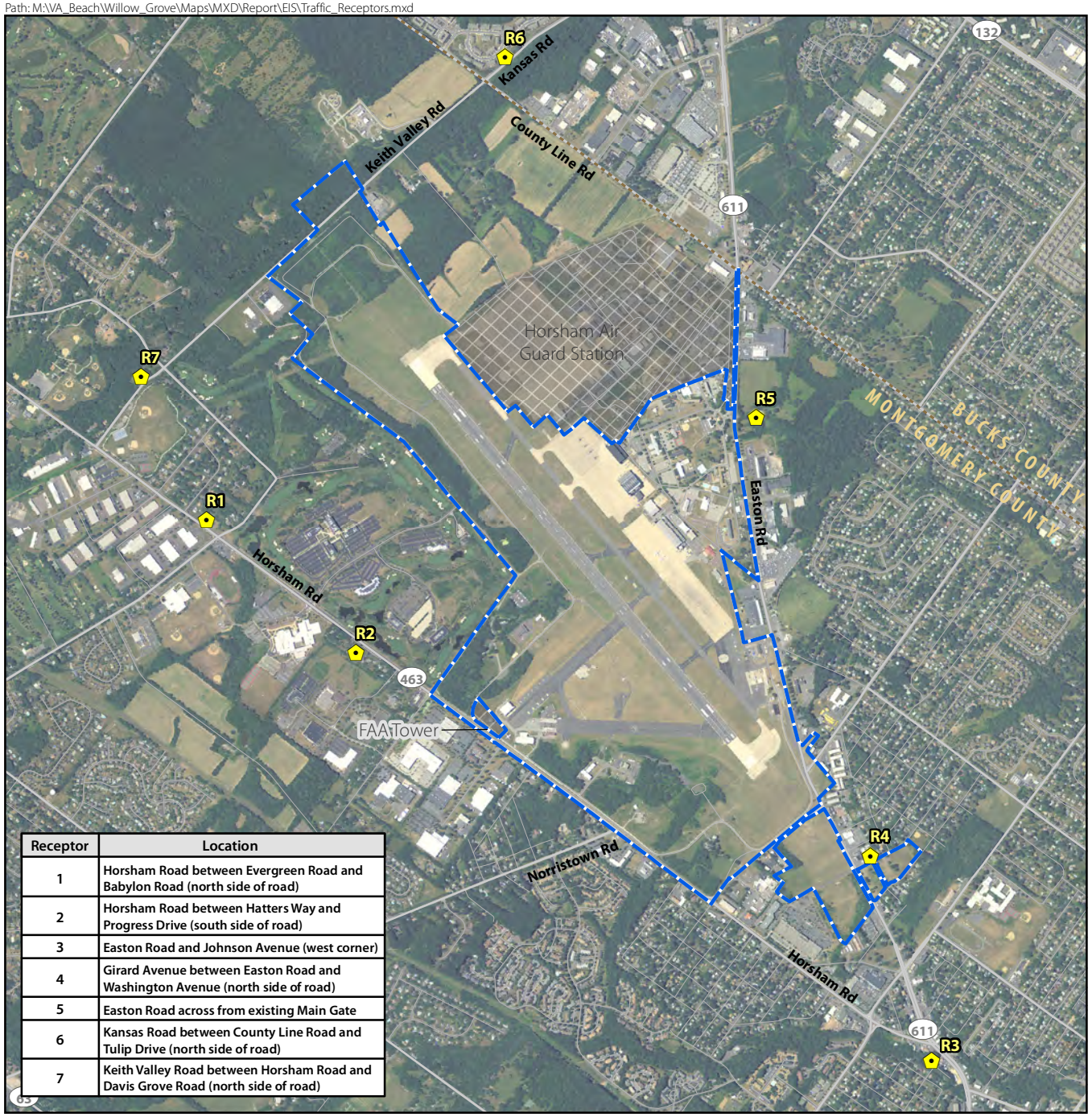
Source: Silcox 2013.

In 2010, aircraft operations were conducted by rotary-wing (CH-53 Super Stallion), fixed-wing turbo-prop (C-9B Skytrain, C-12 Huron), and jet (C-130) aircraft. Four reserve squadrons were based at NAS JRB Willow Grove during 2010, including one CH-53E squadron (HMH-772) with five aircraft, one C-130 squadron (VR-54) with three aircraft, one C-9B squadron (VR-52) with four aircraft, and one C-12 Detachment. In addition, a military-dependent flying club operated from the airfield. The club, which operated a Cessna 152 fixed-wing and a T-34B turboprop aircraft, provided private flight training to military members, their dependents, DOD civilian employees, and other federal personnel.

The DNL is a standard metric for describing aircraft noise. DNL is a composite noise metric accounting for the sound energy of all flight operations and ground engine-maintenance run ups in a 24-hour period. The DNL metric includes a 10-dB penalty for nighttime operations (10:00 p.m. to 7:00 a.m.) because people are more sensitive to noise during normal sleeping hours, when ambient noise levels are lower.

The DNL is depicted as a series of contours that connect points of equal value, usually in 5-dB increments. It is calculated based on modeled aircraft noise events; calculated noise contours, therefore, do not represent exact scientific measurements. The area between two specific contours is known as a noise zone.

Path: M:\VA_Beach\Willow_Grove\Maps\MXD\Report\EIS\Traffic_Receptors.mxd



Receptor	Location
1	Horsham Road between Evergreen Road and Babylon Road (north side of road)
2	Horsham Road between Hatters Way and Progress Drive (south side of road)
3	Easton Road and Johnson Avenue (west corner)
4	Girard Avenue between Easton Road and Washington Avenue (north side of road)
5	Easton Road across from existing Main Gate
6	Kansas Road between County Line Road and Tulip Drive (north side of road)
7	Keith Valley Road between Horsham Road and Davis Grove Road (north side of road)

Figure 3.7-1

Traffic Noise Receptors

Former NAS JRB Willow Grove

Horsham, PA

Legend

- Traffic Noise Receptors
- NAS JRB Willow Grove
- FAA Tower and Horsham Air Guard Station (not included in redevelopment)
- County Boundary
- Major Road
- Local Road

N

SCALE

0 0.25 0.5 Miles

SOURCE: Ecology and Environment 2013; ESRI 2010; National Aerial Imagery Program 2010

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The noise zones used in this analysis are:

- 65 to 70 dB DNL,
- 70 to 75 dB DNL, and
- Greater than 75 dB DNL.

Figure 3.7-2 presents the modeled noise contours based on 2010 annual aircraft operations. Noise modeling was conducted utilizing the Integrated Noise Model (INM) version 7.0d. Further discussion of the modeling assumptions used to develop the noise contours is provided in Appendix E.

As shown on Figure 3.7-2, the area covered by the noise zones encompasses approximately 521 acres, primarily over the former installation property and the Horsham Air Guard Station. Approximately 18 acres of land area outside of the installation boundaries are within the noise zones (see Table 3.7-8). The 65 dB DNL noise zone extends outside the installation boundaries over open fields to the north of the installation, slightly to the west over the golf course, and to the southeast near the commercial intersection of Easton Road (SR 611) and Maple Avenue.

Table 3.7-8 Land Area (acres[1]) within Noise Zones at former NAS JRB Willow Grove (2010)

DNL Noise Zone	On-Installation[2]	Off-Installation	Total
65 to 70 dB DNL	211	17	228
70 to 75 dB DNL	152	1	153
Greater than 75 dB DNL	140	0	140
Total	**503**	**18**	**521**

Notes:
1 Acreage calculations are approximate and are rounded to the nearest acre.
2 On-installation includes both the former NAS JRB Willow Grove property and the Horsham Air Guard Station, which had aircraft operations that were a component of the 2010 baseline noise zones.

The Navy has developed guidance for communities on the types of land uses that are compatible or not compatible within military airfield noise zones. Similarly, the FAA has developed guidelines for land use compatibility in noise zones surrounding commercial and general aviation airports. FAA Regulations, 14 CFR Part 150, Airport Noise Compatibility Planning, stipulate that DNL be used as the metric to assess airport noise and its impacts on the surrounding community. The FAA Noise Compatibility Program recommends community land uses that are compatible with noise levels associated with commercial and general aviation airports and identifies noise mitigation measures for land uses that do not meet the compatibility guidelines (see Table 3.7-9).

Table 3.7-9 FAA Land Use Compatibility Recommendations with Day-Night Average Sound Levels

Land Use	Sound Levels (DNL)					
	Below 65	65-70	70-75	75-80	80-85	Over 85
Residential						
Residential, other than mobile homes and transient lodgings	Y	N[1]	N[1]	N	N	N
Mobile home parks	Y	N	N	N	N	N
Transient lodgings	Y	N[1]	N[1]	N[1]	N	N
Public Use						
Schools	Y	N[1]	N[1]	N	N	N

Table 3.7-9 FAA Land Use Compatibility Recommendations with Day-Night Average Sound Levels

Land Use	Sound Levels (DNL)					
	Below 65	65-70	70-75	75-80	80-85	Over 85
Hospitals and nursing homes	Y	25	30	N	N	N
Churches, auditoriums, and concert halls	Y	25	30	N	N	N
Governmental services	Y	Y	25	30	N	N
Transportation	Y	Y	Y[2]	Y[3]	Y[4]	Y[4]
Parking	Y	Y	Y[2]	Y[3]	Y[4]	N
Commercial Use						
Offices, business and professional	Y	Y	25	30	N	N
Wholesale and retail: building materials, hardware, and farm equipment	Y	Y	Y[2]	Y[3]	Y[4]	N
Retail trade, general	Y	Y	25	30	N	N
Utilities	Y	Y	Y[2]	Y[3]	Y[4]	N
Communication	Y	Y	25	30	N	N
Manufacturing and Production						
Manufacturing, general	Y	Y	Y[2]	Y[3]	Y[4]	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y[6]	Y[7]	Y[8]	Y[8]	Y[8]
Livestock farming and breeding	Y	Y[6]	Y[7]	N	N	N
Mining and fishing, resource production and extraction	Y	Y	Y	Y	Y	Y
Recreational						
Outdoor sports arenas and spectator sports	Y	Y[5]	Y[5]	N	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts, and camps	Y	Y	Y	N	N	N
Golf courses, riding stables, and water recreation	Y	Y	25	30	N	N

Notes:

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

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

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

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

5 Land use compatible provided that special sound-attenuation is installed.

6 Residential buildings require an NLR of 25.

7 Residential buildings require an NLR of 30.

8 Residential buildings not permitted.

Key:

25, 30, or 35	=	Land use and related structures generally compatible; measures to achieve NLR of 25, 30, or 35 dB must be incorporated into design and construction of structure.
N (No)	=	Land use and related structures are not compatible and should be prohibited.
NLR	=	Noise level reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.
Y (Yes)	=	Land use and related structures compatible without restrictions.

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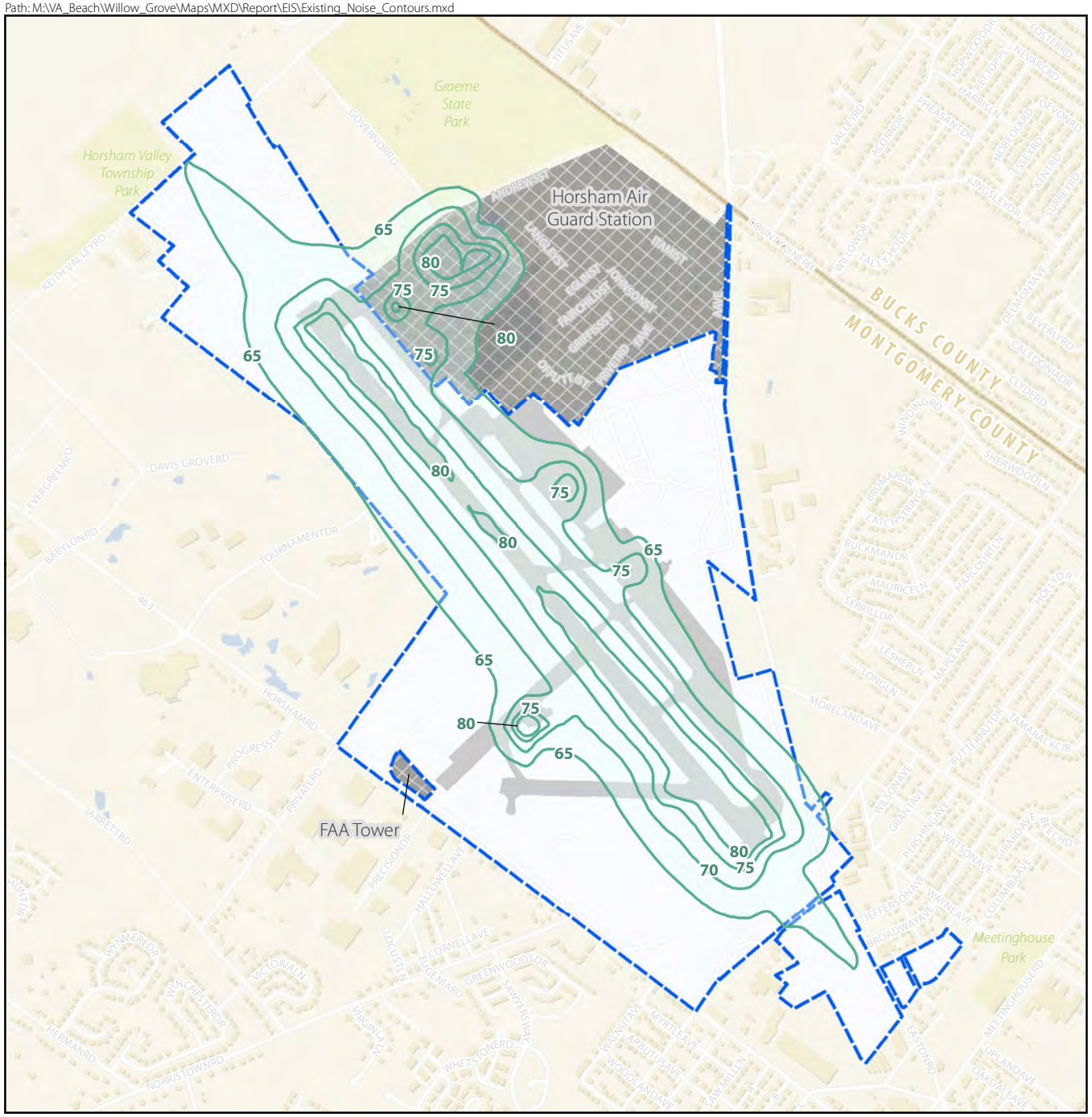

Figure 3.7-2

2010 Noise Contours for Aircraft Operations

NAS JRB Willow Grove

Horsham, PA

Legend

- NAS JRB Willow Grove
- Existing Noise Contours (dB)
- Existing Noise Contours (dB)
- Runways, Taxiways, Parking Aprons
- FAA Tower and Horsham Air Guard Station (not included in redevelopment)
- County Boundary
- Waterbody
- Park

SCALE

0 1,000 2,000 Feet

SOURCE: Blue Ridge Research and Consulting 2013; Ecology and Environment 2013; ESRI 2010; RKG 2012; Tetra Tech 2012.

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3.8 Infrastructure and Utilities

The focus of this section is on infrastructure and utilities including water supply, wastewater, stormwater, and other infrastructure.

"Infrastructure" is the underlying framework of a system. Utility systems—water supply, wastewater management, stormwater management, and electricity and natural gas generation and distribution—rely on the underlying systems of generation, protection, and transmission:

- Drinking water is made available through either municipal or public water systems;
- Wastewater is managed through municipal wastewater treatment systems or individual, on-site septic systems;
- Electricity is generated and transmitted through a series of stations and lines; and
- Natural gas is transmitted through pipelines to supply heat.

With the exception of the regulations discussed below regarding stormwater management, there are no specific statutes that govern the provision of other utilities.

To assess baseline conditions, information on existing infrastructure and utilities was obtained from various sources and reviewed for an indication of current condition and capacity.

3.8.1 Water Supply

3.8.1.1 Horsham Township

Water Supply and Distribution System

Horsham Township's existing water system is operated and maintained by the Horsham Water & Sewer Authority (HWSA). The system obtains most of its water via subsurface supply withdrawn from 15 wells located throughout the township and interconnections with other utilities. Water treatment is limited to chlorine disinfections at each supply well or interconnection, with supplemental aeration at five of the supplies, prior to the water entering into the Authority's 103 miles of distribution system piping. Five elevated water storage tanks with a combined capacity of 4,250,000 gallons provide the township with pressure equalization, firefighting reserve, and emergency standby storage. The HWSA has a water customer base of 7,042 metered connections, of which approximately 6,500 are residential units. The system delivers over 800 million gallons of water to its customers annually (HWSA 2012).

Water Supply Capacity and Usage

The HWSA estimates that its residential customers use approximately 70 to 80 gallons of water per day per person. As of 2013, the average daily water demand for the township is approximately 2.1 to 2.2 million gallons per day (gpd). According to HWSA's operational data from 2008 to 2013, well production has met only 80 to 85 percent of the average daily demand (O'Rourke 2013). The remaining demand is met through the purchase of water via interconnections with water utilities located in two neighboring communities. There are currently no plans to drill any additional wells in the township.

Horsham Township is located in the Ground Water Protection Area of Southeastern Pennsylvania. In this area, groundwater and surface water withdrawals are regulated by the Delaware River Basin Commission (DRBC). The HWSA and DRBC have indicated that the basin is already at or near capacity and,

therefore, the installation of additional public supply wells would likely not be permitted (O'Rourke 2013).

Based on the average daily demand, the five elevated storage tanks, which store approximately 4,250,000 gallons, can provide approximately a 2-day supply of water. The HWSA currently does not have any plans to increase the storage capacity of the five tanks since they appear to provide adequate pressure and storage capacity for the existing distribution system.

3.8.1.2 NAS JRB Willow Grove

Water Supply and Distribution System

The former NAS JRB Willow Grove installation obtained most of its drinking water from two on-site wells and two storage reservoirs (see Figure 3.8-1). The only exception was Buildings 176, 177, and 178, located at the southwest end of the installation. Drinking water was obtained from a 12-inch water main connection to the Horsham municipal water system. The two 200-gallon-per-minute drinking wells (wells 31 and 32) pumped approximately 167,000 gpd to meet most of NAS JRB Willow Grove's drinking water and fire protection demands. Once pumped, the water was passed through an air stripper to remove trichloroethylene (TCE) and tetrachloroethylene (PCE) and then disinfected with chlorine. This type of treatment system is common among the local water authorities, as both TCE and PCE are common groundwater contaminants in Montgomery County, Pennsylvania. The treated water was then conveyed to one of two 500,000-gallon underground reservoirs for storage—either the Northern Reservoir (Tank 106), which was located in the basement of Building 6, or the southern reservoir (Tank 107), which was located in the southern portion of the installation. The system was classified as a Community Water System (CWS) and served a population of approximately 6,000 persons (Navy 2006).

Upon closure of the NAS JRB Willow Grove, the groundwater supply wells were transferred to the U.S. Air Force and are not available for reuse.

On February 22 and 23, 2011, the drinking water treatment and distribution system was inspected by consultants contracted by the HLRA during preparation of the Redevelopment Plan (RKG 2012). The consultants reported that the system was functional at the time of the inspection. Key findings made during the inspection included the following:

- The system's four domestic cold water pumps were in fair to poor condidtion
  - Two of the pumps were electric and more than 25 years old, but still functional
  - The remaining two pumps were combination steam/electric pumps; both were more than 40 years old, one of which was out of service at the time of the inspection
- Un-insulated sections of pipes and pumps exhibited surface corrosion
- The installation's underground water distribution pipes were relined between 1990 and 1992

Water Supply Capacity and Usage

The distribution system on the former NAS JRB Willow Grove consisted of 119 unmetered connections located throughout the facility's water distribution network. Based on data reported in the annual PA-DEP Chapter 110 Primary Facility Reports, which are summarized below in Table 3.8-1, water consumption ranged from approximately 36 to 53 gallons per person per day.

Path: M:\VA_Beach\Willow_Grove\Maps\MXD\Report\EIS\WaterSupplyWells.mxd

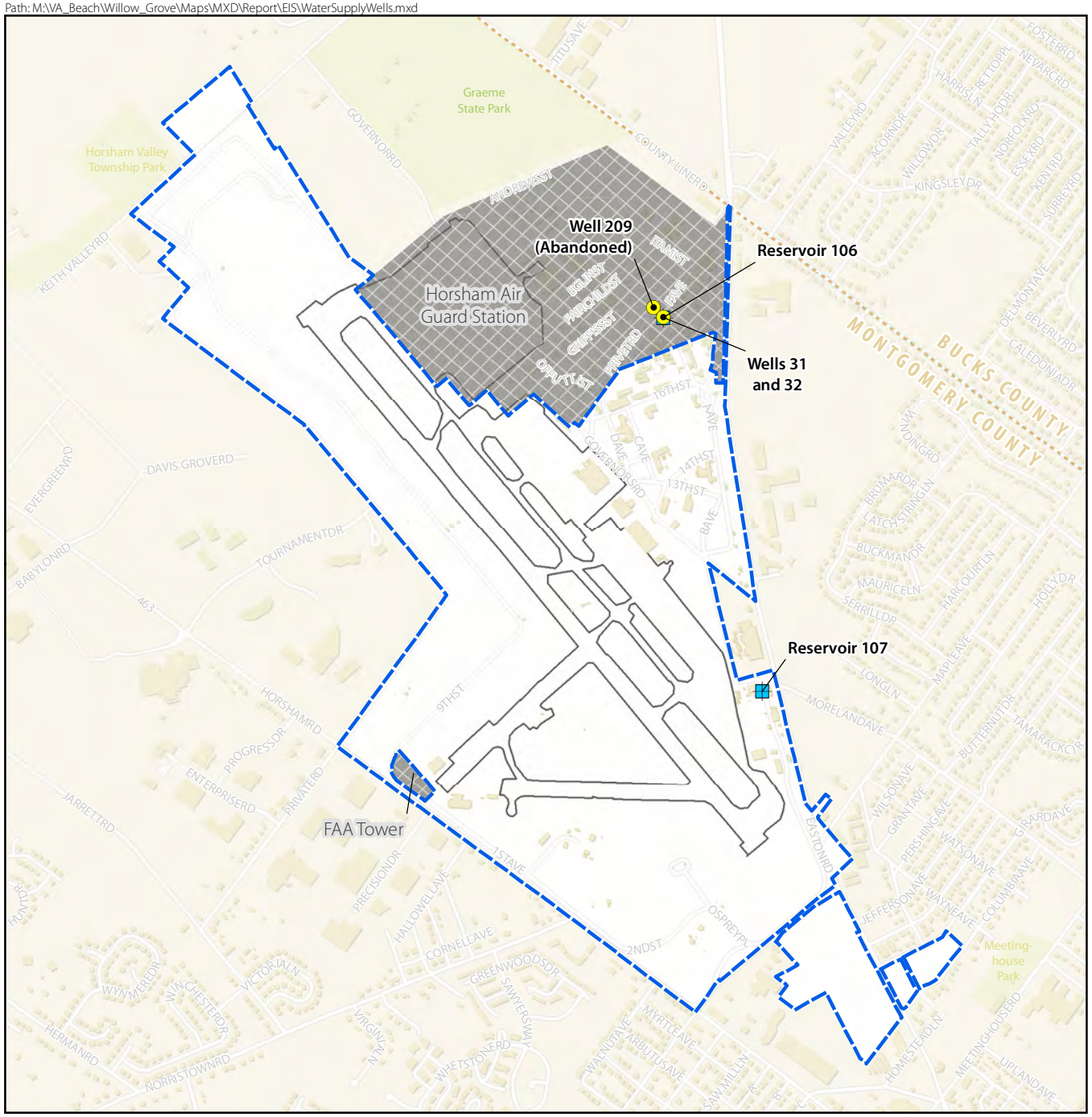

Figure 3.8-1

Water Supply Wells

Former NAS JRB Willow Grove

Horsham, PA

Legend

- Reservoir
- Water Supply Well
- NAS JRB Willow Grove
- County Boundary
- Runways, Taxiways, Parking Aprons
- FAA Tower and Horsham Air Guard Station (not included in redevelopment)

SCALE

0 0.25 0.5 Miles

SOURCE: ESRI 2010; Ecology and Environment 2013; Tetra Tech 2012.

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Table 3.8-1 NAS JRB Average Daily Flow

Year	Population	Gallons per Day
2007	5,200	186,035
2008	4,000	213,236
2009	4,000	170,098

Source: Navy 2008, 2009, 2010.

Based on the average daily demands, the two 500,000-gallon underground reservoirs had the capacity to supply NAS JRB Willow Grove with drinking water for approximately 5 days.

3.8.2 Wastewater

3.8.2.1 Horsham Township

Wastewater System

The wastewater conveyance and treatment system in Horsham Township is operated and maintained by the HWSA. Horsham Township comprises five distinct sewer service areas, which are designated as Service Areas A, B, C, D, and E. Service Areas A, B, and C encompass the eastern third of Horsham Township, where natural flow is easterly toward Pennypack Creek. Sewage generation in Service Areas A, B, and C is conveyed to the neighboring Upper Moreland Hatboro Joint Sewer Authority's (UMHJSA) Terwood Road Sewage Treatment Plant (STP), in which the HWSA has an approximate 30 percent ownership interest. Service Areas D and E encompass the central and western two-thirds of the township and drain northerly toward Park Creek and the HWSA-owned Park Creek STP. The current capacity of the Park Creek STP is 1.0 million gpd. Since 2003, the HWSA has been working on an expansion of the Park Creek STP to address future development in the township and more stringent effluent criteria from the PADEP. However, due to property size constraints, Horsham Township zoning and land development requirements, and the aforementioned more stringent effluent criteria, only a single expansion for future capacity could occur (O'Rourke 2013).

Wastewater Generation and Capacity

The current capacity of the Park Creek STP is 1 million gpd. The 2012 average daily flow was 776,000 gpd. Based on 2010 census data, the HWSA estimates that the 2012 population in the Park Creek STP service area was approximately 6,422. This equates to an estimated average wastewater generation of 121 gallons per person per day (HWSA 2012).

According to base personnel, a Special Study dated June 2010 included an analysis of the potential reuse of the former installation (O'Rourke 2013). This analysis was needed to quantify anticipated sewer capacity needs, which would allow the HWSA to proceed with the design of the final expansion of the Park Creek STP. As discussed above, expansion of the Park Creek STP is necessary in order to provide capacity for the future build out of Service Areas D and E and to allow for the transfer of a portion of existing flows from the UMHJSA plant. The expansion will result in a final treatment capacity of 2.25 million gpd. The June 2010 Special Study, which provides for the expansion of Park Creek STP to 2.25 million gpd, was approved by the PADEP on August 18, 2011 (O'Rourke 2013).

3.8.2.2 NAS JRB Willow Grove

Wastewater System

While in operation, NAS JRB Willow Grove owned and maintained an on-site STP at Building 8. The facility treated all of the wastewater generated by the installation. After the wastewater was treated, it was then discharged into the nearby Park Creek. The wastewater treatment facility at NAS JRB Willow

Grove was considered a non-industrial treatment facility and operated under a National Pollutant Discharge Elimination System (NPDES) permit (No. PA0022411) for the discharge of treated wastewater (Navy 2006).

In September 2011, the Navy shut down and demolished the NAS JRB Willow Grove STP and capped a majority of the sewer pipes throughout the installation with exception of those servicing the Horsham Air Guard Station. Sewage flows from the Horsham Air Guard Station facility are currently sent to the HWSA system via a new connector that was constructed in the fall of 2011. Currently, there is no system in place to handle wastewater distribution outside the Horsham Air Guard Station.

Included with the decommissioned NAS JRB Willow Grove wastewater treatment and conveyance system were 11 oil/water separators (OWSs) located throughout the installation. Eight of the OWSs were considered underground wastewater treatment tanks. For more information about the OWSs, see Section 3.5.3.3 for more information (Navy 2006).

Wastewater Generation and Capacity

The NAS JRB Willow Grove wastewater treatment plant had a maximum treatment capacity of 1 million gpd. However, based on recorded flow data from 2007 through 2009 (see Table 3.8-2), the average daily wastewater generation rate during the years in which the facility was active was 142,000 gpd. This equates to an approximate wastewater generation rate of 33 gallons per person.

Table 3.8-2 NAS JRB Willow Grove Average Daily Wastewater Flow

Year	Population	Average Generation (gpd)
2007	5,200	137,000
2008	4,000	131,000
2009	4,000	159,000

Source: Navy 2008, 2009, 2010.

3.8.3 Stormwater

Stormwater is rainwater and snowmelt that falls onto surfaces, such as roofs, streets, and the ground, and is not absorbed or retained by that surface but flows off, collecting volume and energy. Stormwater runoff management addresses reducing flow energy and pollutants in stormwater and controlling discharge from point and non-point sources. Non-point source discharge can result in pollution of surface water and groundwater resources by diffuse sources. Point-source discharge is produced by a single, identifiable point source.

Section 402 of the Clean Water Act (CWA) established the NPDES to regulate the discharge of effluents into waters of the United States. The PADEP is responsible for administering the state's stormwater management program, which includes NPDES permits. State NPDES regulations are found in 25 PA Code Chapter 92a, water quality standards are identified in Chapter 93 and Erosion and Sediment Control Plans and Post-Construction stormwater management plans for earth disturbance activities are found in Chapter 102. PADEP administers the NPDES construction permit program through delegation agreements with the conservation districts. The districts process and authorize the permit coverage. NPDES permits are required for construction activities equal to or larger than one acre. Erosion and sedimentation plans and BMPs are required based on the amount of disturbance (e.g., less than 5,000 square feet or greater than 5,000 square feet (PADEP 2012b).

Under 25 PA Code 92.81 to 83, point source discharges of stormwater associated with industrial activities that discharge into surface waters of the Commonwealth are regulated under an NPDES permit. The permit establishes water quality discharge standards, BMPs, and monitoring requirements.

Section 438 of the Energy Independence and Security Act (EISA) of 2007 requires that any development or redevelopment project involving a federal facility with a footprint exceeding 5,000 square feet shall use site planning, design, construction, and maintenance strategies in order to maintain or restore the predevelopment hydrology of the property with regard to temperature, rate, volume, and duration of flow. Compliance with this requirement can be met through the implementation of low-impact development (LID) technologies.

The U.S. Navy has developed a LID policy for stormwater management. This policy focuses on the implementation of LID techniques in lieu of conventional stormwater collection and conveyance systems, because conventional measures cannot replicate natural systems and can result in increased storm water volume and flow, as well as adverse water quality impacts on the receiving waterbodies (Navy 2007a). LID techniques include a variety of BMPs that maintain or restore predevelopment hydrology and reduce pollutant loading of storm water. Examples of LID BMPs include bioretention (vegetated depressions that collect runoff and facilitate infiltration), filter strips (dense vegetation designed to filter runoff), grassed swales (shallow, grass-lined channels used to convey and storm runoff), and permeable pavement.

The U.S. Navy's LID policy sets a goal of no net increase in stormwater volume and sediment or nutrient loading from major renovation and construction projects. This policy dictates that LID be considered in the design for all projects that have a stormwater management component (Navy 2007a).

3.8.3.1 Horsham Township

Stormwater infrastructure (drains, ditches, pipes, outflows, etc.) is maintained by the Horsham Township Department of Parks and Recreation. The Horsham Township Comprehensive Plan Update 2011 states that one of its objectives is to locate medium- and high-density development near transportation and commercial facilities that are served, or intended to be served, by infrastructure, including stormwater drainage systems (Horsham Township 2011).

The portion of Horsham Township that lies within the Little Neshaminy Creek watershed is currently subject to the provisions of the Neshaminy/Little Neshaminy Creek Watershed Act 167 ordinance. This ordinance requires development applications to reduce both stormwater runoff rates and stormwater volumes to predevelopment drainage conditions. In addition, development within the Little Neshaminy Creek watershed is subject to the requirements of the Neshaminy Creek Watershed Stormwater Management Plan, which was approved by both Bucks and Montgomery counties (Bucks County 2010). Both the ordinance and the Stormwater Management Plan were prepared under the PADEP Stormwater Management Act 167, which requires counties to prepare and adopt watershed-based stormwater management plans to help regulate and reduce potential negative impacts on surface waters that may result from further development in the watershed. It also requires municipalities to adopt and implement ordinances to regulate development consistent with these plans.

Similar to the Little Neshaminy Creek watershed, the Pennypack Creek watershed has an approved Act 167 plan (Temple University 2012). To date, an Act 167 ordinance has not been approved for the Pennypack Creek watershed. However, the portion of the township that lies within the Pennypack Creek watershed also requires development applications to reduce both stormwater runoff rates and stormwater volumes to predevelopment drainage conditions (Horsham Township 2011).

3.8.3.2 NAS JRB Willow Grove

The Water Pollution Control Act Amendments of 1972, commonly known as the Clean Water Act (CWA), reduces pollutant discharges into waterways and to manage runoff. An NPDES permit is required for all facilities that discharge industrial-related stormwater. In 2001, NAS JRB Willow Grove

applied for and received an NPDES permit from U.S. EPA Region 3 for stormwater that drains into Little Neshaminy Creek, Pennypack Creek, and Park Creek through the Commonwealth National Country Club. The NPDES permit (No. PA 0022411) had a term of 5 years and expired on 7 December 2006 (Navy 2006).

As part of the NPDES permit program, NAS JRB Willow Grove prepared a Stormwater Preparedness, Prevention and Contingency (PPC) Plan to control stormwater discharges associated with industrial activity at the installation to meet the requirements of NPDES Permit No. PA 0022411 (Woodard & Curran, Inc. 2003). Stormwater discharges from the former NAS JRB Willow Grove are regulated under this permit. The PPC Plan's purpose was to assist installation personnel eliminate, reduce, or mitigate the effects of stormwater pollution from activities such as aircraft maintenance, equipment cleaning, and airport deicing operations (Woodard & Curran, Inc. 2003).

Stormwater Drainage System

Impervious surfaces cover approximately 28.5 percent of the land area at the former NAS JRB Willow Grove installation. Stormwater discharges via multiple point sources into the Park Creek, Little Neshaminy Creek, and Pennypack Creek watersheds. The storm drainage system on the installation consists of a combination of ditches, retention basins, concrete culverts, catch basins, and reinforced concrete and corrugated metal piping. The storm drains transport stormwater off-site to a number of separate outfall locations, which have been numbered Outfalls Nos. 1 through 16.

A description of each Outfall and its drainage area according to the PPC Plan are as follows:

Outfall No. 1 serves approximately 10 acres of undeveloped land at the southeastern corner of the installation. The outfall receives stormwater from surface drainage along Perimeter Road. The system consists of catch basin CB-777 and drainage to the municipal stormwater system at the corner of Easton Road and Maple Avenue. Discharges from this outfall eventually reach Pennypack Creek.

Outfall No. 2 serves approximately 150 acres along the southern edge of the installation and receives stormwater from the Marine Vehicle Maintenance facility.

Outfall No. 2A is a small head wall with an opening covered with a trash rack. This outfall serves a small amount of surface drainage from along the west side of Perimeter Road, near the entrance to the Marine compound.

Outfall No. 3 serves approximately 150 acres in the southwest corner of the installation. The outfall receives stormwater from the Army Reserve Compound and the Army Motor Pool.

Outfall No. 4 serves approximately 1 acre on the southwestern corner of the installation. The outfall receives stormwater from surface flow. The system consists of a head wall with an opening covered by a trash rack at the perimeter fence. Discharges from this outfall eventually reach Pennypack Creek.

Outfall No. 5 serves approximately 200 acres along the western boundary of the installation. The outfall receives stormwater from heavily industrialized areas such as the south end of the runway, the Army and PAANG hangars, Fire Department, and HazMin Center.

Outfalls Nos. 6 and 6A serve approximately 20 acres along the western edge of the installation. The outfall receives stormwater surface flow from undeveloped land.

Outfalls Nos. 7 and 7A serve approximately 50 acres of undeveloped area, including a wetland area, along the western edge of the installation. (Outfall No. 7A is not identified by a sign. It is located

approximately 500 feet north of Outfall No. 7.) The system consists of a 12-inch-diameter CMP (Outfall 7) culvert and an 18-inch-diameter CMP (Outfall 7A) culvert under Perimeter Road. Discharges from these outfalls eventual reach the Park Creek watershed.

Outfall No. 8 serves approximately 175 acres on the northwestern corner of the installation. The outfall receives stormwater from the Aircraft Intermediate Maintenance Department (AIMD) (Building 180); the Airplane Wash Rack (Building 175); Auto Hobby Shop; Fire Department; HazMin Center; the VR-52, VP-64, and VP-66 hangar areas; and Ground Support Activity. The outfall is located approximately 430 feet along the fence from the road east of the aircraft approach zone.

Outfalls No. 8A-8E serve approximately 40 acres at the northwestern corner of the installation. The outfalls receive stormwater from surface flow and discharges from Outfall No. 8. The system consists of five 10-inch-diameter CMP culverts, all approximately 25 feet long, which direct drainage under the perimeter fence at the northwest corner of the installation. Drainage from these outfalls eventually reaches Park Creek.

Outfall No. 9 serves approximately 200 acres in the northeastern area of the installation. The outfall receives stormwater from the Air Force base and a large populated area of the Navy base, including the Fuel Farm, MAG 49, Recycling Center, and Gas Station.

Outfall Nos. 10 through 13 serve approximately 25 acres of developed area along the northeast edge of the installation. The outfalls received stormwater from the former installation STP, Public Works building, and Vehicle Wash Rack areas.

Outfall No. 14 serves a 50-acre area on the east-central portion of the installation. The outfall receives stormwater from an area with no industrial activity.

Outfall No. 15 serves approximately 1 acre on the eastern edge of the installation. The outfall receives stormwater from the parking lot adjacent to the Air Museum.

Outfall No. 16 serves approximately 5 acres on the eastern edge of the installation. The outfall receives stormwater from a parking lot adjacent to Building No. 29.

According to the HLRA's Redevelopment Plan, the "condition of the piping could not be verified and sheet flow patterns have not been documented. A more extensive review of the remaining infrastructure is required to provide a better definition of the system equipment and capabilities. There is the potential for stormwater run-off from the installation to contribute to flooding conditions at the northern end of the installation at Keith Valley Road" (RKG 2012).

A main stormwater retention basin with a surface area of approximately 1 acre is located along the northern border within the property owned by the Horsham Air Guard Station. This detention basin is used for stormwater treatment and includes the use of oil booms and a sluice gate outlet that controls the discharge into Park Creek (Navy 2006).

3.8.4 Other Utility Systems

3.8.4.1 Horsham Township

- **Electric**. The Philadelphia Electric Company (PECO) is the primary electricity utility providing connection and distribution services in Horsham Township. This is a user-supported utility service, and customers pay for the service and electricity supplied.

- **Natural Gas**. PECO is also the primary natural gas utility providing connection and distribution services in Horsham Township. This is a user-supported utility service, and customers pay for the service and natural gas supplied.

3.8.4.2 Former NAS JRB Willow Grove Installation

- **Electric.** The electrical distribution system on the former NAS JRB Willow Grove is owned and maintained by the Navy; however, PECO provides electric power to the former installation. Electric power enters the installation at six points: two points are located at the northern edge of the installation, along Easton Road, one near the USAF Reserve Center, and the other near the main entrance for the facility. The remaining four electricity entry points are all located on the southern end of the installation along Horsham Road (NAVFAC 2011).

  According to the HLRA's Redevelopment Plan, "In 1990, the base electrical service was converted from a 2400 volt service to a 33Kv service with 4160 volt internal base distribution. At the time of the voltage conversion, the Main Service Entrance Substation was installed and all pad mounted transformers and the base underground feeder distribution system were replaced. Therefore, most of the site electrical distribution equipment has been in operation for approximately twenty one years" (RKG 2012).

  During 2010, the estimated total electric usage through the six meters served by PECO was 14.7 million kWh.

  According to the Pennsylvania Public Utility Commission (PUC) report Electric Power Outlook for Pennsylvania 2012-2017 (PUC 2013), "…sufficient generation, transmission and distribution capacity exists to reasonably meet the needs of Pennsylvania's electricity consumers for the foreseeable future."

- **Natural Gas.** PECO is also the primary natural gas provider to the former NAS JRB Willow Grove. Facility single-line drawings identified the locations of the natural gas infrastructure on the installation. Facilities located in the northern portion of the installation received natural gas through several connections to the natural gas mains located along Easton Road; facilities located in the southern portion of the installation received natural gas through several connections to the natural gas mains located along Horsham Road (NAVFAC 2011). However, no determination of the adequacy of the natural gas distribution system on the former installation can be made without a more extensive review of the remaining infrastructure in order to provide a better definition of the system equipment and capabilities (RKG 2012).

  Natural gas totals are reported to the PADEP in accordance with the Title V air quality permit (AECOM 2011). During 2010, NAS JRB Willow Grove reported total natural gas usage of approximately 92.2 million ccf.

  In the PECO report "Gas Long Term Infrastructure Improvement Plan 2013-2022" (PECO 2013) improvements to infrastructure over the next decade will upgrade and expand infrastructure to meet future demands.

- **Fuel Oil.** NAS JRB Willow Grove used 6,920 gallons of fuel oil in 2010 for two steam boilers and 1,814 gallons for various emergency generators and fire pumps (AECOM 2011). (Note: the two steam boilers no longer exist; they were transferred to the Air Force and subsequently dismantled.)

3.9 Cultural Resources

Cultural resources are historic districts, sites, buildings, structures, or objects considered important to a culture, subculture, or community for scientific, traditional, religious, or other purposes. They include archaeological resources, historic architectural/engineering resources, and traditional resources. Cultural resources that are eligible for listing in the National Register of Historic Places (NRHP) are called historic properties and are evaluated for potential adverse effects from a proposed major Federal action. In addition, some cultural resources, such as Native American sacred sites or traditional resources, may not be historic properties, but they are also evaluated under NEPA for potential impacts from a proposed major federal action. These resources are identified through consultation with appropriate Native American or other interested groups.

National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended (16 USC 470) requires federal agencies to identify historic properties within the proposed project's area of potential effect (APE). The APE is the geographic area within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if such properties exist. The APE is influenced by the scale and nature of the undertaking and may be different for different kinds of effects caused by the undertaking. Generally, an area broader than the project footprint must be considered. For the purposes of compliance with Section 106 of the NHPA, the APE for the proposed action is synonymous with the boundaries of the former installation property that would be transferred from Navy ownership and oversight (see Figure 1-1). Federal agencies must also determine what potential effects the proposed action may have on identified historic properties and consult with the State Historic Preservation Officer (SHPO) on determinations of eligibility and findings of effects. For undertakings occurring on or affecting historic properties on American Indian tribal lands, federal agencies must consult with the Tribal Historic Preservation Officer (THPO) in lieu of the SHPO.

If the proposed action adversely affects an identified historic property, further consultation with the SHPO or THPO is required to avoid or minimize the adverse effect. To be considered eligible for inclusion in the NRHP, cultural resources must be determined to be significant by meeting one or more of the criteria outlined in 36 CFR 60.4 (NRHP, Criteria for Evaluation). A historic property must also possess integrity of location, design, setting, materials, workmanship, feeling, or association. A property must be 50 years old or older to be considered for eligibility in the NRHP or must have achieved exceptional importance within the last 50 years. For example, more recent historic resources on a military installation may be considered significant if they are of exceptional importance in understanding the Cold War.

Tribal Treaty Rights and Trust Responsibilities

Treaties with American Indian tribes are considered government-to-government agreements, similar to international treaties, and preempt state laws. Treaty language securing fishing and hunting rights is not a "grant of rights (from the federal government to the Indians), but a grant of rights from them - a reservation of those not granted" (United States v. Winans 1905). This means that the tribes retain rights not specifically surrendered to the United States. Furthermore, the United States has a trust or special relationship with American Indian tribes. The Secretary of the Interior and the Secretary of Commerce, pursuant to the Endangered Species Act of 1973, issued Secretarial Order 3206, American Indian Tribal Rights, Federal-Tribal Trust Responsibilities. This order states the following: "The unique and distinctive political relationship between the United States and the Indian Tribes is defined by statutes, EOs, judicial decisions, and agreements, and differentiates tribes from other entities that deal with, or are affected by, the federal government."

This unique relationship provides the basis for legislation, treaties, and EOs that grant unique rights or privileges to American Indians (Morton v. Mancari, 1974). The trust responsibility has been interpreted to require federal agencies to carry out their activities in a manner that is protective of American Indian treaty rights. Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments) affirms the trust responsibility of the United States and directs agencies to consult with American Indian tribes and respect tribal sovereignty when taking actions affecting such rights. This policy is also reflected in the March 30, 1995, document, *Department of Commerce - American Indian and Alaska Native Policy* (United States Department of Commerce 1995). Also, on November 21, 1999, the DOD promulgated its Native American and Alaska Native Policy emphasizing the importance of respecting and consulting with tribal governments on a government-to-government basis. The Policy requires an assessment, through consultation, of the effects of proposed DOD actions that may have the potential to significantly affect protected tribal resources, tribal rights, and Native American lands before decisions are made by the services.

3.9.1 Baseline Cultural Resources and Historic Properties

The Navy conducted a number of cultural resources investigations at NAS JRB Willow Grove, as summarized below in Table 3.9-1. The purpose of these investigations was to identify archaeological and architectural or built resources on the installation property, including those resources that have been determined NRHP-eligible.

Table 3.9-1 Results of Previous Cultural Resource Investigations at NAS JRB Willow Grove

Report Author	Year	Report Title	Focus of Report	Results and Conclusions for Investigations
The Cultural Resources Group, Louis Berger & Associates	1996a	*Draft Cultural Resources Survey: Naval Air Station Willow Grove, Pennsylvania*	Assessment of the potential for the base to have cultural resources (this document was never finalized).	Five areas at the installation had the potential to contain buried archaeological resources. Individually, none of the buildings surveyed retained historic integrity, and collectively, the buildings surveyed were recommended not eligible as a historic district.
The Cultural Resources Group, Louis Berger & Associates	1996b	*Historic and Archaeological Resources Protection Plan, Naval Air Station Willow Grove, Pennsylvania*	Identified additional cultural resources investigations required for compliance with federal cultural resources laws.	There were no previously recorded cultural resources on the base at this time; therefore, the Historic and Archaeological Resources Protection Plan did not have specific cultural resources issues to address.

Table 3.9-1 Results of Previous Cultural Resource Investigations at NAS JRB Willow Grove

Report Author	Year	Report Title	Focus of Report	Results and Conclusions for Investigations
Mohlman, Geoffrey, (Southeastern Archaeological Research, Inc.)	2011	*Architectural Assessment and National Register of Historic Places Evaluation of Above-Ground Navy-owned Resources Located at Naval Air Station Joint Reserve Base Willow Grove, Willow Grove, Pennsylvania*	Architectural assessment and NRHP-eligibility evaluation of 121 architectural or built resources at NAS JRB Willow Grove.	Six ammunition magazines were found to meet the requirements for listing in the NRHP. The remaining 115 architectural or built resources at NAS JRB Willow Grove were determined not to be NRHP-eligible.
Rachleff, Allison, Jennings, Anne, Waterloo, Emma (AECOM)	2011	*Historic Architectural Survey of Select Facilities at Naval Air Station Joint Reserve Base Willow Grove, Montgomery County, Pennsylvania and Off-Base Housing Enclaves, Bucks County, Pennsylvania*	Architectural survey of additional built resources at NAS JRB Willow Grove.	Eleven historic architectural resources were identified within the APE. None of the architectural or built resources assessed at NAS JRB Willow Grove were recommended as eligible for listing in the NRHP, although six ammunition magazines (Facilities 54, 55, 87, 165, 166, and 173) were covered under the Program Comment for World War II and Cold War Era (1939-1974) Ammunition Storage Facilities.
Stehling, Nancy A., Messon, Michele, Myers, George Jr. (AECOM)	2012	*Phase I Archaeological Survey at Naval Air Station Joint Reserve Base Willow Grove Located in Montgomery County and Bucks County, Pennsylvania*	Phase I Subsurface Testing Survey of NAS JRB Willow Grove, the Jacksonville Road enclave, and the Shenandoah Woods parcel.	Seven archaeological sites were recorded. Four sites were located at NAS JRB Willow Grove. Two were found to be eligible for listing in the NRHP and two were determined to be not eligible.

3.9.1.1 Archaeological Resources

In 1996, a Phase 1A cultural resources survey was conducted at NAS JRB Willow Grove by Louis Berger & Associates, Inc. (LBA 1996a). Much of the preliminary research documented in the report focused on the amount of ground disturbance that has occurred on the base. The report concluded that while a substantial amount of development and redevelopment has occurred over the years at NAS JRB Willow Grove, there were a total of 19 areas that could contain buried archaeological deposits (LBA 1996a). Four areas had the potential to contain prehistoric archaeological deposits and 15 'Historic Site Areas'

(HSAs), characterized by historic buildings and surrounding land with the potential to contain historic archaeological deposits.

The 1996 Phase IA survey results indicated that of the four areas with potential to contain prehistoric archaeological deposits, one had the potential for intact prehistoric archaeological resources. The three other areas had low probability for containing intact prehistoric archaeological resources due to prior subsurface disturbance associated with earth moving and landscaping activities that had occurred at these areas (LBA 1996a).

The 1996 Phase IA survey results indicated that of the 15 HSAs, two had a high potential for containing intact historic archaeological deposits and another two had moderate or low-to-moderate potential for containing intact historic archaeological deposits. These four HSAs could contain archaeological deposits that would make the site eligible for listing in the NRHP, but without additional historical research and subsequent subsurface investigations, no assessment concerning eligibility is possible (LBA 1996a).

In 2011, AECOM conducted subsurface testing as part of a Phase IB archaeological investigation of the areas identified as sensitive for containing archaeological resources in the LBA Phase IA study and also at another area on the installation property. The Phase IB archaeological investigation resulted in the identification of four archaeological sites (see Table 3.9-2) (Stehling et al. 2012). As indicated in Table 3.9-2, all of the identified archaeological sites were historic; two had prehistoric components (Sites 36-MG-0459 and 36-MG-0460) and one had a single prehistoric artifact (Site 36-Mg-0458). Two of the archaeological sites, Sites 36-MG-0459 and 36-MG-0460, were determined to be potentially NRHP-eligible pending the results of additional testing. The other two archaeological sites, Sites 36-Mg-0458 and 36-Mg-0461, were determined not to be NRHP-eligible.

Table 3.9-2 Results of Phase I Archaeological Testing at NAS JRB Willow Grove

Site Number	Location	Description	NRHP-Eligibility Recommendation
36-MG-0458	Area A	Historic archaeological deposit with one prehistoric artifact	Not eligible
36-MG-0459	Area B	Historic archaeological deposit with intrusive prehistoric finds	Potentially eligible; Phase II archaeological evaluation recommended
36-MG-0460	Area D	Historic archaeological deposit with intrusive prehistoric and modern finds	Potentially eligible; Phase II archaeological evaluation recommended
36-MG-0461	Area E	Sparse historic archaeological deposit	Not eligible

Source: Stehling et al. 2012; Drozd 2012a.

3.9.1.2 Architectural Resources

The 1996 Phase IA cultural resources survey conducted at NAS JRB Willow Grove included an assessment of architectural or built resources (LBA 1996a). The results of the Phase IA survey indicated that numerous buildings at NAS JRB Willow Grove date to the late 1800s and were still in use at the time of the survey, and many of the 20th century buildings at NAS JRB Willow Grove were constructed prior to 1945, the cutoff date for structures that would be considered historic resources at the time the survey was conducted. The Phase IA report concluded that none of the buildings had retained integrity and thus were not eligible for listing in the NRHP.

In September 2010, Southeastern Archaeological Research, Inc., was contracted to complete an architectural assessment and NRHP-eligibility evaluation of 121 architectural or built resources at NAS JRB Willow Grove. None of the 121 architectural or built resources assessed at NAS JRB Willow Grove

were recommended as eligible for listing in the NRHP, although six ammunition magazines (Facilities 54, 55, 87, 165, 166, and 173) were covered under the Program Comment for World War II and Cold War Era (1939-1974) Ammunition Storage Facilities (see Table 3.9-3) (Mohlman 2011).

Table 3.9-3 Results of Architectural Assessments at NAS JRB Willow Grove

Building/ Facility Number	Building/Facility Name	Construction Date	Description	NRHP-Eligibility Recommendation
Facility 54	Small Arms Magazine (Pyrotechnics)	1944	World War II-era earth-covered, reinforced concrete igloo-type structure typical of wartime construction	Not NRHP-eligible; covered under the Program Comment for World War II and Cold War Era (1939-1974) Ammunition Storage Facilities
Facility 55	Small Arms Magazine (Pyrotechnics)	1944	World war II-era earth-covered, reinforced concrete igloo-type structure typical of wartime construction	Not NRHP-eligible; covered under the Program Comment for World War II and Cold War Era (1939-1974) Ammunition Storage Facilities
Facility 87	Ready Arms Magazine (Ready Ammunition Magazine)	1956	Masonry vernacular ready ammo locker with a shed roof, concrete block exterior walls, concrete foundation, and two metal doors.	Not NRHP-eligible; covered under the Program Comment for World War II and Cold War Era (1939-1974) Ammunition Storage Facilities
Facility 165	Magazine (High Explosive Magazine)	1968	An igloo magazine with a curvilinear, earth-covered roof and a concrete headwall containing a double-leaf metal door providing access to a single-pen interior.	Not NRHP-eligible; covered under the Program Comment for World War II and Cold War Era (1939-1974) Ammunition Storage Facilities
Facility 166	Magazine(Small Arms Magazine)	1968	An igloo magazine with a curvilinear, earth-covered roof and a concrete headwall containing a double-leaf metal door providing access to a single-pen interior.	Not NRHP-eligible; covered under the Program Comment for World War II and Cold War Era (1939-1974) Ammunition Storage Facilities
Facility 173	Magazine (High Explosive Magazine)	1974	A small igloo magazine with a curvilinear, earth-covered roof and a poured concrete vent stack and a concrete block headwall containing a double-leaf metal door providing access to a single-pen interior.	Not NRHP-eligible; covered under the Program Comment for World War II and Cold War Era (1939-1974) Ammunition Storage Facilities

Source: LBA 1996a; Rachleff et al. 2011; Mohlman 2011.

In 2011, a supplemental architectural assessment and NRHP-eligibility evaluation of 14 additional architectural and built resources at NAS JRB Willow Grove was conducted by AECOM. None of these 14 architectural or built resources were recommended as eligible for listing in the NRHP (Rachleff et al. 2011).

3.9.2 NRHP-Listed or -Eligible Historic Properties

As a result of archaeological investigations conducted at the former NAS JRB Willow Grove property, the Navy has determined that two archaeological sites (Sites 36-Mg-0459 and 36-Mg-0460, as described in Section 3.9.1.1) have the potential to provide additional historical/scientific data consistent with National Register Criterion D and that additional evaluative investigation would be necessary to determine the NRHP-eligibility of these two sites. For the purposes of impact analysis as part of the Proposed Action, the Navy is treating both of these sites as NRHP-eligible. The Navy has determined that the other two archaeological sites (Sites 36-Mg-0458 and 36-Mg-0461) lack sufficient integrity or have been previously disturbed such that they are not eligible for listing in the NRHP, and no additional archaeological investigations were necessary for these two archaeological sites (Drozd 2012a). The Pennsylvania SHPO concurred with these findings (McLearen 2012a).

The Navy has determined that none of the 135 architectural or built resources included in the architectural assessments and NRHP-eligibility evaluations at the former NAS JRB Willow Grove property are NRHP-eligible, including six magazines (Facilities 54, 55, 87, 165, 166 and 173, as described in Section 3.9.1.2) that may meet National Register Criteria under the 2006 Program Comment for World War II and Cold War Era (1939-1974) Ammunition Storage Facilities (Mohlman 2011; Drozd 2012b). The Pennsylvania SHPO concurred with these findings, indicating that none of the architectural resources at NAS JRB Willow Grove are historically or architecturally significant and none are NRHP-eligible (MacDonald 2011).

3.9.3 Native American Resources

Previously conducted cultural resources investigations and previously developed cultural resources management plans for NAS JRB Willow Grove have not included the evaluation of the property for Native American sensitivity or resources (LBA 1996a, 1996b; Mohlman 2011; Rachleff et al. 2011; Stehling et al. 2012). The Navy is consulting with the appropriate Native American groups regarding the results of the previously conducted cultural resources investigations, including the potential sensitivity of the property for Native American resources.

3.10 Topography, Geology, and Soils

This section summarizes the baseline topography, geology, and soil conditions at the former NAS JRB Willow Grove property.

3.10.1 Topography

A majority of the former installation property is located within an eroded part of the Piedmont Plateau (USDA 1967). The property is located in an area that is generally characterized by low hills that have broad, rounded summits and short, steep side slopes. Elevation increases gradually from 240 feet above mean sea level (amsl) at the northwestern edge of the property boundary to 360 feet amsl in the eastern portion of the property, with slopes ranging from gentle to moderate (USGS 1996a). Most of the property has nearly level to 3 percent slopes, but some steeper slopes occur southeast of Dawes Road and in the northwestern portion of the installation (NRCS 2013a).

3.10.2 Geology

The former installation property lies within the Gettysburg-Newark Lowland Section of the Piedmont Province (Pennsylvania Department of Conservation and Natural Resources [PA DCNR] 2000). The Gettysburg-Newark Lowland Section consists mainly of low, rolling hills and valleys developed on red sedimentary rock. The basic drainage pattern is dendritic or branching pattern, and soils are usually red. Isolated higher hills have developed on diabase, baked sedimentary rock (hornfels), and conglomerates. The Gettysburg-Newark Lowland Section is made up of sedimentary rocks that were deposited in a long, narrow, inland basin that formed when the continents of North America and Africa separated more than 200 million years ago. Bedrock of the Stockton formation underlies the former installation property. This formation was formed during the Triassic period and includes arkosic and sandstone rocks (Miles and Whitfield 2001).

Montgomery County, Pennsylvania, including the former NAS JRB Willow Grove property, is relatively inactive seismically and has a low probability of earthquake hazard. According to the U.S. Geological Survey, the peak ground acceleration as a percent of gravity (%g) with 2 percent probability of exceedance in 50 years is 0.10 to 0.12 (USGS 2012).

3.10.3 Soils

3.10.3.1 Soil Types

The following sections describe soil resources at the former installation property, including the nature and properties of the soil association and/or mapping units located on the site. The soil resources data were gathered from the United States Department of Agriculture (USDA) Montgomery County Soil Survey (USDA 1967), and the Web-based Soil Survey Geographic database (NRCS 2013a) (see Figure 3.10-1).

Approximately 70 percent of the installation property has already been developed or modified for some purpose. The soils on the former installation that have not been substantially altered by development are identified as Lansdale-Penn Readington Association soils (USDA 1967). These soils were formed in material weathered from sandstone, shale, and conglomerate and range from shallow to deep over underlying bedrock. There are small areas of steep, rocky, and very shallow soils, and small areas of poorly drained soils occur in depressions and drainages. The soils of this association have a friable, easily worked consistency and retain moderate amounts of moisture for use by plants.

Soil map units that determined by USDA to have been substantially altered for development purposes by grading, filling, and construction of the runway, roads, buildings and other facilities occupy approximately 70 percent of the installation property (NRCS 2013a). Soils that have been altered but that do not have structures on them are within the “Udorthents” map units (symbol: UdtB). The UdtB soils are mostly vegetated with grass or trees. Soils that have been built on are within the “Urban Land” map units (symbol: UgB) and UgB soils are largely covered with pavement or buildings.

3.10.3.2 Soil Characteristics and Limitations

Soils on the former installation property that have not already been developed generally have minimal to moderate developmental limitations. The main developmental limitations include shallow depths to a saturated zone or bedrock, both which may constrain construction.

Table 3.10-1 lists the individual soil types (i.e., soil map units) within the former installation property and extent in acres. Table 3.10-1 also identifies prime farmland and the potential limitations each map unit may present to development.

Table 3.10-1 Soil Map Units on Former NAS JRB Willow Grove with Prime Farmland Status and Soil Limitations for Development

Map Unit Symbol	Map Unit Name	Area (acres)	% of Property	Prime Farmland Status	Soil Limitations for Development
Bo	Bowmansville-Knauers silt loams	3.38	0.4	Not prime farmland	F, FH, P, SZ
BwA	Buckingham silt loam, 0 to 3 % slopes	3.60	0.4	Farmland of statewide importance	FH, SZ
CfA	Chalfont silt loam, 0 to 3 % slopes	17.01	2.0	Farmland of statewide importance	FH, SZ
CfB	Chalfont silt loam, 3 to 8 % slopes	4.83	0.6	Farmland of statewide importance	FH, SZ
CrA	Croton silt loam, 0 to 3 % slopes	3.50	0.4	Not prime farmland	FH, H, BR, P, SZ
DsA	Doylestown silt loam, 0 to 3 % slopes	10.49	1.2	Not prime farmland	FH, H, SZ
LaA	Lansdale loam, 0 to 3 % slopes	15.45	1.8	Prime farmland	(none)
LaB	Lansdale loam, 3 to 8 % slopes	28.83	3.4	Prime farmland	BR
LaC	Lansdale loam, 8 to 15 % slopes	3.23	0.4	Farmland of statewide importance	BR
LeA	Lawrenceville silt loam, 0 to 3 % slopes	103.93	12.1	Prime farmland	SZ
LeB	Lawrenceville silt loam, 3 to 8 % slopes	4.23	0.5	Farmland of statewide importance	SZ
PlB	Penn-Lansdale complex, 0 to 8 % slopes	2.04	0.2	Prime farmland	BR
PlC	Penn-Lansdale complex, 8 to 15 % slopes	8.15	0.9	Farmland of statewide importance	BR
ReA	Readington silt loam, 0 to 3 % slopes	10.41	1.2	Prime farmland	SZ
ReB	Readington silt loam, 3 to 8 % slopes	27.99	3.3	Farmland of statewide importance	SZ
Rt	Rowland silt loam, terrace	4.15	0.5	Prime farmland	F, FH, SZ
UdtB	Udorthents, shale and sandstone, 0 to 8 % slopes	302.24	35.1	Not prime farmland	N/A
UgB	Urban land, 0 to 8 % slopes	297.79	34.6	Not prime farmland	N/A
UroB	Urban land-Lawrenceville complex, 0 to 8 % slopes	7.18	0.8	Not prime farmland	N/A
UusB	Urban land-Udorthents, shale and sandstone complex, 0 to 8 % slopes	0.82	0.1	Not prime farmland	N/A
W	Water	1.28	0.1	Not prime farmland	N/A
Grand Total		**860.53**	**100.0**		

Data Source: NRCS 2013a.

Notes:
N/A = Does not apply or data not available

Soil Limitations for Development:
BR = Shallow to Bedrock
F = Flooding
FH = Frost Heaving
H = Hydric Soil
P = Ponding
SZ = Shallow Depth to Saturated Zone

Path: M:\VA_Beach\Willow_Grove\Maps\MXD\Report\EIS\Soils.mxd

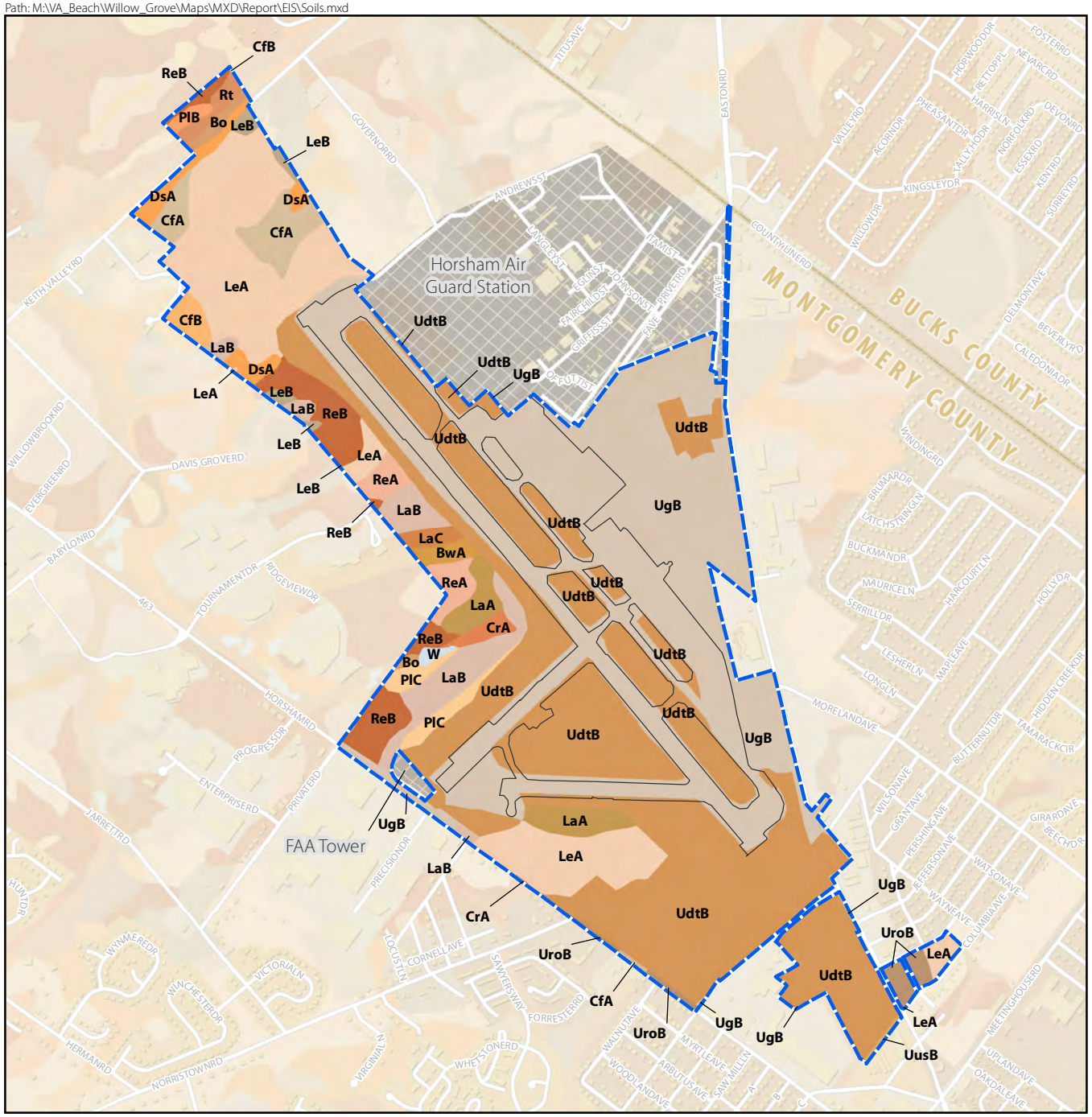

Figure 3.10-1

Soil Map Units

Former NAS JRB Willow Grove

Horsham, PA

Legend

- NAS JRB Willow Grove
- FAA Tower and Horsham Air Guard Station (not included in redevelopment)
- Runways, Taxiways, Parking Aprons
- County Boundary
- Bo- Bowmansville-Knauers silt loams
- BwA- Buckingham silt loam, 0 to 3 percent slopes
- CfA- Chalfont silt loam, 0 to 3 percent slopes
- CfB- Chalfont silt loam, 3 to 8 percent slopes
- CrA- Croton silt loam, 0 to 3 percent slopes
- DsA- Doylestown silt loam, 0 to 3 percent slopes
- LaA- Lansdale loam, 0 to 3 percent slopes
- LaB- Lansdale loam, 3 to 8 percent slopes
- LaC- Lansdale loam, 8 to 15 percent slopes
- LeA- Lawrenceville silt loam, 0 to 3 percent slopes
- LeB- Lawrenceville silt loam, 3 to 8 percent slopes
- PlB- Penn-Lansdale complex, 3 to 8 percent slopes
- PlC- Penn-Lansdale complex, 8 to 15 percent slopes
- ReA- Readington silt loam, 0 to 3 percent slopes
- ReB- Readington silt loam, 3 to 8 percent slopes
- Rt- Rowland silt loam, terrace
- UdtB- Udorthents, shale and sandstone, 0 to 8 percent slopes
- UgB- Urban land, 0 to 8 percent slopes
- UroB- Urban land-Lawrenceville complex, 0 to 8 percent slopes
- UusB- Urban land-Udorthents, shale and sandstone complex, 0 to 8 percent slopes
- W- Water

N

SCALE

0 0.25 0.5 Miles

SOURCE: Ecology and Environment 2013; ESRI 2010; Tetra Tech 2012; USDA NRCS 2009.

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Prime Farmland

The Natural Resources Conservation Service (NRCS) defines four classes of prime farmland: prime, unique, of statewide importance, and of local importance. Prime farmland, as defined by the USDA, "is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It has the soil quality, growing season, and moisture supply needed to produce a sustained high yield of crops while using acceptable farming methods. Prime farmland produces the highest yields and requires minimal amounts of energy and economic resources, and farming it results in the least damage to the environment" (NRCS 2007). The prime farmland and farmland of statewide importance classifications do not consider whether the land is actively farmed. Cultivated land, pastureland, and forestland all could potentially be prime farmland.

Approximately 234 acres of the former installation property have prime farmland soils or farmland of statewide importance (see Figure 3.10-2). No unique farmland soils occur on the property. Developed land (i.e., urban, industrialized, residential, or built-up land) or water bodies are by definition not farmland soils. The prime farmland and statewide important farmland soils on the installation have essentially been converted to urban uses. None of the installation is currently used or has recently been used for farming. Furthermore, the prime and statewide important farmlands within the installation development are surrounded by buildings, the runway, and other urban uses, both within and around the installation. There is also very little agriculture in the vicinity of the installation and little in the way of farm support services. There are no agricultural investments (barns, drainage or irrigation systems, etc.) on the installation. While prime farmland soils and farmland of statewide importance on the property have the potential to be farmed, the surrounding uses are not particularly compatible with such activity. Very little actively farmed land remains in the vicinity of the former installation. As a result, the business and technical infrastructure to support farming in the vicinity is minimal.

Hydric Soils

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper soil layer. Hydric soils tend to be saturated for major parts of each year, may be prone to flooding or ponding, and tend to have poor drainage. These qualities are limitations that need be addressed to improve their suitability for construction.

These soils, under natural conditions, are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation. Because of this, regulated wetlands may occur in hydric soils. Approximately 14 acres are occupied by soil map units in which all or some of soils within the map unit are hydric. Soil map units not identified as all or partially made up of hydric soils may also include areas of hydric soil.

Constructability

Constructability refers to the relative suitability of a soil for the construction of buildings, roads, and other infrastructure. Table 3.10-1 identifies attributes that may affect constructability for each soil map unit. Approximately 25 percent of the soils on the former installation property would be considered to have some limitations to constructability.

Constructability limitations on the former installation property include the presence of hydric soils, shallow depth to saturation or bedrock, and flooding or ponding, and frost action. Hydric soils may be associated with wetlands that are subject to regulation by federal and/or state regulation (see Section 3.11.5). The wet conditions associated with hydric soils may also present limitations to development such as excavation and the movement of heavy equipment. Shallow depth to saturation may require dewatering during excavation and construction and other measures to facilitate construction in a saturated environment. Shallow depth to bedrock may require blasting to excavate for foundations. Approximately

22 percent of the site has soils with a shallow depth to a saturated zone and 5 percent of the site has soils with a shallow depth to bedrock. Areas that experience flooding should generally be avoided as building sites. Ponding may require surface or subsurface drainage. Frost action can destabilize roadways and shallow excavations unless specific design and construction measures are taken to manage dimensional changes due to freezing and thawing of water in the soil.

3.11 Water Resources

The following sections provide a summary of the baseline conditions and physical characteristics of water resources found on or in the vicinity of the former NAS JRB Willow Grove property. Water resources evaluated in this EIS are defined in the following subsections and include surface water, groundwater, floodplains, and wetlands.

Surface Water and Water Quality Background

Surface water includes streams, rivers, lakes, and reservoirs. Water quality describes the chemical and physical composition of water as affected by natural conditions and human activities. The Clean Water Act (CWA) (33 U.S.C. §1251) established the basic structure for regulating discharges of pollutants into waters of the United States. The CWA contains the requirements to set water quality standards for all contaminants in surface waters. The EPA is the designated regulatory authority to implement pollution control programs and other requirements of the CWA. However, the EPA delegates regulatory authority for the CWA to the applicable state agency for the implementation of pollution control programs as well as other CWA requirements. The Rivers and Harbors Act regulates development and use of the nation's navigable waterways: 33 U.S.C. 401 §10 of the Act prohibits unauthorized obstruction or alteration of navigable waters and vests the U.S. Army Corps of Engineers (USACE) with authority to regulate discharges of fill and other materials into such waters.

The CWA designates water quality standards and establishes permitting and certification processes. Water quality standards are the foundation of a water-quality-based pollution control program, which is implemented through the states for waterbodies within their jurisdiction. These standards define the goals for a waterbody by designating its uses and setting criteria to protect these uses.

Water quality standards consist of three principal elements:

1. Designated best uses (also referred to as beneficial uses)
2. Narrative statements and numeric criteria (i.e., for specific physical, chemical, and biological characteristics) to protect the uses
3. An anti-degradation policy to protect higher-quality waters from being further degraded

The CWA requires that each state conduct water quality assessments to determine whether its streams, lakes, and estuaries are sufficiently “healthy” to meet their designated best uses. This information is updated and reported to the EPA every two years. This process is mandated by Section 305(b) of the CWA, and the state prepares 305(b) reports. The 305(b) report is the primary source of information for the development of the “Impaired Waters” list for the states, known as the 303(d) list. Impaired waters are waterbodies that do not meet the water quality standards for their designated uses.

The water quality standards are based on the designated uses of the waterbody. If a waterbody contains levels of pollutants that are greater than the water quality standards, it will not support one or more of its designated uses and its water quality will be considered to be impaired. Thus, when a waterbody is included on the 303(d) list, the designated use that is impaired are identified. For waterbodies that are

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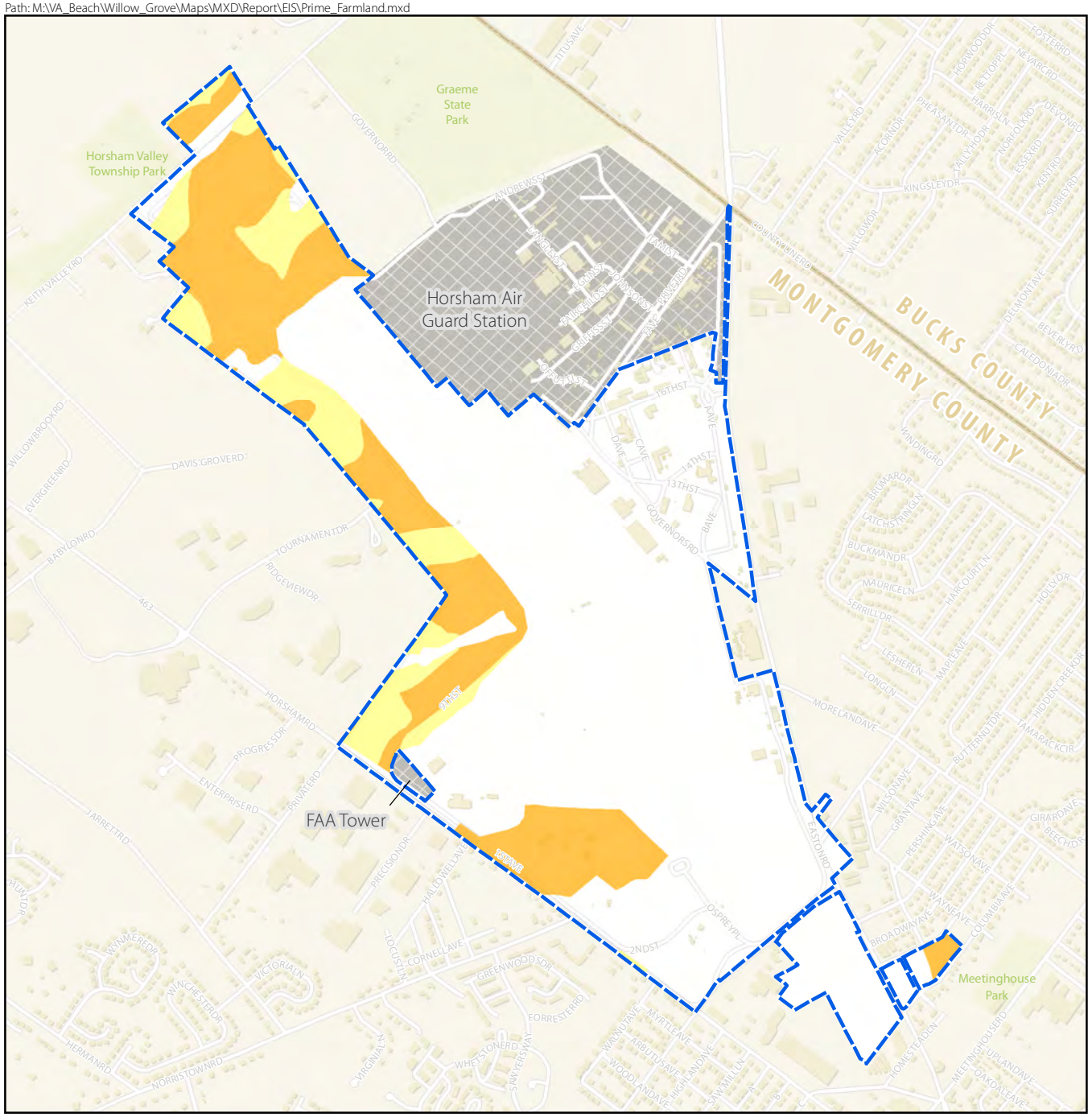

Figure 3.10-2
Prime Farmland Soils and Soils of Statewide Importance
Former NAS JRB Willow Grove
Horsham, PA

Legend

- NAS JRB Willow
- FAA Tower and Horsham Air Guard Station (not included in redevelopment)
- County Boundary
- Prime Farmland
- Farmland Soils of Statewide Importance
- Soils not designated as Prime or of Statewide Importance

SCALE

0 0.25 0.5 Miles

SOURCE: Ecology and Environment 2013; ESRI 2010; Tetra Tech 2012; USDA NRCS 2009.

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designated as impaired, Section 303(d) of the CWA requires that the state prepare a Total Maximum Daily Load (TMDL). A TMDL identifies specific pollutants and the reductions needed in those pollutant loads in order to meet established water quality standards.

In Pennsylvania, the PADEP is responsible for assessing water quality and determining whether waters meet the water quality standards. The PADEP prepares a water quality assessment report every two years that is submitted to EPA for review. This report satisfies the requirements of the CWA Sections 305(b) and 303(d). The PADEP submitted the *2012 Pennsylvania Integrated Water Quality Monitoring and Assessment Report* (PADEP 2012a), which was approved by the EPA on May 9, 2013. This report summarizes the water quality conditions in Pennsylvania from 2010 through 2011 and includes a comprehensive list of impaired waters.

In Pennsylvania, the state's water quality standards are promulgated in Title 25 PA Code, Chapter 93 - Water Quality Standards. The code designates the following four uses:

- Aquatic life
- Water supply
- Fish consumption
- Recreation

Surface waters of the state are assigned a current use and a PADEP classification (see Table 3.11-1).

Table 3.11-1 Current Surface Water Uses

Existing Use	Description
Aquatic Life	
Cold-Water Fishes (CWF)	Maintenance or propagation, or both, of fish species, including the family Salmonidae, and additional flora and fauna that are indigenous to a cold-water habitat.
Warm-Water Fishes (WWF)	Maintenance and propagation of fish species and additional flora and fauna that are indigenous to a warm-water habitat.
Migratory Fishes (MF)	Passage, maintenance, and propagation of anadromous[4] and catadromous[5] fishes and other fishes that move to or from flowing waters to complete their life cycle in other waters.
Trout Stocking (TSF)	Maintenance of stocked trout from February 15 to July 31 and maintenance and propagation of fish species and additional flora and fauna that are indigenous to a warm-water habitat.
Water Supply	
Potable Water Supply (PWS)	Used by the public as defined by the federal Safe Drinking Water Act, or by other water users that require a permit under the Pennsylvania Safe Drinking Water Act, after conventional treatment, for drinking, culinary, and other domestic purposes.
Industrial Water Supply (IWS)	Used by industry for inclusion into nonfood products, processing, and cooling.

[4] Anadromous fish migrate from the ocean to spawn in freshwater rivers or in the brackish upper reaches of an estuary.

[5] Catadromous fish are a special category of marine fish that spawn in salt water and whose young migrate long distances to freshwater to complete their development to the adult stage.

Table 3.11-1 Current Surface Water Uses

Existing Use	Description
Livestock Water Supply (LWS)	Used by livestock and poultry for drinking and cleansing.
Wildlife Water Supply (AWS)	Used for waterfowl habitat and for drinking and cleansing by wildlife.
Irrigation (IRS)	Used to supplement precipitation for crop production, maintenance of golf courses and athletic fields, and other commercial horticultural activities.
Recreation and Fish Consumption	
Boating (B)	Use of the water for power boating, sail boating, canoeing and rowing for recreational purposes when surface water flow or impoundment conditions allow.
Fishing (F)	Use of the water for the legal taking of fish for recreation or consumption.
Water Contact Sports (WC)	Use of the water for swimming and related activities.
Esthetics (E)	Use of the waters as an esthetic setting to recreational pursuits.
Special Protection	
High-Quality Waters (HQ)	None
Exceptional Value Waters (EV)	None
Other	
Navigation	Use of the water for the commercial transport and transport of people, animals, and goods.

Source: Title 25 PA Code, 93.3 - Protected Water Uses.

3.11.1 Surface Water

The former NAS JRB Willow Grove property is located within two watersheds: the Little Neshaminy Creek watershed (Hydrologic Unit Code [HUC] 020402010203) and the Pennypack Creek watershed (HUC 020402020303) (see Figure 3.11-1). Due to its position within two watersheds, the northern portion of the property drains into Park Creek, and the southern portion of the property drains into an unnamed stream that flows into Pennypack Creek (NAVFAC 2000). Five surface waters, Park Creek, an unnamed tributary of Park Creek, and three unnamed streams are located on the property. The watersheds and the surfaces waters pertinent to the former NAS JRB Willow Grove property are discussed below. For a characterization of the water quality of the watersheds and surface waters, see Section 3.11.1.3.

Little Neshaminy Creek Watershed

Approximately 78.6 percent of the former NAS JRB Willow Grove property is within the Little Neshaminy Creek watershed, a 43-square-mile sub-watershed of Neshaminy Creek located in southwestern Bucks County and southeastern Montgomery County. The Little Neshaminy Creek watershed consists of 16 linear stream miles of the main stem of Little Neshaminy and 6 linear miles of Park Creek, its principal tributary. Little Neshaminy Creek represents the largest tributary contributing to the 232-square-mile Neshaminy Creek Watershed (Heritage Conservatory 2007), which discharges into the Delaware River watershed and ultimately into the Atlantic Ocean through Delaware Bay.

Little Neshaminy Creek flows in an easterly direction through Wrightstown, Warwick, and Northampton townships to its confluence with the main stem of Neshaminy Creek. Park Creek also flows in an easterly direction from its headwaters in both Lower Gwynedd and Upper Dublin townships through Horsham Township, where it joins Little Neshaminy Creek (Heritage Conservatory 2007). Both Little Neshaminy Creek and Park Creek (as well as associated minor tributaries of these waterbodies) have been classified as WWF and MF (see Table 3.11-1; PADEP 2012a).

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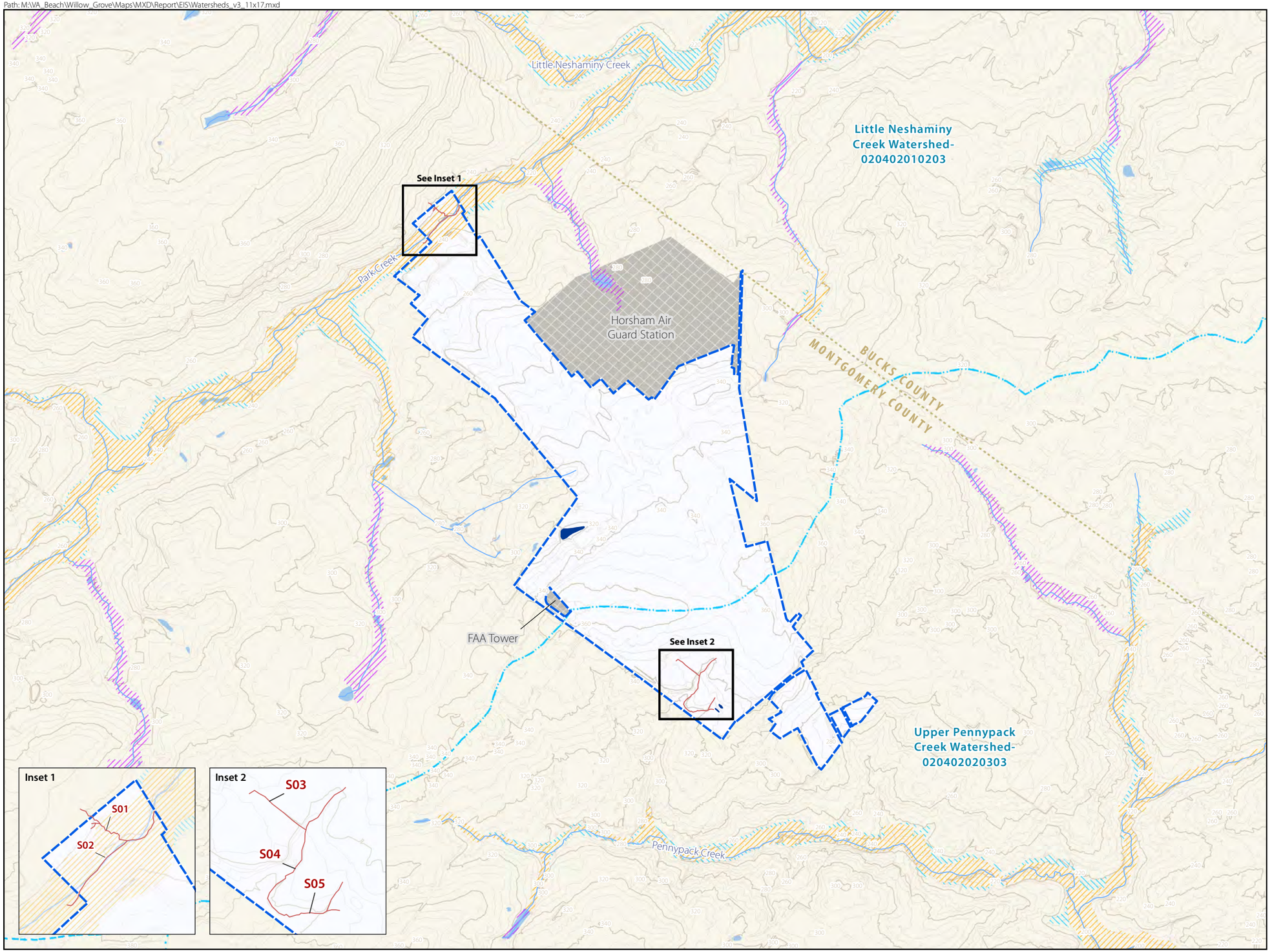

Figure 3.11-1

Water Resources

Former NAS JRB Willow Grove

Horsham, PA

Note: *Flood Zone AE= Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. In most instances, base flood elevations derived from detailed analyses are shown at selected intervals within these zones. Flood Zone A= Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones.*

Legend

- County Boundary
- Field-Delineated Stream
- NHD Stream
- Contour (20 ft)
- Contour (5 ft)
- NAS JRB Willow Grove
- FAA Tower and Horsham Air Guard Station (not included in redevelopment)
- Waterbody
- Pond
- HUC 12 Watershed

FEMA Flood Zone

- AE
- A
- 0.2 % Annual Chance Flood Hazard

SCALE

0 0.25 0.5 Miles

SOURCE: Ecology and Environment 2013; Delaware Valley Regional Planning Commission 2006; ESRI 2010; FEMA 2009; USFWS 2010; USGS 2011; Tetra Tech 2012.

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Pennypack Creek Watershed

The Pennypack Creek watershed is a 56-square-mile drainage area, which is largely located within southeast Montgomery County, with small portions also located in Bucks County and Philadelphia County. The principal watercourse of the watershed is Pennypack Creek, which originates in Horsham and Warminster townships and flows roughly 25 miles southeasterly to its confluence with the Delaware River, in the City of Philadelphia. Numerous tributaries and drainages flow into Pennypack Creek, and the watershed has a combined stream length estimated to be 124.3 miles (PWD 2009). The watershed includes highly developed suburban communities and multiple neighborhoods within the City of Philadelphia (Temple University 2006). Approximately 21.4 percent of the former NAS JRB Willow Grove property is located within the Pennypack Creek watershed.

Pennypack Creek is classified as having TSF and WWF existing uses, which reflect intermediate quality streams that support stocked trout as a recreational fishery, as well as support other life indigenous to warm-water habitats.

3.11.1.1 Field-Delineated Streams

As discussed below in Section 3.11.5.1, streams on the property were delineated during field surveys conducted in April and May 2013. Field surveys conducted as part of the wetland delineation included the collection of information on seeps, streams, and ponds/lakes. A total of five streams were delineated during the field survey: three perennial streams, one intermittent stream, and one ditch/canal (see Table 3.11-2 and Figure 3.11-1). These features have a combined length on the property of approximately 4,421 feet. Additional information on streams on the former NAS JRB Willow Grove property is provided in the *NAS JRB Willow Grove Wetland Delineation Report*, which is included as Appendix F.

Table 3.11-2 Field-Delineated Streams

Stream	Flow Type	Description	Length (feet)
S01	Intermittent	S01 is an unnamed tributary of Park Creek that flows between the two separate sections of a wetland before draining into Park Creek, north of Keith Valley Road. The stream is branched to the west and these branched channels are ephemeral. The main channel originates outside of the installation. The channel shows evidence of erosion, and the width (bank to bank) is 12 feet. The riparian corridor of the stream is primarily forested.	573
S02 Park Creek	Perennial	Park Creek flows in a northeasterly direction, parallel to Keith Valley Road. In some areas, bank width can reach 55 feet, with a bank height of 9 feet. Several other features in the area drain into Park Creek, including S01, several wetlands, and other drainages. Construction of Keith Valley Road has removed most of the riparian corridor along the southern bank; the riparian corridor along the northern bank is forested and has a width of 150 to 300 feet. Evidence of erosion was documented.	1,022

Table 3.11-2 Field-Delineated Streams

Stream	Flow Type	Description	Length (feet)
S03	Ditch/Canal	S03 is an artificially channelized natural drainage located to the west of a wetland area, southwest of the former airfield. A subsurface connection likely exists between the wetland and S03. S03 flows southeast and drains into S04. The width of the channel is approximately 12 feet (bank to bank), and the channel shows evidence of erosion. No riparian buffer exists along this waterbody.	607
S04	Perennial	S04 is an unnamed stream that drains a wetland, located in the southwestern portion of the installation. The bank width is 11 feet, and the stream shows evidence of erosion. The stream is conveyed under a paved path via a culvert near its origin. S04 drains from the installation via a culvert, along Horsham Road. A forested riparian buffer is present and is approximately 25 feet wide.	1,438
S05	Perennial	S05 is an unnamed stream that drains a wetland complex containing two open-water ponds. This stream has a bank width of 4 feet and shows evidence of erosion. A large portion of the riparian area is comprised of the surrounding wetland. As with S04, this stream drains from the installation via the culvert along Horsham Road.	781
Total			**4,421**

Source: E & E 2013.

In addition to the streams described in Table 3.11-2, multiple drainage features – man-made structures such as ditches and culverts – were delineated, as were four seeps. However, only man-made features connected to a wetland or stream with a significant enough function worth noting were mapped. Additional man-made features such as roadside ditches were not mapped.

3.11.2 Water Quality

This section discusses the water quality of the watersheds and surface waters located at or in the vicinity of the former NAS JRB Willow Grove installation.

Little Neshaminy Creek Watershed

According to the *2012 Pennsylvania Integrated Water Quality Monitoring and Assessment Report* (PADEP 2012a), both Little Neshaminy Creek and Park Creek are listed as impaired waters. Little Neshaminy Creek does not meet its designated uses for aquatic life, fish consumption, and recreation due to excessive nutrients and low dissolved oxygen, PCBs, and pathogens, respectively. Park Creek does not meet its designated uses for aquatic life, fish consumption, and recreation due to excessive nutrients, PCBs, and pathogens, respectively (PADEP 2012a). Several unnamed tributaries of Park Creek are also listed as impaired for similar designated uses and causes as Park Creek. The *TMDL Assessment for the Neshaminy Creek Watershed* (PADEP 2003), which focuses on sediment, identifies all impaired segments within that watershed. The report also includes a TMDL development plan for the Little Neshaminy Creek Watershed. According to the *2012 Pennsylvania Integrated Water Quality Monitoring and Assessment Report*, additional TMDLs for Little Neshaminy Creek are projected for completion in 2015 for PCBs and 2023 for pathogens (PADEP 2012a). Similarly, TMDLs for Park Creek for PCBs are anticipated to be completed in 2015 and pathogens in 2023. An additional TMDL for Park Creek for nutrients is anticipated in 2015 (PADEP 2012a).

The headwaters of the Little Neshaminy Creek watershed are the most highly developed areas within the upper sub-basin of the Neshaminy Creek watershed, and conservations efforts have been implemented to improve and protect the surface waters of this basin, as identified in the Little Neshaminy Creek River Conservation Plan (Heritage Conservatory 2007). The main goals of the Little Neshaminy Creek River Conservation Plan include the following:

- Protect and improve the surface and groundwater quality to improve recreational opportunities, wildlife habitat, and sources of drinking water.
- Improve the way stormwater is managed in the watershed to reduce flooding, protect stream base flow, and maintain the hydrologic balance.
- Mitigate impacts from floods.
- Protect cultural resources identified in the watershed.
- Protect the natural resources of the watershed.
- Maintain and enhance recreational opportunities, and the parks and open space resources of the watershed.
- Increase participation in education and conservation activities.
- Encourage sustainable economic development practices.
- Improve watershed-wide plan coordination and integration.
- Improve Little Neshaminy Creek River Conservation Plan implementation resources.

Development within the watershed is subject to the requirements of the Neshaminy Creek Watershed Stormwater Management Plan (Bucks County 2010), which includes the Little Neshaminy Creek watershed. Additional discussion on stormwater management, including compliance with this plan, is provided in Section 3.8.3.1.

Pennypack Creek Watershed

Pennypack Creek is listed as impaired for aquatic life from urban runoff and storm sewers. Siltation from urban runoff and other, unknown causes contributes to the impairment. A TMDL development date of 2017 has been set for this waterbody and several of its unnamed tributaries (PADEP 2012a). Approximately 82 percent of the Pennypack Creek watershed has been identified as impaired for designated uses and has been listed on the Pennsylvania 303(d) list of impaired waters (Temple University 2006). Two TMDLs have been established to date for the Pennypack Creek watershed—the 1999 TMDL, which focused on major contaminants and contributors to Pennypack Creek, including trichloroethylene (TCE), dissolved oxygen, and fecal coliform bacteria, and a 2008 nutrient and sediment TMDL for Southampton Creek, a tributary of Pennypack Creek (PWD 2009).

Due to the impairment in the Pennypack Creek watershed from siltation, stormwater runoff management and non-point source pollution control requirements have been developed under the Pennypack Creek Watershed Act 167 Plan to comply with Act 167 (Temple University 2012). The plan presents criteria and standards for new development and redevelopment within the watershed through the implementation of stormwater management improvements. Stormwater is discussed further in Section 3.8.3.

The headwaters of Pennypack Creek are located approximately 0.25 miles south of the former NAS JRB Willow Grove property. Drainage from several existing stormwater collection features currently discharge to Pennypack Creek (NAVFAC 2000).

3.11.3 Groundwater

Groundwater is water present beneath the surface in soil pore spaces and in the fractures of rock formations; it can be collected using wells, tunnels, or drainage galleries, or it may flow naturally to the ground surface via seeps or springs. An aquifer is an underground layer of water-bearing permeable rock or unconsolidated materials (e.g., gravel, sand, silt, or clay) that can yield a usable quantity of water.

The regional aquifer supplying groundwater, the Stockton Aquifer, has been characterized as having a complex, heterogeneous aquifer with areas or zones of high permeability. The rocks of the Stockton formation form a complex, heterogeneous aquifer that contains a series of gently dipping lithologic units with different hydraulic properties. A regional groundwater divide is located near the southeastern portion of the former installation property. From this divide, groundwater flows both northeastward, toward Park Creek, and southeastward, toward Pennypack Creek (Sloto 2002). The water table aquifer extends from near surface to a depth of 75 to 100 feet below ground surface (bgs) and discharges to nearby streams and open waters (Sloto 2002). The average water table level measured at a monitoring well in the Horsham Township is approximately 10 to 11 feet bgs (Montgomery County Health Department 2013).

Underlying the water table aquifer is the confined artesian aquifer, the principal drinking water source for Horsham Township. The water table aquifer is the source of recharge to the artesian aquifer (Sloto 2002). Groundwater levels have been known to fluctuate with seasonal variations in recharge and are also affected by pumping of nearby wells. Groundwater is used as the main water supply for the Horsham Township and the former NAS JRB Willow Grove property. A description of the water supply for both the township and the former installation property is provided in Section 3.8.1.2.

Drinking water obtained from groundwater is regulated through several federal and state statutes. The Safe Drinking Water Act was originally passed in 1974 to protect public health by regulating the nation's public drinking water supply. The law, as amended in 1986 and 1996, includes numerous requirements to protect drinking water and its sources. A sole-source aquifer, as defined under Section 1424(e) of the Safe Drinking Water Act, is an aquifer that has been designated as the sole or principal drinking water source for the area, and that, if contaminated, would create a significant hazard to public health. No sole-source aquifers exist in Montgomery County, Pennsylvania (EPA 2007). At the state level, drinking water is regulated through Title 25 of the PA Code, Chapter 109 - Safe Drinking water, which includes drinking water quality standards.

The groundwater supply in the vicinity of the former installation property is part of the Ground Water Protection Area (GWPA) of Southeastern Pennsylvania and is monitored and regulated by the DRBC under Resolution No. 1980-80 and Title 25 of the PA Code, Part V - Delaware River Commission, which limits withdrawals of groundwater in the Delaware River basin through the use of a withdrawal application process. The GWPA has been implemented to help increase recharge into the aquifer; historically, it has been observed that lowered water tables within the GWPA have actually resulted in reduced flows in some streams and caused others to dry up (DRBC 1999). The GWPA of Southeastern Pennsylvania encompasses 1,200 square miles and includes 127 municipalities, including all of Montgomery County and portions of western Bucks County (DRBC 1999). Through informal discussions between the HWSA and DRBC, the latter has indicated that the basin is already at or near capacity for its withdrawal limit and therefore the installation of additional public supply wells would likely not be permitted (O'Rourke 2013).

The quality of groundwater in the vicinity of the former installation property was evaluated by the USGS. The results of the investigation concluded that the groundwater beneath the property contains volatile organic compounds (VOCs), specifically chlorinated solvents, and is not suitable for public or private

drinking water use without treatment (Tetra Tech 2012a). Currently, VOC-contaminated groundwater plumes have been identified at the former Privet Road Compound and Fire Training Area. The groundwater contamination is believed to have resulted from both on-site and off-site activities. Institutional and land use controls have been implemented at these sites that preclude unrestricted use of the site and site groundwater (Tetra Tech 2012a, 2012b). The current status of both of these sites is discussed in detail in Section 3.5, Environmental Management.

3.11.4 Floodplains

A floodplain is flat, or nearly flat, land adjacent to a stream or river that experiences occasional or periodic flooding. Executive order (EO) 11988 (Floodplain Management) and the regulations of the National Flood Insurance Program administered by the Federal Emergency Management Agency (FEMA) (44 CFR, Part 60, Criteria for Land Management and Use) establish avoidance of development in floodplains as federal policy. FEMA defines the regulatory 100-year floodplain as the area covered by a flood that has a 1 percent chance of occurring in any given year (often referred to as the "100-year flood event"). Development in the regulatory floodplain is discouraged because floodplains provide a natural means of detaining floodwaters, thereby protecting downstream properties from damage.

Under the authority of EO 11988, Floodplain Management, federal agencies are required to avoid, to the extent practicable, the long- and short-term impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development where there is a practicable alternative. Federal agencies are also required to reduce the risk of flood loss; minimize the impacts of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values provided by the floodplain.

Areas within 100-year floodplains have been mapped by FEMA (FEMA 2009). Most of the former NAS JRB Willow Grove property is located outside the 100-year floodplain for both Park Creek and Pennypack Creek (see Figure 3.11-1). However, a very small portion of the former installation property along the northern portion of Keith Valley Road is located within a 100-year floodplain associated with Park Creek. The area of delineated 100-year floodplain within the property boundary is approximately 17 acres.

3.11.5 Wetlands

Wetlands are defined as "those areas that are inundated or saturated by groundwater at a frequency and duration sufficient to support, and that under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas" (33 CFR 328.3[b]). This section provides a review of regulatory statutes governing wetlands at both the federal and state levels, as well as results of a wetland field assessment conducted in support of the EIS (E & E 2013).

3.11.5.1 Federally/State-Regulated Wetland Permit Statutes

Section 404 of the CWA established a program to regulate the discharge of dredged or fill material into waters of the United States, including wetlands. Activities such as infrastructure development are regulated under this program, and a permit is required before any dredged or fill material can be discharged into wetlands or waters of the U.S. EO 11990 requires that new construction in wetlands be avoided to the extent practicable and that all practicable measures be taken to minimize or mitigate impacts on wetlands.

The EPA and the USACE use the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) and regional supplements, where appropriate, to identify wetlands for the CWA Section

404 permit program. The USACE administers and enforces Section 404 provisions and conducts or verifies jurisdictional determinations of waters of the U.S. boundaries.

EO 11990, Protection of Wetlands, was issued to help avoid potential long- and short-term adverse impacts associated with the destruction and modification of wetlands and to avoid direct or indirect support of development in wetlands wherever there is a practicable alternative. EO 11990 requires that federal agencies establish and implement procedures to minimize development in wetlands.

The Dam Safety and Encroachments Act provides the primary framework for the state's wetlands protection and regulation, with the program's rules and regulations detailed in Title 25, PA Code, Chapter 105. The act contains both permitting criteria and mitigation requirements to be followed for any project impacting a regulated body of water. The act also establishes a joint permit application for the fill or modification of state- and federally regulated (CWA Section 404) wetlands and other waters of the U.S. The PADEP is the lead agency for reviewing and issuing the joint permit. In the Commonwealth of Pennsylvania, Water Quality Certifications (CWA Section 401) have been integrated with the joint permit application (PADEP 2013c). Under the authority of the Dam Safety and Encroachment Act, the PADEP can issue a permit for the fill or modification of jurisdictional wetlands and other waters of the U.S. under the Pennsylvania State Programmatic General Permit 4 (PASPGP-4). However, under this program permanent wetland impacts cannot exceed a total of 1 acre (PADEP 2012c).

Projects that do not qualify for a state general permit can alternatively be permitted through the USACE via either a nationwide or individual permit. Nationwide permits can be used for appropriate activities; however, most are limited to a total of 0.5 acres of permanent wetland impacts. If project development would permanently impact more than 0.5 acres of wetlands, a Section 404 individual permit can be requested. The USACE Philadelphia Regulatory District is the lead agency for review of nationwide and individual permit requests. Both nationwide and individual permits require Water Quality Certification (CWA Section 401) for authorization, although some nationwide permits may be pre-approved by the state (USACE 2012a).

3.11.5.2 Wetland Assessment

A wetland assessment was conducted at the former NAS JRB Willow Grove property to identify waters of the U.S. according to USACE standards as referenced in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region Version 2.0* (USACE 2012b). The purpose of the assessment was to delineate and characterize all potential "waters of the U.S." (33 U.S.C. 1344, Section 328.3), including wetlands, streams, and ponds, subject to permitting requirements under Section 404 of the CWA (33 U.S.C. 1251 et seq.) and the Commonwealth's Dam Safety and Encroachment Act (PA Code Title 25, Chapter 105). The wetland assessment involved a desktop analysis of baseline wetland information and an on-site survey. The USACE did not make a jurisdictional determination confirming the wetland boundaries, as they are being used for planning-level analysis specific to this study. The complete *NAS JRB Willow Grove Wetland Delineation Report* (E & E 2013) is presented as Appendix F.

Desktop Analysis

A desktop analysis was conducted to characterize conditions at the former installation property prior to conducting the field assessment. Resources reviewed included U.S. Geological Survey (USGS) topographic maps, USGS National Land Cover Database (NLCD), the USGS National Hydrography Dataset, USFWS National Wetland Inventory (NWI) maps, current aerial imagery, USDA Soil Survey Geographic Database (SSURGO) soil map unit data, and NRCS WETS table data.

In addition to the public databases queried during the desktop analysis, the former installation's *Integrated Natural Resources Management Plan* (INRMP) (NAVFAC 2000) was reviewed for descriptions of previously noted water resources. The INRMP indicates that 14.3 acres of wetlands occur on the former installation property; this total was based on delineations conducted in 1998 (NAVFAC 2000). Water resources noted included streams, ponds, and forested scrub/shrub and emergent wetlands (NAVFAC 2000).

On-Site Survey

Based on the results of the desktop analysis, specific areas of the former installation property were targeted for field verification and delineation from April 1 through April 6, April 30 through May 3, and May 12, 2013. The survey area for the delineation was based on the former installation boundary available at the time, and encompassed approximately 860 acres. The delineation did not include areas of the former installation that have been, or will be, transferred to other federal agencies, such as the FAA (tower) and the U.S. Air Force (Horsham Air Guard Station). The on-site surveys were conducted by E & E biologists to confirm the presence/absence of hydrologic features noted during the desktop review, and if present, delineate their boundaries, and to map any features not identified during the desktop review. Soil test pits were referenced to *Field Indicators of Hydric Soils in the United States, Version 7.0* (NRCS 2010) and *Munsell® Soil Color Charts* (Gretag/Macbeth 2000). Water resources were categorized according to the Cowardin System (Cowardin et al. 1979) and the *Terrestrial and Palustrine Plant Communities of Pennsylvania* (Fike 1999). Nomenclature of vascular plant species and wetland indicator status follows the *PLANTS database* (NRCS 2013b).

A total of 23 wetlands, totaling 25.96 acres, were identified during the field surveys (see Figures 3.11-2 and 3.11-3). All wetlands delineated on the former installation property are palustrine systems, defined as shallow ponds and wet areas, including all non-tidal wetlands, dominated by trees, shrubs, persistent emergent, emergent mosses, or lichens (Cowardin et al. 1979). Four palustrine wetland subclass types occur on the property: Palustrine Forested (PFO), Palustrine Emergent (PEM), Palustrine Scrub-Shrub (PSS), and Open Water (OW) (Table 3.11-3). These wetland types are described below. Finer differences in life form are recognized at the subclass level. For example, the only Forested Wetland subclass (and its classification code) occurring on the former installation property is "1 – Broad-Leaved Deciduous," the only Scrub-Shrub Wetland subclass is "1 – Broad-Leaved Deciduous," and the only Emergent Wetland subclass was "1 – Persistent."

Table 3.11-3 Summary of Wetlands Delineated at NAS JRB Willow Grove

Class	Size (acres)
PEM1	1.49
PEM1/PSS1/PFO1	0.79
PFO1	2.33
PFO1/PEM1	0.69
PSS1	1.51
PSS1/PEM1	0.71
PSS1/PEM1/OW	3.28
PSS1/PFO1	7.73
PSS1/PFO1/OW	0.15
PSS1/PFO1/PEM1	7.30
Total	**25.96**[1]

Source: E & E 2013.

Note:
[1] Total may be different than sum of numbers due to rounding.

Palustrine Forested Wetlands. Six wetland areas encompassing approximately 2.33 acres of the property were classified as PFO1 wetlands (Figure 3.11-2). An additional 13 areas encompassing approximately 19 acres contain PFO wetlands within larger mixed wetland complexes (Table 3.11-3). PFO wetlands on the property are dominated by silver maple (*Acer saccharinum*), red maple (*Acer rubrum*), slippery elm (*Ulmus rubra*), and green ash (*Fraxinus pennsylvanica*).

Palustrine Emergent Wetlands. Six wetland areas encompassing approximately 1.49 acres of the property were classified as PEM1 wetlands (Figure 3.11-2). An additional nine areas encompassing approximately 13 acres contain PEM wetlands within larger mixed wetland complexes (Table 3.11-3). PEM wetlands on the property are dominated by lamp rush (*Juncus effusus*), fig buttercup (*Ficaria verna*), uptight sedge (*Carex stricta*), sensitive fern (*Onoclea sensibilis*), common reed (*Phragmites australis*), and broadleaf cattail (*Typha latifolia*).

Palustrine Scrub-Shrub Wetlands. Five wetland areas encompassing approximately 1.51 acres of the property were classified as PSS1 wetlands (Figure 3.11-2). An additional 13 areas encompassing approximately 20 acres contain PSS wetlands within larger mixed wetland complexes (Table 3.11-3). PSS wetlands on the property are dominated by southern arrow-wood (*Viburnum dentatum*), red maple, crack willow (*Salix fragilis*), red osier (*Cornus alba*), and pin oak (*Quercus palustris*).

Palustrine Open Water Wetlands. OW areas on the property are contained within two wetland complexes. The first is within a PSS1/PEM1/PFO1 complex in the western/central portion of the property between Privet Road and 9th Street (see Figure 3.11-2). The OW component of this wetland is a pond that is dammed by a road on its western side. The second OW area, comprised of two ponds, is part of a 3.30-acre PSS1/PFO1 wetland complex in the southeastern portion of the property, between 1st Street and Maple Avenue.

3.12 Vegetation and Wildlife

3.12.1 Vegetation

The USGS NLCD was used to quantify the coverage of vegetative communities across the entire property (Fry et al. 2011). However, because the USGS NLCD was generated using satellite imagery, its accuracy is somewhat limited. Therefore, where appropriate, site-specific survey data were used to quantify certain community types (e.g., wetlands). The NAS JRB Willow Grove INRMP, the EA for the INRMP (NAVFAC 2000; Commander Naval Reserve Force 2001), and results from the wetland delineation (Appendix F) were used to identify the occurrence of plant species at the former installation.

Approximately 85 percent of the former installation consists of developed land, including landscaped areas and maintained grass (see Table 3.12-1). Landscaped areas primarily occur around the buildings on the eastern side of the property, while mowed areas occur around the buildings and the runway. Landscaped areas contain tree species, including eastern white pine (*Pinus strobus*), Norway spruce (*Picea abies*), pin oak (*Quercus palustris*), silver maple (*Acer saccharinum*), red maple (*Acer rubrum*), Norway maple (*Acer platanoides*), American sycamore (*Platanus occidentalis*), quaking aspen (*Populus tremuloides*), white ash (*Fraxinus americana*), Austrian pine (*Pinus nigra*), and black locust (*Robinia pseudoacacia*). Mowed areas have been planted with Kentucky bluegrass (*Poa pratensis*), tall fescue (*Festuca arundinacea*), orchard grass (*Dactylis glomerata*), timothy grass (*Phleum pratense*), and rough bluestem (*Poa trivialis*) (Commander Naval Reserve Force 2001).

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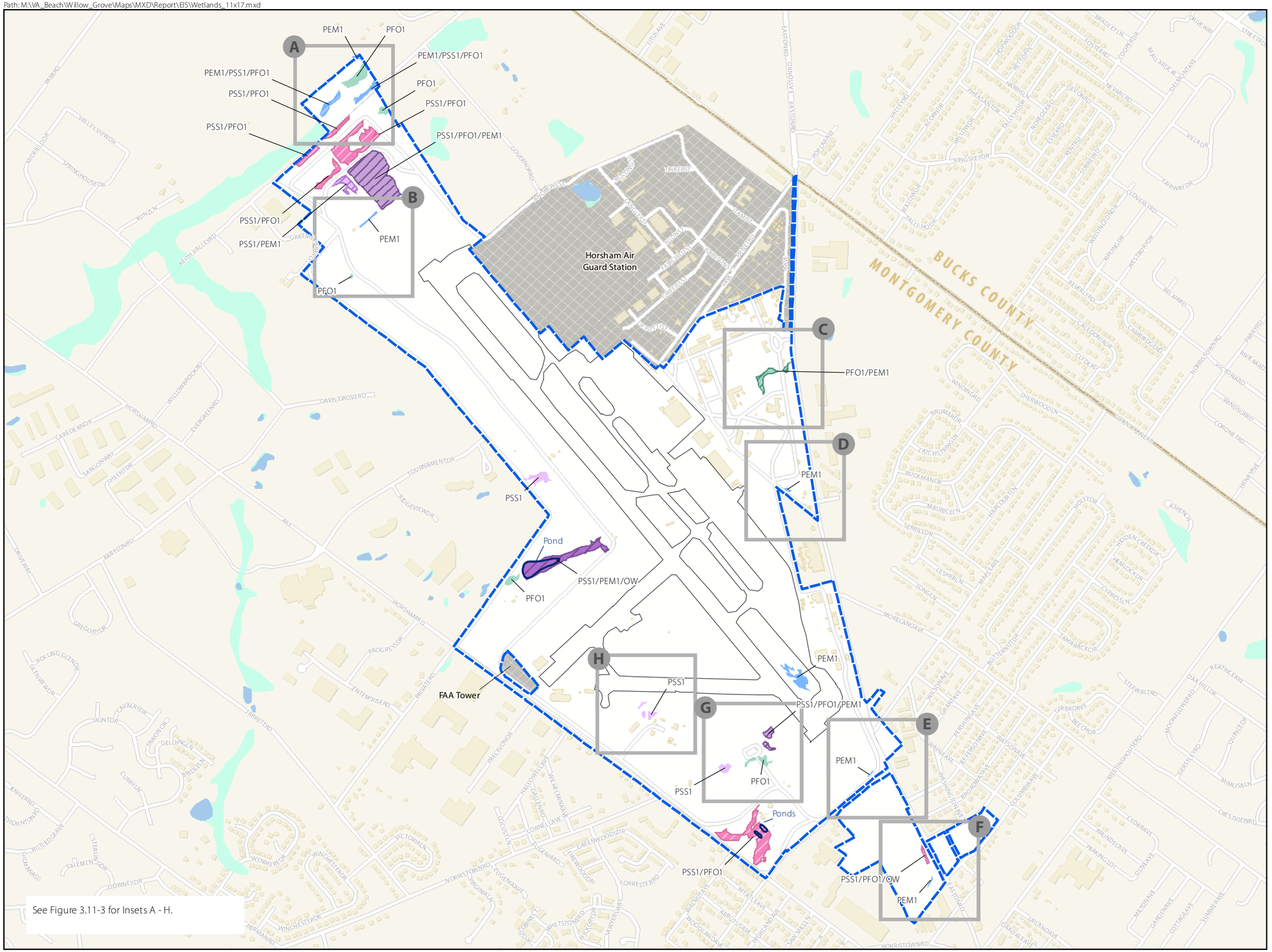

Figure 3.11-2
Field-Delineated Wetlands
NAS JRB Willow Grove
Horsham, PA

Legend

- NAS JRB Willow Grove
- FAA Tower and Horsham Air Guard Station (not included in redevelopment)
- Runways, Taxiways, Parking Aprons
- County Boundary
- Waterbody
- Pond
- NWI Wetland

Field-Delineated Wetland

- PEM1
- PEM1/PSS1/PFO1
- PFO1
- PFO1/PEM1
- PSS1
- PSS1/PEM1
- PSS1/PFO1/PEM1
- PSS1/PEM1/OW
- PSS1/PFO1
- PSS1/PFO1/OW

* A jurisdictional determination by the U.S. Army Corps of Engineers (USACE) was not obtained for these delineated wetlands.

Key:

PFO = Palustrine Forested
PEM = Palustrine Emergent
PSS = Palustrine Scrub-Shrub
OW = Open Water

N

SCALE

0 0.25 0.5 Miles

SOURCE: Ecology and Environment 2013; ESRI 2010; Tetra Tech 2012; USDA NRCS 2009.

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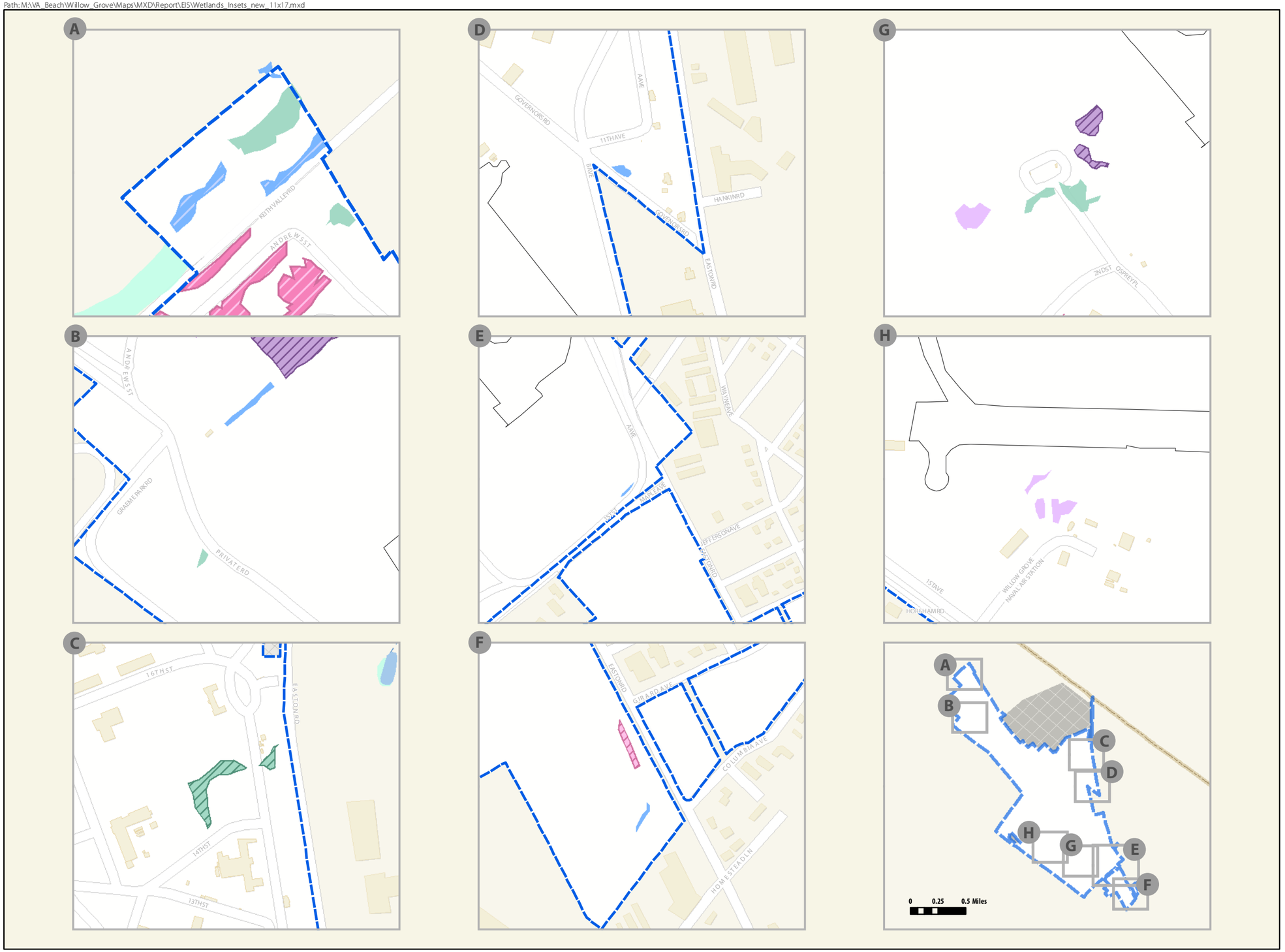

Figure 3.11-3

Field-Delineated Wetlands (Insets)

Former NAS JRB Willow Grove

Horsham, PA

Legend

- NAS JRB Willow Grove
- FAA Tower and Horsham Air Guard Station (not included in redevelopment)
- Runways, Taxiways, Parking Aprons
- County Boundary
- Waterbody
- NWI Wetland

Field-Delineated Wetland

- PEM1
- PEM1/PSS1/PFO1
- PFO1
- PFO1/PEM1
- PSS1
- PSS1/PEM1
- PSS1/PFO1/PEM1
- PSS1/PEM1/OW
- PSS1/PFO1
- PSS1/PFO1/OW

* A jurisdictional determination by the U.S. Army Corps of Engineers (USACE) was not obtained for these delineated wetlands.

Key:

PFO = Palustrine Forested
PEM = Palustrine Emergent
PSS = Palustrine Scrub-Shrub
OW = Open Water

N

SCALE

0 1000 Feet

SOURCE: Ecology and Environment 2013; ESRI 2010; Tetra Tech 2012; USDA NRCS 2009.

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Table 3.12-1 Vegetative Cover Types Occurring at NAS JRB Willow Grove[1]

Cover Type	Acres[2]	% of Property
Barren Land	1.3	0.2
Cultivated Crop	1.5	0.2
Deciduous Forest	89.3	10.4
Developed, High Intensity	78.6	9.1
Developed, Low Intensity	85.1	9.9
Developed, Medium Intensity	194.7	22.6
Developed, Open Space	377.0	43.8
Emergent Herbaceous Wetlands	5.7	0.7
Grassland/Herbaceous	4.4	0.5
Mixed Forest	0.2	<0.1
Pasture/Hay	14.2	1.7
Shrub/Scrub	6.5	0.8
Woody Wetlands	2.1	0.2
Total	**861**	**100**

Source: Fry et al. 2011.

Notes:
1 Totals may not sum exactly due to rounding.
2 Acreage based on USGS NLCD. Section 3.11.4.1 provides wetland acreages based on site-specific field delineations.

More natural vegetative cover occurs primarily along the northern, western, and southern portions of the former installation. These areas contain shrub/scrub and forested uplands, and wetlands. Dense shrubby areas occur around the basins off the north end of the runway. The area contains green ash (*Fraxinus pennsylvanica*), white ash (*Fraxinus americana*), black willow (*Salix nigra*), crack willow (*Salix fragilis*), autumn olive (*Elaeagnus umbellate*), red maple, multiflora rose (*Rosa multiflora*), and silky dogwood (*Cornus amomum*). Early successional forests and shrubland areas occur in the western and southern portions of the installation. Common species in the upland forested areas include red maple, eastern red cedar (*Juniperus virginiana*), big-tooth aspen (*Populus grandidentata*), crack willow, autumn olive, and dogwood (*Cornus* spp.). Common species in the upland shrub areas and understories of the forested areas include Japanese honeysuckle (*Lonicera japonica*), multiflora rose, garlic mustard (*Alliaria petiolata*), raspberry (*Rubus* spp.), bayberry, and skullcap (*Scutellaria integrifolia*) (Commander Naval Reserve Force 2001). Descriptions of the wetland vegetation are included in Section 3.11.4, Wetlands.

Vegetation of Conservation Concern

There are no known populations of rare, threatened, or endangered vascular plant species on the former installation (PNHP 2013). During a thorough on-site investigation of NAS JRB Willow Grove in 1991, a single species of concern – a population of field paspalum (*Paspalum laeve* var. *pilosum*) was documented. At the time of the survey this grass species was listed by the Commonwealth of Pennsylvania as "rare". This plant has subsequently been removed from the state list of rare plants (NAVFAC 2000).

Noxious Weeds

The Commonwealth of Pennsylvania's Noxious Weed Control Law (3 P.S. §§ 255.1-255.11) defines a noxious weed as "a plant that is determined to be injurious to public health, crops, livestock, agricultural land, or other property". Chapter 110, adopted under the Noxious Weed Control Law, provides a list of noxious weed species that must be controlled within the Commonwealth. Under the Noxious Weed Control Law, the Secretary of Agriculture can designate a weed control area, requiring landowners within

that area to implement control measures. Additionally, a control order can be issued against an individual landowner, requiring the landowner to implement control measures for noxious weeds if they are found growing on their property (Pennsylvania General Assembly 1982).

The 1991 vascular plant species inventory recorded the presence of two species listed on the Pennsylvania noxious weed control list: purple loosestrife (*Lythrum salicaria*) and multiflora rose (*Rosa multiflora*) (Pennsylvania Department of Agriculture n.d.). Multiflora rose was also documented in multiple locations on the former installation during wetland assessments conducted in spring 2013. Purple loosestrife poses an ecological threat to a variety of wetland communities, such as wet meadows, river and stream banks, lake shores, non-tidal marshes, and ditches. Although purple loosestrife was not specifically identified at any of the sample sites during the 2013 wetland assessment field work, the sample sites only represent a portion of the given wetlands and it may be present elsewhere. This species can quickly form dense stands that completely dominate the area and exclude native vegetation (PA DCNR n.d.[a]). Multiflora rose is a dense, thorny shrub that forms impenetrable thickets that exclude native plant species. It has a wide tolerance for various soil, moisture, and light conditions and can be found in dense woods, along streams and roadsides, and in open field and prairies (PA DCNR n.d.[b]).

3.12.2 Wildlife

3.12.2.1 Birds

Migratory birds are any species or family of birds that live, reproduce or migrate within or across international borders at some point during their annual life cycle. The Migratory Bird Treaty Act (MBTA) was enacted in the United States in 1918 in order to establish federal protection for migratory birds (16 U.S.C. 703-712). The MBTA prohibits the taking, killing, or possessing of migratory birds unless authorized to do so under appropriate permits. Bird species protected under the MBTA are listed in 50 CFR 10.13. Several avian species common to urban environments such as those surrounding the former NAS JRB Willow Grove property are not covered under the MBTA, including the European starling (*Sturnus vulgaris*), house sparrow (*Passer domesticus*), and rock pigeon (*Columba livia*), none of which are native to the United States.

Site-specific information regarding the occurrence of birds at the former NAS JRB Willow Grove property is limited to incidental sightings. More general publicly available data sources, including the Pennsylvania Breeding Birds Atlas (PBBA), USGS Breeding Bird Survey (BBS), and the National Audubon Society Christmas Bird Count (CBC) were used to identify bird species that potentially occur at or in the vicinity of the installation. Three hundred and three bird species have been documented in Montgomery County, Pennsylvania (Pennsylvania Society for Ornithology n.d.). However, given the developed nature of the former installation and surrounding area, it is likely that much fewer bird species occur on the property. Due to the geographic location of the property, birds that are year-round residents, as well as birds that are seasonal residents, are likely to occur. Seasonally resident birds include those that migrate south for the winter (e.g., warblers, flycatchers, and thrushes) but occur within the region during spring and fall migration and the summer breeding season, and species from more northerly climates (e.g., sparrows) that travel south to winter in the region.

Two breeding bird atlases have been compiled for Pennsylvania: the first PBBA was compiled from 1984 through 1989, and the second was compiled from 2004 through 2008 (Schulman 2013). The PBBAs document the results of extensive surveys conducted to determine the distribution of breeding bird species in Pennsylvania. Volunteer birders recorded evidence of breeding bird species throughout the state within 4,937 delineated blocks, each measuring approximately 3.3 miles north to south and 2.9 miles east to west. The data provide evidence of breeding species composition and, in general, the quality of breeding habitat; the data do not, however, provide abundance measures of breeding birds. Cross referencing data between the two atlases allows for a comparison to see whether the distribution of breeding birds has

changed. Two PBBA blocks overlap the former installation property: Ambler 2 (82C22) and Ambler 4 (82C24) encompass the northern and southern portions of the property, respectively (Cornell Lab of Ornithology 2009a, b). In both atlases, a total of 78 species were documented as potentially occurring in these two blocks (see Table 3.12-2), and these species could occur in appropriate habitat on the former installation property. Species identified in the PBBA blocks included year-round residents (e.g., mourning dove [*Zenaida macroura*], downy woodpecker [*Picoides pubescens*], American crow [*Corvus brachyrhynchos*], black-capped chickadee [*Poecile atricapillus*], northern mockingbird [*Mimus polyglottos*]) and migratory species (e.g., yellow-billed cuckoo [*Coccyzus americanus*], chimney swift [*Chaetura pelagica*], eastern wood-pewee [*Contopus virens*], red-eyed vireo [*Vireo olivaceus*], blue-gray gnatcatcher [*Polioptila caerulea*], wood thrush [*Hylocichla mustelina*], ovenbird [*Seiurus aurocapilla*]) (Cornell Lab of Ornithology 2009c, d, e, f). Species such as the red-shouldered hawk (*Buteo lineatus*), red-eyed vireo, veery (*Catharus fuscescens*), wood thrush, ovenbird, and scarlet tanager (*Piranga olivacea*) require relatively large, unfragmented forest blocks and are, therefore, unlikely to occur on the former installation property due to the heavily fragmented nature of the forested areas on the property. The osprey (*Pandion haliaetus*), a Pennsylvania threatened species, was also documented in the PBBA (Cornell Lab of Ornithology 2009d; Pennsylvania Natural Heritage Program [PNHP] n.d.[a]). However, this species was recorded as "observed" and was not believed to be breeding in the area. The property does not have suitable habitat to support the osprey. Refer to Section 3.12.3 for additional information on threatened and endangered species.

Table 3.12-2 Bird Species Documented during the First and Second Pennsylvania Breeding Bird Atlases in Survey Blocks Encompassing the Former NAS JRB Willow Grove Property

Canada Goose (*Branta Canadensis*)	**Tree Swallow (*Tachycineta bicolor*)**
Mute Swan (*Cygnus olor*)	Northern Rough-winged Swallow (*Stelgidopteryx serripennis*)
Wood Duck (*Aix sponsa*)	Barn Swallow (*Hirundo rustica*)
Mallard (*Anas platyrhynchos*)	**Carolina Chickadee (*Poecile carolinensis*)**
Ring-necked Pheasant (*Phasianus colchicus*)	**Black-capped Chickadee (*Poecile atricapillus*)**
Wild Turkey (*Meleagris gallopavo*)	**Tufted Titmouse (*Baeolophus bicolor*)**
Northern Bobwhite (*Colinus virginianus*)	**White-breasted Nuthatch (*Sitta carolinensis*)**
Great Blue Heron (*Ardea herodias*)	**Carolina Wren (*Thryothorus ludovicianus*)**
Green Heron (*Butorides virescens*)	House Wren (*Troglodytes aedon*)
Black Vulture (*Coragyps atratus*)	Blue-gray Gnatcatcher (*Polioptila caerulea*)
Turkey Vulture (*Cathartes aura*)	**Eastern Bluebird (*Sialia sialis*)**
Osprey (*Pandion haliaetus*) (PT)	Veery (*Catharus fuscescens*)
Red-shouldered Hawk (*Buteo lineatus*)	Wood Thrush (*Hylocichla mustelina*)
Red-tailed Hawk (*Buteo jamaicensis*)	**American Robin (*Turdus migratorius*)**
American Kestrel (*Falco sparverius*)	**Gray Catbird (*Dumetella carolinensis*)**
Killdeer (*Charadrius vociferous*)	**Northern Mockingbird (*Mimus polyglottos*)**
Spotted Sandpiper (*Actitis macularius*)	Brown Thrasher (*Toxostoma rufum*)
Rock Pigeon (*Columba livia*)	**European Starling (*Sturnus vulgaris*)**
Mourning Dove (*Zenaida macroura*)	**Cedar Waxwing (*Bombycilla cedrorum*)**
Yellow-billed Cuckoo (*Coccyzus americanus*)	Blue-winged Warbler (*Vermivora pinus*)
Eastern Screech-Owl (*Megascops asio*)	Yellow Warbler (*Dendroica petechia*)
Great Horned Owl (*Bubo virginianus*)	Ovenbird (*Seiurus aurocapilla*)
Chimney Swift (*Chaetura pelagica*)	Common Yellowthroat (*Geothlypis trichas*)
Ruby-throated Hummingbird (*Archilochus colubris*)	Scarlet Tanager (*Piranga olivacea*)
Belted Kingfisher (*Megaceryle alcyon*)	**Eastern Towhee (*Pipilo erythrophthalmus*)**
Red-bellied Woodpecker (*Melanerpes carolinus*)	**Chipping Sparrow (*Spizella passerina*)**
Downy Woodpecker (*Picoides pubescens*)	**Field Sparrow (*Spizella pusilla*)**

Table 3.12-2 Bird Species Documented during the First and Second Pennsylvania Breeding Bird Atlases in Survey Blocks Encompassing the Former NAS JRB Willow Grove Property

Hairy Woodpecker (*Picoides villosus*)	**Song Sparrow (*Melospiza melodia*)**
Northern Flicker (*Colaptes auratus*)	**Northern Cardinal (*Cardinalis cardinalis*)**
Eastern Wood-Pewee (*Contopus virens*)	Rose-breasted Grosbeak (*Pheucticus ludovicianus*)
Willow Flycatcher (*Empidonax traillii*)	Indigo Bunting (*Passerina cyanea*)
Eastern Phoebe (*Sayornis phoebe*)	**Red-winged Blackbird (*Agelaius phoeniceus*)**
Great Crested Flycatcher (*Myiarchus crinitus*)	**Common Grackle (*Quiscalus quiscula*)**
Eastern Kingbird (*Tyrannus tyrannus*)	**Brown-headed Cowbird (*Molothrus ater*)**
White-eyed Vireo (*Vireo griseus*)	Orchard Oriole (*Icterus spurius*)
Warbling Vireo (*Vireo gilvus*)	Baltimore Oriole (*Icterus galbula*)
Red-eyed Vireo (*Vireo olivaceus*)	**House Finch (*Carpodacus mexicanus*)**
Blue Jay (*Cyanocitta cristata*)	**American Goldfinch (*Carduelis tristis*)**
American Crow (*Corvus brachyrhynchos*)	**House Sparrow (*Passer domesticus*)**

Source: Cornell Lab of Ornithology 2009c, d, e, f; Commander, Naval Reserve Force 2001; PNHP n.d.[a].

Note: Species in bolded text have been documented to occur on the former NAS JRB Willow Grove property.

Key:
PT = Pennsylvania Threatened

While the USGS BBS is not as site-specific as the PBBA blocks, it does provide information on the general abundance of breeding birds. The closest BBS route to the former installation property is the Collegeville (72084) route, located approximately 1 mile southwest of the property at its closest point (USGS 1996b). Surveys were conducted along this route every year from 1971 through 2012, except for 1975. A total of 95 species have been recorded along this route throughout the history of the survey (Sauer et al. 2012). Most of the recorded species are the same that were recorded in the PBBA blocks encompassing the former installation property. The 10 most common species recorded on the Collegeville BBS route include the European starling, American robin (*Turdus migratorius*), common grackle (*Quiscalus quiscula*), house finch (*Carpodacus mexicanus*), mourning dove, American crow, house sparrow, gray catbird (*Dumetella carolinensis*), northern cardinal (*Cardinalis cardinalis*), and rock pigeon (Sauer et al. 2012). All of these species are well adapted to urban/suburban environments and, with the exception of the gray catbird, are likely to occur in the region year-round.

The primary objective of the National Audubon's Society's CBC is to monitor the status and distribution of wintering bird populations across the Western Hemisphere. The CBC is an all-day census of early winter bird populations within 15-mile-diameter survey areas. The results are compiled into the longest running database in ornithology, representing over a century of continuous data on trends of early winter bird populations across the Americas (National Audubon Society 2013a). The CBCs are conducted mostly by volunteer birders. The CBC data provide a good overview of the species that occur regionally in early winter in similar habitat. The count circle closest to the former installation property is the Wyncote circle (National Audubon Society 2013b), which is centered approximately 7 miles to the south and overlaps the extreme southern portion of the property. This count has been conducted every year since 1987 and has documented a total of 120 species (National Audubon Society n.d.). The most commonly recorded species include the Canada goose (*Branta canadensis*), European starling, American robin, white-throated sparrow (*Zonotrichia albicollis*), dark-eyed junco (*Junco hyemalis*), mallard (*Anas platyrhynchos*), American crow, mourning dove, house finch, and Carolina chickadee (*Poecile carolinensis*). These species could occur in appropriate habitat on the property. Of these, the white-throated sparrow and dark-eyed junco are winter residents, while the remaining species are likely to occur year-round.

Ten additional bird species, other than those listed in Table 3.12-2, have been documented at the former installation property. All ten species were documented during the wetland assessments conducted in spring 2013. Observed species included the northern harrier (*Circus cyaneus*), Cooper's hawk (*Accipiter cooperii*), rough-legged hawk (*Buteo lagopus*), fish crow (*Corvus ossifragus*), golden-crowned kinglet (*Regulus satrapa*), vesper sparrow (*Pooecetes gramineus*), white-throated sparrow, dark-eyed junco, eastern meadowlark (*Sturnella magna*), and purple finch (*Haemorhous purpureus*). Given the timing of the surveys, individuals of these species were likely year-round residents, winter residents, or were migrating northward through the area. Based on the species' ranges, the northern harrier, Cooper's hawk, and fish crow are likely year-round residents; the rough-legged hawk, golden-crowned kinglet, white-throated sparrow, dark-eyed junco, eastern meadowlark, and purple finch are likely winter residents; and, the vesper sparrow was likely migratory, moving northward to breeding grounds further to the north (Sibley 2003).

Important Bird Areas. The Important Bird Area (IBA) program was started in Europe in the 1980s by BirdLife International, a global coalition of partner organizations (United Nations Environment Programme – World Conservation Monitoring Centre 2010). The National Audubon Society administers the IBA program in the United States and developed the program to identify and conserve a network of sites that provide critical habitat for birds. IBAs are selected according to standardized criteria (i.e., sites for species at risk, sites for responsibility assemblages, and sites for congregation of birds) through a collaborative effort with non-governmental conservation organizations (NGOs), government agencies, local conservation groups, academics, birders, and others (National Audubon Society 2010). The first state IBA programs were initiated in Pennsylvania and New York, with these states publishing inventories in 1999 and 1998, respectively (Cecil et al. 2009). Audubon Pennsylvania administers the IBA program in Pennsylvania. Two IBAs are within 10 miles of the former installation property: two separate portions of the Fairmount Park and Benjamin Rush State Park IBA are within approximately 5 miles southwest and 6 miles southeast of the property, and the Peace Valley Park IBA is approximately 7 miles north of the installation.

Bird/Animal Aircraft Strike Hazard. The presence of resident and migratory birds and other animals creates a "bird/animal aircraft strike hazard," or BASH. BASH is a critical safety concern for both civilian and military aviation. At the former installation property, the greatest BASH threat occurs during spring and fall migrations. Up to 2,000 Canada geese have been observed on the property during these migrations (NAVFAC 2000). The BASH threat can be reduced by rescheduling flight operations to avoid periods of peak wildlife activity; managing against wildlife habitat on the airfield and in the clear zone; managing stormwater detention ponds to preclude geese; actively dispersing wildlife from the airfield and clear zone; and improving detection, documentation, and reporting to air crews (NAVFAC 2000).

3.12.2.2 Mammals

Forty-four mammal species have documented distributions in Montgomery County, Pennsylvania (see Table 3.12-3) (Carnegie Museum of Natural History 2013). Species likely to occur on the former installation property include those that are well adapted to urban environments. The white-tailed deer (*Odocoileus virginianus*), gray squirrel (*Sciurus carolinensis*), woodchuck (*Marmota monax*), eastern cottontail (*Sylvilagus floridanus*), eastern chipmunk (*Tamias striatus*), red fox (*Vulpes vulpes*), raccoon (*Procyon lotor*), Virginia opossum (*Didelphis virginiana*), and striped skunk (*Mephitis mephitis*) have been observed on the installation (Commander Naval Reserve Force 2001; NAVFAC 2000). Evidence of beaver (*Castor canadensis*) activity has also been observed (Commander Naval Reserve Force 2001). White-tailed deer gain access to the property by either jumping over or crawling beneath the installation's perimeter fence. Woodchucks have been observed primarily near the administrative and urban/developed areas, and the eastern cottontail and red fox occur on the property primarily near shrub vegetation (NAVFAC 2000). Bats have also been observed on the installation during the warmer months of the year (Commander Naval Reserve Force 2001). Two species with distributions in Montgomery County, the

least shrew (*Cryptotis parva*) and small-footed myotis (*Myotis leibii*), are listed as Pennsylvania endangered and Pennsylvania threatened, respectively (PNHP n.d.[a]). However, communications with state and federal agencies indicate that neither of these species is expected to occur on the former installation property. Refer to Section 3.12.3 for additional information on threatened and endangered species.

Table 3.12-3 Mammal Species With Published Distributions in Montgomery County, Pennsylvania

Virginia Opossum (*Didelphis virginiana*)	**Eastern Chipmunk (*Tamias striatus*)**
Masked Shrew (*Sorex cinereus*)	Red Squirrel (*Tamiasciurus hudsonicus*)
Short-tailed Shrew (*Blarina brevicauda*)	Southern Flying Squirrel (*Glaucomys volans*)
Least Shrew (*Cryptotis parva*) (PE)	Beaver (*Castor canadensis*)
Smokey Shrew (*Sorex fumeus*)	White-footed Mouse (*Peromyscus leucopus*)
Eastern Mole (*Scalopus aquaticus*)	Red-backed Vole (*Clethrionomys gapperi*)
Hairy-tailed Mole (*Parascalops breweri*)	Meadow Vole (*Microtus pennsylvanicus*)
Star-nosed Mole (*Condylura cristata*)	Woodland or Pine Vole (*Microtus pinetorum*)
Big Brown Bat (*Eptesicus fuscus*)	Muskrat (*Ondatra zibethica*)
Silver-haired Bat (*Lasionycteris noctivagans*)	Bog Lemming (*Synaptomys cooperi*)
Red Bat (*Lasiurus borealis*)	House Mouse (*Mus musculus*)
Hoary Bat (*Lasiurus cinereus*)	Norway Rat (*Rattus norvegicus*)
Small-footed Myotis (*Myotis leibii*) (PT)	Meadow Jumping Mouse (*Zapus hudsonius*)
Northern Long-eared Myotis (*Myotis septentrionalis*)	Coyote (*Canis latrans*)
Little Brown Bat (*Myotis lucifugus*)	Gray Fox (*Urocyon cinereoargenteus*)
Evening Bat (*Nycticeius humeralis*)	**Red Fox (*Vulpes vulpes*)**
Eastern Pipistrel (*Pipistrellus subflavus*)	**Raccoon (*Procyon lotor*)**
Eastern Cottontail (*Sylvilagus floridanus*)	Ermine or Short-tailed Weasel (*Mustela erminea*)
Appalachian Cottontail (*Sylvilagus obscurus*)	Long-tailed Weasel (*Mustela frenata*)
Woodchuck or Groundhog (*Marmota monax*)	Mink (*Mustela vison*)
Gray Squirrel (*Sciurus carolinensis*)	**Striped Skunk (*Mephitis mephitis*)**
Fox Squirrel (*Sciurus niger*)	**White-tailed Deer (*Odocoileus virginianus*)**

Source: Carnegie Museum of Natural History 2013; PNHP n.d.[a].

Note: Species in bolded text have been documented on the former NAS JRB Willow Grove property.

Key:
PE = Pennsylvania Endangered
PT = Pennsylvania Threatened

3.12.2.3 Reptiles and Amphibians

Forty-six species of reptiles and amphibians are listed as occurring in Montgomery County, Pennsylvania (see Table 3.12-4) (PA HERP n.d.). The few species likely occur on the former installation property are probably limited to the few wetland areas on the property. The American bullfrog (*Lithobates catesbeiana*), common musk turtle (*Sternotherus odoratus*), and eastern garter snake (*Thamnophis sirtalis sirtalis*) are expected to be the most common species (NAVFAC 2000). Three species listed as occurring in Montgomery County are listed as special status species: the bog turtle (*Glyptemys muhlenbergii*) is listed as federally threatened and Pennsylvania endangered, and the northern cricket frog (*Acris crepitans*) and eastern mud turtle (*Kinosternon subrubrum*) are both listed as Pennsylvania endangered (PNHP n.d.[a]). However, communications with state and federal agencies indicate that none of these species is expected to occur on the property. Refer to Section 3.12.3 for additional information on threatened and endangered species.

Table 3.12-4 Reptile and Amphibian Species Listed for Montgomery County, Pennsylvania

Salamanders	Turtles
Marbled Salamander (*Ambystoma opacum*)	Spiny Softshell (*Apalone spinifera*)
Spotted Salamander (*Ambystoma maculatum*)	Snapping Turtle (*Chelydra serpentina*)
Dusky Salamander (*Desmognathus fuscus*)	Eastern Mud Turtle (*Kinosternon subrubrum*) (PE)
Long-tailed Salamander (*Eurycea longicauda*)	Northern Red-bellied Cooter (*Pseudemys rubriventris*)
Northern Two-lined Salamander (*Eurycea bislineata*)	Common Musk Turtle (*Sternotherus odoratus*)
Four-toed Salamander (*Hemidactylium scutatum*)	Eastern Box Turtle (*Terrapene carolina*)
Eastern Newt (*Notophthalmus viridescens*)	Bog Turtle (*Glyptemys muhlenbergii*) (FT, PE)
Northern Slimy Salamander (*Plethodon glutinosus*)	Wood Turtle (*Glyptemys insculpta*)
Northern Red-backed Salamander (*Plethodon cinereus*)	Eastern Painted Turtle (*Chrysemys picta picta*)
Northern Red Salamander (*Pseudotriton ruber ruber*)	Yellow-bellied Slider (*Trachemys scripta scripta*)
Frogs and Toads	Red-eared Slider (*Trachemys scripta elegans*)
Northern Cricket Frog (*Acris crepitans*) (PE)	**Snakes**
Fowler's Toad (*Anaxyrus fowleri*)	Northern Copperhead (*Agkistrodon contortrix mokasen*)
American Toad (*Anaxyrus americanus*)	Racer (*Coluber constrictor*)
Gray Treefrog (*Hyla versicolor*)	Northern Ringneck Snake (*Diadophis punctatus edwardsii*)
Upland Chorus Frog (*Pseudacris feriarum*)	Eastern Rat Snake (*Pantherophis alleghaniensis*)
Spring Peeper (*Pseudacris crucifer*)	Eastern Hognose Snake (*Heterodon platirhinos*)
New Jersey Chorus Frog (*Pseudacris feriarumkalmi*)	Eastern Milk Snake (*Lampropeltis triangulum triangulum*)
Green Frog (*Lithobates clamitans*)	Northern Water Snake (*Nerodia sipedon*)
American Bullfrog (*Lithobates catesbeiana*)	Queen Snake (*Regina septemvittata*)
Wood Frog (*Lithobates sylvatica*)	Dekay's Brown Snake (*Storeria dekayi*)
Southern Leopard Frog (*Lithobates sphenocephala*)	Eastern Ribbon Snake (*Thamnophis sauritus sauritus*)
Northern Leopard Frog (*Lithobates pipiens*)	Eastern Garter Snake (*Thamnophis sirtalis sirtalis*)
Pickerel Frog (Lithobates palustris)	Smooth Earth Snake (*Virginia valeriae*)

Source: PA HERP n.d.; PNHP n.d.[a].

Key:
FT = Federally Threatened
PE = Pennsylvania Endangered

3.12.3 Threatened and Endangered Species

Endangered Species Act

Federally threatened and endangered species are those listed for protection under the federal Endangered Species Act (ESA) (16 U.S.C. 1536), which is administered by the U.S. Fish and Wildlife Service (USFWS). The USFWS also lists federal species of concern. Federal species of concern is an informal term that indicates a species may be in need of conservation actions. Federal species of concern do not receive legal protection, and this term does not imply the species will eventually be proposed for listing.

Under NEPA, the impacts of a proposed action on federally threatened and endangered species must be considered. The ESA of 1973 established protection over and conservation of federally threatened and endangered species and the ecosystems upon which they depend. An "endangered" species is a species

that is in danger of extinction throughout all or a significant portion of its native habitat, while a "threatened" species is one that is likely to become endangered within the foreseeable future throughout all or a significant portion of its native habitat.

The USFWS and the National Marine Fisheries Service (NMFS) jointly administer the ESA and are responsible for the listing of species (i.e., the labeling of a species as either threatened or endangered). The USFWS has primary responsibility for the management of terrestrial and freshwater species, while the NMFS has primary responsibility for managing marine species and anadromous fish species (species that migrate from saltwater into freshwater to spawn). The ESA allows the designation of geographic areas as critical habitat for threatened or endangered species. Critical habitat has been designated for only one species in Pennsylvania, the Piping Plover (*Charadrius melodus*). The designated critical habitat is located on Presque Isle in Erie County, which is close to 300 miles away from the former installation (USFWS 2012).

In Pennsylvania, four agencies share the responsibility for administering programs to protect and manage threatened and endangered species and species of special concern. The Pennsylvania Fish and Boat Commission (PFBC) is responsible for fish, reptiles, amphibians, and aquatic organisms under the Fish and Boat Code (30 PA. C.S.A. §§ 101 *et seq.*). The Pennsylvania Game Commission (PGC) is responsible for wild birds and mammals under the Game and Wildlife Code (34 PA C.S.A. §§ 101 et *seq*.). The Pennsylvania Department of Conservation and Natural Resources (PA DCNR) is responsible for preserving the Commonwealth's native wild plants, terrestrial invertebrates, significant natural communities, and geologic features under the Wild Resources Conservation Act (32 P.S. §§ 5301 et *seq*.). Lastly, the USFWS is responsible for federally listed, proposed, and candidate species under the federal ESA (PADEP 2009). Project reviews among the four agencies are coordinated through the PNHP's Pennsylvania Natural Diversity Inventory (PNDI). The PNDI is the database utilized by the PNHP for environmental reviews. The PNDI is managed by the DCNR in order to build, maintain, and provide accurate and accessible ecological information needed for conservation, development planning, and natural resource management (PADEP 2009).

The potential occurrence of threatened and endangered species at the former installation property was assessed using the online PNDI Environmental Review Tool (PNHP n.d.[b]). The review indicated that "no known impacts" were expected from the proposed action for species under the jurisdiction of the PGC, DCNR, and USFWS and that no further review was required by these agencies. The review indicated that a potential impact was possible on species under the jurisdiction of the PFBC and that further review by this agency was required (PNHP 2013). On March 27, 2013, the Navy sent letters to all four agencies requesting confirmation of the PNDI search results and any additional information regarding the potential occurrence of threatened, endangered, and/or special concern species, unique natural communities, or other significant wildlife communities at or near the former installation property. The PFBC response letter dated April 16, 2013, indicated that a species of concern is known from the vicinity of the former installation; however, the species name was not provided (Urban 2013). Response letters from the agencies are provided in Appendix A.

4 Environmental Consequences

4.1 Land Use

This section summarizes the potential land use impacts resulting from the implementation of Alternatives 1, 2, and 3 and the No Action Alternative. The analysis examines the compatibility of the proposed land uses under each alternative with baseline land uses on and surrounding the former NAS JRB Willow Grove property. The proposed land uses are also analyzed to determine consistency with applicable land use plans (comprehensive plans) and regulations (zoning ordinances) that existed when the installation was closed in September 2011. The study area includes the installation property and areas adjacent to the property.

Local and regional plans were reviewed for goals and policies pertaining to land use. In some instances, goals and policies were specific to the former NAS JRB Willow Grove and are included in this analysis. Zoning ordinances of each of the adjoining communities also were reviewed. A build-out analysis was prepared for each alternative, and adapted from the Redevelopment Plan (RKG 2012) to project the maximum number of residential housing units and total floor area of commercial, business, education, and recreation land uses (see Section 2.2 and 2.3 for more details on the redevelopment alternatives and proposed residential and commercial spaces).

Under each alternative, except the No Action Alternative, the properties not transferred to other federal agencies would be under the jurisdiction of Horsham Township upon completion of the BRAC disposal process. The HLRA was established to implement the chosen Redevelopment Plan for the former installation. Horsham Township would be responsible for providing municipal services (e.g., public utilities, police, and fire protection) and administration of the former federal property. Redevelopment of the installation property and reuse of the site's existing buildings would be regulated by Horsham Township's Comprehensive Plan Update 2011 and zoning ordinance. In addition, future reuse and development would require the review and approval of Horsham Township in accordance with the process outlined in the Horsham Township Zoning Ordinance of 1995.

Under the No Action Alternative, the installation would be retained by the federal government in caretaker status. Horsham Township regulations would not be enforceable since the property would continue to be owned by the federal government.

4.1.1 Alternative 1 (HLRA Plan - Preferred Alternative)

4.1.1.1 Baseline Land Use

Under Alternative 1, there would be a change in land use at the former NAS JRB Willow Grove property. The installation would be redeveloped to form a mixed-use, smart-growth-oriented community (see Table 4.1-1). Horsham Air Guard Station and the FAA tower would remain under federal control and ownership. Once the BRAC process is complete, the former installation would be reintegrated into Horsham Township and begin the redevelopment of the approximately 861 acre property. A majority of office and retail space, including the town center and a hotel/conference center, would be located on approximately 220 acres on the southern end of the installation, and various types of residential uses (approximately 220 acres) would be located on the interior and northwest portions of the installation. Approximately 240 acres of open space and recreation areas would be interspersed throughout the property. It would be expected that full build-out would be implemented over a 20-year period.

Table 4.1-1 Alternative 1 – Land Use Districts[1]

Land Use District	Acres[2]	Percent of Total
Large-lot, single-family residences	86	10.0
¼-acre lot, single-family residences	--	--
Small-lot, single-family residences	53	6.2
Townhomes	53	6.2
Apartments/condominiums	19	2.2
Town center	29	3.4
Bucks County Housing Group	11	1.3
Continuing Care Retirement Community (CCRC)	39	4.5
Hotel/conference center	17	2.0
Office park	157	18.2
Retail	15	1.7
Recreation center	12	1.4
School	43	5.0
Aviation museum	14	1.6
Parks/open space/fields/golf course	241	28.0
Airfield	--	--
Airfield operations	--	--
Roads/pedestrian paths/sidewalks/plazas	72	8.4
Total	**861**	**100**

Notes:
[1] Not all land use districts are included in each redevelopment alternative.
[2] As noted in Section 2, the acreages by land use district differ from those noted in the Redevelopment Plan (Option F). The difference is primarily associated with areas within specific districts being allocated to the roads, sidewalks, paths, etc. category.

Implementation of Alternative 1 would impact the land use conditions within the boundaries of the installation. These impacts would include changes to the existing built environment, including the introduction of a densely populated mixed-use residential district with business, education, and recreation land uses and no reuse of the existing airfield. Implementation of Alternative 1 would also result in open public access to the formerly secure and restricted military property. In addition, a large-lot single-family residential area would be located near a segment of a natural gas pipeline (see Figure 4.1-1). An existing utility easement would prohibit development over the pipeline, and houses would be set-back from the pipeline right-of-way (RKG 2012). The developer would need to work with the pipeline company to ensure proposed residential area design accommodates the easement and establishes a set-back distance to enhance safety and avoid the potential for third-party damage to the pipeline.

4.1.1.2 Consistency with Local Zoning and Comprehensive Plans

The redevelopment proposed under Alternative 1 is primarily consistent with local planning.

Horsham Township Zoning Ordinance of 1995

The proposed land uses under Alternative 1 would not be consistent with the Horsham Township Zoning Ordinance of 1995 as currently written. Prior to the closure of NAS JRB Willow Grove in 2011, the installation was zoned I-1 (Industrial), which does not permit residential, education, commercial, retail, or outdoor recreation land uses, but permits hotels and restaurants by special exception (Horsham Township 1995). For Alternative 1 to be consistent with the zoning ordinance, the zoning map and zoning ordinance would need to be amended to accommodate the proposed land uses under Alternative 1.

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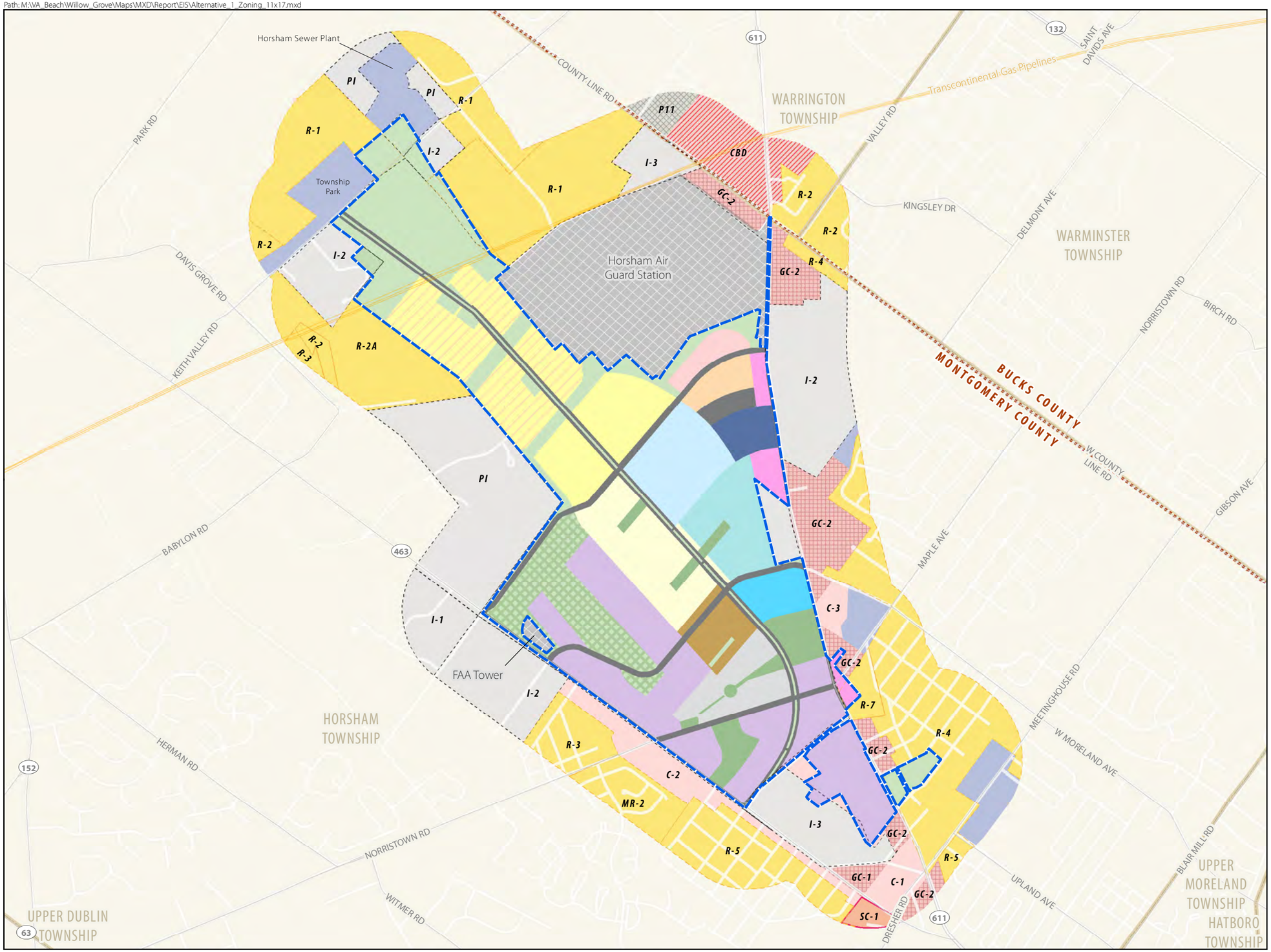

Figure 4.1-1

Alternative 1 - Zoning

on and surrounding former NAS-JB Willow Grove

(HLRA Plan - Preferred Alternative)

Horsham, PA

Legend

- Major Road
- Transcontinental Gas Pipelines
- NAS JRB Willow Grove
- County Boundary
- Township Boundary
- FAA Tower and Horsham Air Guard Station (not included in redevelopment)

Alternative 1 Land Uses

- Townhomes
- Small-Lot Single-Family
- Large-Lot Single-Family
- Apartments/ Condominiums
- Aviation Museum
- Bucks County Housing Group
- Continuing Care Retirement Community
- Hotel/Conference/ Office Center
- Office Park
- Open Space
- Par-3 Golf Course
- Park
- Recreation Center
- Retail
- Roads/Paths/ Parking
- School
- Town Center

Existing Zoning

- Residential
- Central Business
- Commercial
- Commercial Neighborhood
- General Commercial
- Manufacturing
- Planned Industrial
- Municipal Property

N

SCALE

0 0.25 0.5 Miles

SOURCE: ESRI 2010; RKG 2012; Horsham Township 1995. Horsham Township Zoning Map; Warminster Township 2009. Warminster Township Zoning Map; Warrington Township 2006. Zoning in Warrington and Adjacent Municipalities. Warrington Township Comprehensive Plan Update 2006; Ecology and Environment 2013; National Pipeline Mapping System 2007; Tetra Tech 2012.

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Horsham Township Comprehensive Plan Update 2011

Development under Alternative 1 would be based on smart growth principles. Connectivity with the area surrounding the installation would be improved by extending Moreland Avenue, Norristown Road, Precision Road, and Privet Road and realigning Maple Avenue; however, Alternative 1 would not extend Tournament Drive, which is noted in the township's comprehensive plan. Alternative 1 would include areas for open space, schools, employment centers, recreation, retail, and business services. A variety of housing options would be available, and a network of pedestrian and bicycle pathways would connect these housing options to commercial areas and various surrounding land uses. Development would no longer be restricted on land at both ends of the runway, and these areas would be converted to an office park and open space. In addition, proposed commercial development would be focused on Easton Road. Although Alternative 1 would conform to most of the goals and policies of the Horsham Township Comprehensive Plan Update (Horsham Township 2011), it would not be entirely consistent with the comprehensive plan because Tournament Drive would not be extended under this alternative.

Connections – the Regional Plan for a Sustainable Future

Alternative 1 would be consistent with the DVRPC's *Connections – The Regional Plan for a Sustainable Future* because Alternative 1 would redevelop infill property that is no longer being used for its historic purpose. Alternative 1 would also be based on smart growth principles and incorporate a compact design of mixed uses, which would be consistent with the land use goals contained in the Connections plan.

HLRA Redevelopment Plan

Alternative 1 would be consistent with the HLRA's Redevelopment Plan as it was the final, preferred redevelopment (Option F) that was proposed and documented by the HLRA.

4.1.1.3 Land Use Build-out

Under Alternative 1, the built environment of the installation would be more densely developed compared to baseline conditions. Redevelopment of the installation would introduce new land uses, including a densely populated mixed-use residential district, and business, education, and recreation land uses.

Full build-out of Alternative 1 would allow for a maximum of 1,486 residential units, 2,337,349 square feet of non-residential floor space, and approximately 240 acres of open space, and natural areas. The total build-out projection includes the reuse of six existing non-residential structures, comprising approximately 91,621 square feet of useable space (RKG 2012). The remaining development would be comprised of new residential and non-residential construction. The build-out assumes full occupancy of all structures. Table 4.1-2 identifies the maximum build-out 20 years from the baseline.

Full build-out of the installation would increase the density of residential and non-residential development compared to 2011 baseline conditions, which would not be allowed under existing zoning regulations. The maximum projected density of the development would not be expected to occur at once and would be implemented over a 20-year build-out period. The intent would be to develop new building space as future market conditions and improvements to on-site and off-site infrastructure capacity dictate. Considering the 20-year build-out period, the development projected under Alternative 1 would not be expected to result in direct impacts on land use; however, as stated previously, such development would be inconsistent with the existing zoning regulations.

Approved Public Benefit Conveyances

A public benefit conveyance (PBC) is a mechanism used to transfer property at a discount (generally 100 percent of fair market value) to state and local governments and certain non-profit organizations for

public purposes. As part of Alternative 1, PBCs would be used to grant properties, buildings, and easements to 11 organizations or applicants. These PBCs would affect approximately 295.6 acres[6].

Table 4.1-2 Alternative 1 – Projected Maximum Build-out

Land Use	Maximum Build-out Projection
Residential	
Large-lot, single-family residences	90 units
¼-acre lot, single-family residences	-
Small-lot, single-family residences	250 units
Townhomes	350 units
Apartments/Condominiums	300 units
Town center apartments/condominiums	100 units
CCRC independent living apartments	141 units
CCRC assisted living/nursing apartments	185 units
BCHG housing	70 units
Total Residential	**1,486 units**
Commercial and Mixed Use	
CCRC medical office/amenities	25,000 sq. ft.
Hotel/conference center	137,000 sq. ft.
Town center office/retail/service/restaurants	359,370 sq. ft.
Office park	1,163,052 sq. ft.
Retail	200,200 sq. ft.
Total Commercial and Mixed Use	**1,884,622 sq. ft.**
Community Services and Recreation	
Regional recreation center	100,000 sq. ft.
School	152,727 sq. ft.
Aviation museum	200,000 sq. ft.
Park/open space	-
Roads/sidewalks/paths, etc.	-
Airfield	-
Airfield operations	-
Total Community Services and Recreational Uses	**452,727**
Totals	**1,486 Residential Units and 2,337,349 sq. ft. of Non-Residential Space**

The proposed use of the identified PBCs would be consistent with the *Horsham Township Comprehensive Plan Update 2011* (Horsham Township 2011); however, the PBCs would be inconsistent with the Horsham Township zoning ordinance. Proposed uses include education, recreation, public safety, civic and cultural, public infrastructure (e.g., sewer and water lines, roads, etc.), assisted living, and housing for the homeless. As identified in the Redevelopment Plan, all PBC development would be consistent with the policies and objectives identified in the Redevelopment Plan and would be subject to applicable Horsham Township land use controls and zoning regulations (RKG 2012). In addition, the HLRA opted to pursue an Economic Development Conveyance (EDC)[7] of the entire redevelopment area. Under an EDC, each PBC would have greater flexibility in implementing their development plans and conforming to future changes to the Redevelopment Plan (RKG 2012).

[6] Total does not include acreages for water and sewer lines, a water tower, fire station building, and rights-of-way for major roads.

[7] An EDC is a disposal method used by military departments to transfer ownership to a local redevelopment authority for the purpose of generating jobs (NAVFAC n.d).

4.1.1.4 Surrounding Existing Land Uses and Consistency with Comprehensive Plans and Zoning

Proposed land uses along the periphery of the installation would be compatible with baseline land uses adjacent to the installation. Land uses along Easton Road and Horsham Road are primarily commercial/retail, similar to the proposed land uses under Alternative 1 (see Figure 4.1-1). Proposed residential areas located in the northwest portion of the installation would be compatible with baseline land uses adjacent to the installation, including the Commonwealth National Country Club and Horsham Air Guard Station. After the BRAC closure process is complete, Horsham Air Guard Station would no longer have an air support mission; therefore, the proposed residential areas would be compatible land uses and not limit the station's mission. In addition, proposed open spaces and recreation areas would be located next to existing recreation areas, residential areas, and open spaces.

Proposed land uses along the periphery of the installation would be compatible with zoning designations on properties adjacent to the installation, which include industrial, commercial, and residential. As noted in Section 3.1.2, the ACNOD that was in place due to the previous aircraft operations at NAS JRB Willow Grove was eliminated from the Horsham Township zoning ordinance in February 2013. Under Alternative 1, there would be no aircraft operations as the runway would not be reused and therefore, there would be no requirement to establish an overlay district related to aircraft safety zones, height restrictions or noise exposure.

Full build-out of Alternative 1 would likely induce some indirect off-site land use impacts as a result of the residential, commercial, and recreational development on the installation. The addition of new housing and commercial space could cause an overabundance of housing and commercial space, resulting in the abandonment and dilapidation of older areas; however, this would be mitigated by a market-driven development approach that would occur over an estimated 20-year period. Full build-out could have the beneficial indirect effect of preserving natural open spaces and agricultural areas from being developed as future demands for housing and commercial space could be met by redevelopment of the installation.

Warrington Township Comprehensive Plan Update

The former NAS JRB Willow Grove is not located in Warrington Township; therefore, redevelopment of the installation would not be required to comply with the Warrington Township Comprehensive Plan and would not be directly inconsistent with its goals and policies (Warrington Township 2006). However, because of the proximity of the installation to Warrington Township, implementation of Alternative 1 could impact development patterns in the township. Under Alternative 1, new commercial development would be located on Easton Road (SR 611), which could cause abandonment of older commercial and retail space on Easton Road in Warrington Township. The Warrington Township Comprehensive Plan recommends that new commercial development should not be added along Easton Road over a 10-year period between 2008 and 2018 to avoid underutilization of existing commercial space. Therefore, Alternative 1 could indirectly be inconsistent with the Warrington Township Comprehensive Plan.

Warminster Township Comprehensive Plan

NAS JRB Willow Grove is not located in Warminster Township; therefore, redevelopment of the installation would not be required to comply with the Warminster Township Comprehensive Plan and would not be directly inconsistent with its goals and policies. However, because of the proximity of the installation to Warminster Township, implementation of Alternative 1 could impact development patterns in the township. Development under Alternative 1 would include residential, commercial, and office uses. Development of these uses could alleviate pressure to develop infill properties in Warminster Township that possess unique natural and historical resources. Therefore, Alternative 1 could have the indirect beneficial effect of assisting the township in preserving its natural and historical resources.

4.1.2 Alternative 2 (HLRA Plan with Increased Residential Development)

4.1.2.1 Baseline Land Use

Under Alternative 2, there would be a change in land use at the former NAS JRB Willow Grove property. The installation would be redeveloped to form a mixed-use, smart-growth-oriented community, although Alternative 2 would include more open space and higher-density residential areas (see Table 4.1-3). The Horsham Air Guard Station and the FAA tower would remain under federal control and ownership. Once the BRAC process is complete, the former installation would be reintegrated into Horsham Township and begin redevelopment of the approximately 861 acre property. The majority of office and retail space, including the town center and hotel/conference center, would be located on approximately 200 acres on the southern end and outer edges of the installation, with various types of residential uses located on approximately 160 acres in the interior and northwest portions of the installation. Approximately 300 acres of open space and recreation areas would be interspersed throughout the redevelopment area. It would be expected that full build-out would be implemented over a 20-year period.

Table 4.1-3 Alternative 2 – Land Use Districts[1]

Land Use District	Acres[2]	Percent of Total
Large-lot, single-family residences	--	--
¼-acre lot, single-family residences	50	5.8
Small-lot, single-family residences	41	4.8
Townhomes	39	4.5
Apartments/condominiums	24	2.8
Town center	29	3.4
Bucks County Housing Group	12	1.4
Continuing Care Retirement Community (CCRC)	37	4.3
Hotel/conference center	20	2.3
Office park	143	16.6
Retail	12	1.4
Recreation center	22	2.6
School	15	1.7
Aviation museum	15	1.7
Parks/open space/fields/golf course	317	36.8
Airfield	--	--
Airfield operations	--	--
Roads/pedestrian paths/sidewalks/plazas	85	9.9
Total	**861**	**100**

Notes:
[1] Not all land use districts are included in each redevelopment alternative.
[2] As noted in Section 2, the acreages by land use district differ from those noted in the Redevelopment Plan (Option D). The difference is primarily associated with areas within specific districts being allocated to the roads, sidewalks, paths, etc. category.

Implementation of Alternative 2 would impact the land use conditions within the boundaries of the installation. These impacts would include changes to the existing built environment, including the introduction of a densely populated mixed-use residential district, and business, education, and recreation land uses, and no reuse of the existing airfield. Implementation of Alternative 2 would also result in open public access to the formerly secure and restricted military property. In addition, a residential area consisting of ¼-acre, single-family homes would be located near a segment of a natural gas pipeline (see Figure 4.1-2) (RKG 2012). An existing utility easement would prohibit development over the pipeline, and houses would be set-back from the pipeline right-of-way. The developer would need to work with

the pipeline company to ensure the proposed residential area design accommodates the easement and establishes a set-back distance to enhance safety and avoid the potential for third-party damage to the pipeline.

4.1.2.2 Consistency with Local Zoning and Comprehensive Plans

There are some inconsistencies with local planning for the redevelopment proposed under Alternative 2.

Horsham Township Zoning Ordinance of 1995

Similar to Alternative 1, development under Alternative 2 would not be consistent with the Horsham Township Zoning Ordinance of 1995. For Alternative 2 to be consistent with the zoning ordinance, the zoning map and zoning ordinance would need to be amended to allow the various land uses under Alternative 2.

Horsham Township Comprehensive Plan Update 2011

Consistency with the comprehensive plan would be similar to Alternative 1, except that under Alternative 2, Tournament Drive would be extended to connect to a proposed residential area consisting of ¼-acre, single-family homes. In addition, Alternative 2 would have better connectivity to the surrounding area compared to Alternative 1. Alternative 2 would extend all streets identified in the comprehensive plan, including Tournament Drive; therefore, development under Alternative 2 would be entirely consistent with the comprehensive plan.

Connections – the Regional Plan for a Sustainable Future

Consistency with the Connections plan would be similar to Alternative 1.

HLRA Redevelopment Plan

Alternative 2 was a prior iteration (Option D) of the HLRA's final, preferred redevelopment. Although it contains many similar elements to Alternative 1, it had a higher density of residential units than the final plan. Therefore, the redevelopment as proposed under Alternative 2 it would not be entirely consistent with the HLRA's Redevelopment Plan.

4.1.2.3 Land Use Build-out

Under Alternative 2, the built environment at the installation would be developed with a higher density of residential units compared to the baseline conditions and Alternative 1. Redevelopment of the installation would introduce new land uses, including a densely populated mixed-use residential district, and business, education, and recreation land uses.

Full build-out of Alternative 2 would allow for a maximum of 1,999 residential units, over 2,138,221 square feet of non-residential floor space, and 317 acres of open space and natural areas. The total build-out projection includes the reuse of six existing non-residential structures, comprising approximately 91,621 square feet of useable space. The remaining development would be comprised of new residential and non-residential construction. Table 4.1-4 identifies the maximum build-out 20 years from the baseline.

Table 4.1-4 Alternative 2 – Projected Maximum Build-out

Land Use	Maximum Build-out Projection
Residential	
Large-lot, single-family residences	-
¼-acre lot, single-family residences	169 units
Small-lot, single-family residences	227 units
Townhomes	396 units
Apartments/condominiums	645 units
Town center apartments/condominiums	114 units
CCRC independent living apartments	126 units
CCRC assisted living/nursing apartments	252 units
BCHG housing	70 units
Total Residential	**1,999 units**
Commercial and Mixed Use	
CCRC med office/amenities	58,500 sq. ft.
Hotel/conference center	163,400 sq. ft.
Town center office/retail/service/restaurants	342,154 sq. ft.
Office park	1,130,818 sq. ft.
Retail	139,100 sq. ft.
Total Commercial and Mixed use	**1,833,972 sq. ft.**
Community Services and Recreation	
Regional recreation center	96,522 sq. ft.
School	152,727 sq. ft.
Aviation museum	55,000 sq. ft.
Park/open space	-
Roads, sidewalks, paths, etc.	-
Airfield	-
Airfield operations	-
Total Community Services and Recreation Uses	**304,249**
Totals	**1,999 Residential Units and 2,138,221 sq. ft. of Non-Residential Space**

The full build-out of the installation would include an increase in the density of residential and non-residential development as compared to 2011 baseline conditions, which would not be allowed under existing zoning regulations. The projected density of the development would not be expected to occur at once and would be implemented over a 20-year build-out period. The intent would be to develop new building space as future market conditions and improvements to on-site and off-site infrastructure capacity dictate. Considering the 20-year build-out period, the development projected under Alternative 2 would not be expected to result in direct impacts on land use; however, as stated previously, such development would be inconsistent with the existing zoning regulations.

Approved Public Benefit Conveyances

Approved PBCs and impacts associated with the transfer of these properties under Alternative 2 would be similar to those under Alternative 1.

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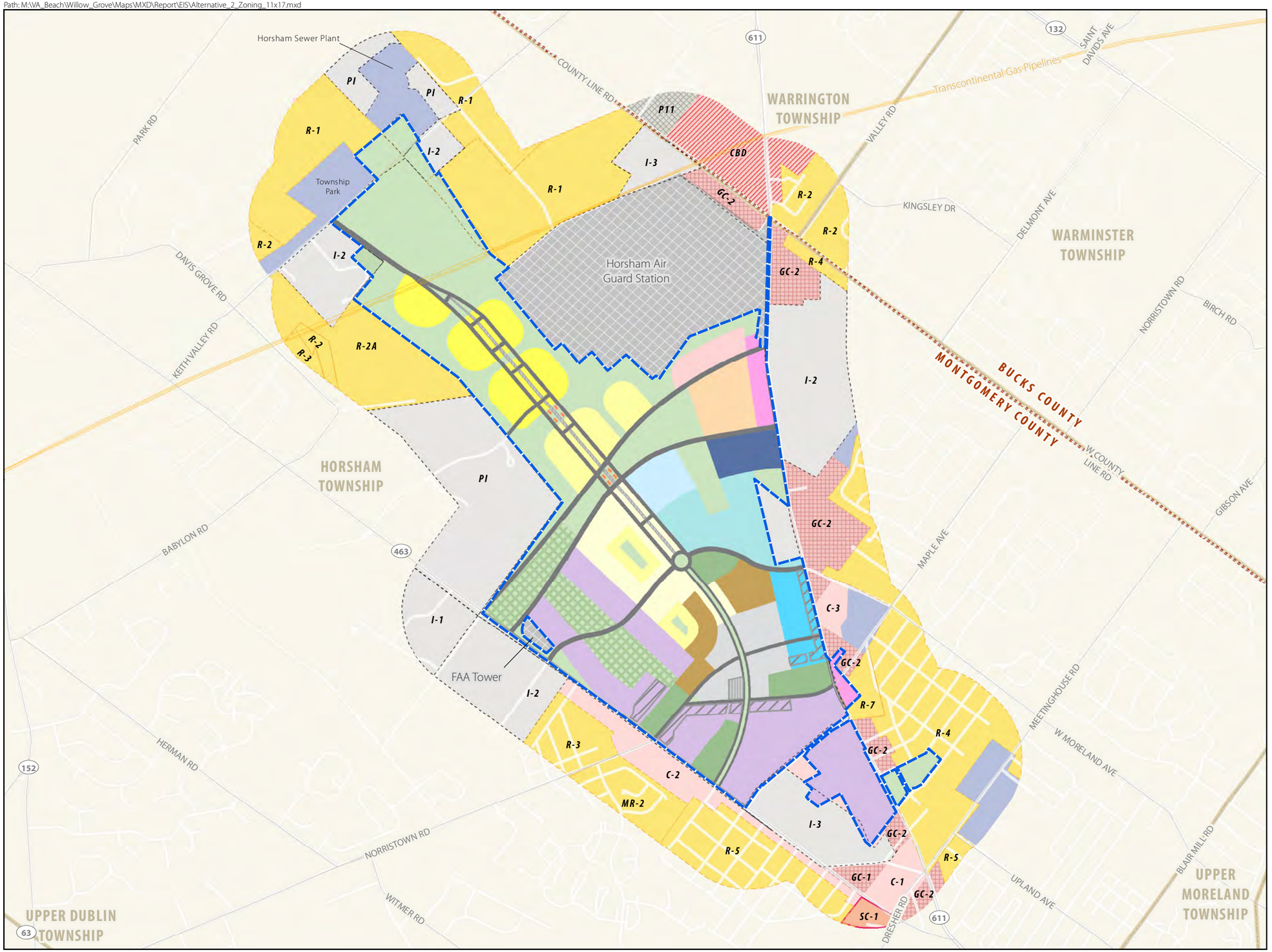

Figure 4.1-2

Alternative 2 - Zoning

on and surrounding former NAS-JB Willow Grove

(HLRA Plan with Increased Residential Development)

Horsham, PA

Legend

- Major Road
- Transcontinental Gas Pipelines
- NAS JRB Willow Grove
- County Boundary
- Township Boundary
- FAA Tower and Horsham Air Guard Station (not included in redevelopment)

Alternative 2 Land Uses

- Townhomes
- Small Lot Singles
- 1/4 Acre Residential
- Apartments/ Condominiums
- Aviation Museum
- Bucks County Housing Group
- Continuing Care Retirement Community
- Hotel Conference Center
- Office Park
- Open Space
- Par-3 Golf Course
- Park
- Courts
- Recreation Center
- Retail
- Indicates Ground Floor Retail
- Pedestrian Path/Plaza
- Roads
- School
- Town Center

Existing Zoning

- Residential
- Central Business
- Commercial
- Commercial Neighborhood
- General Commercial
- Manufacturing
- Planned Industrial
- Municipal Property

SCALE

0 0.25 0.5 Miles

SOURCE: ESRI 2010; RKG 2012; Horsham Township 1995. Horsham Township Zoning Map; Warminster Township 2009. Warminster Township Zoning Map; Warrington Township 2006. Zoning in Warrington and Adjacent Municipalities. Warrington Township Comprehensive Plan Update 2006; Ecology and Environment 2013; National Pipeline Mapping System 2007; Tetra Tech 2012.

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4.1.2.4 Surrounding Existing Land Uses and Consistency with Comprehensive Plans

Similar to Alternative 1, proposed land uses along the periphery of the installation would be compatible with baseline land uses adjacent to the installation (see Figure 4.1-2). The residential areas located in the northwest portion of the installation would be compatible with baseline land uses adjacent to the installation; however, unlike Alternative 1, proposed open space would separate these residential areas from the Horsham Air Guard Station, providing a buffer between the two areas. In addition, proposed open spaces and recreation areas would be located next to existing recreation areas, residential areas, and open spaces.

Proposed land uses along the periphery of the installation would be compatible with zoning designations on properties adjacent to the installation, which include industrial, commercial, and residential. As noted in Section 3.1.2, the ACNOD that was in place due to the previous aircraft operations at NAS JRB Willow Grove was eliminated from the Horsham Township zoning ordinance in February 2013. Under Alternative 2, there would be no aircraft operations as the runway would not be reused and therefore, there would be no requirement to establish an overlay district related to aircraft safety zones, height restrictions or noise exposure.

Full build-out of Alternative 2 would result in similar indirect off-site land use impacts as under Alternative 1; however, more open space and agricultural areas could be preserved because development under Alternative 2 would be of a higher residential density, which would better accommodate the future development needs of the region.

Warrington Township Comprehensive Plan Update

Consistency with the Warrington Township Comprehensive Plan Update would be similar to Alternative 1.

Warminster Township Comprehensive Plan

Consistency with the Warminster Township Comprehensive Plan would be similar to Alternative 1.

4.1.3 Alternative 3 (Airfield Reuse)

4.1.3.1 Baseline Land Use

Under Alternative 3, there would be a change in land use at the former NAS JRB Willow Grove property. The installation would be redeveloped and would include an airfield and the only residential use would be for the BCHG (see Table 4.1-5). The Horsham Air Guard Station and the FAA tower would remain under federal control and ownership. The existing runway and a portion of the taxiways, parking aprons, and hanger space for airfield operations would remain in use. Once the BRAC process is complete, the former installation would be reintegrated into Horsham Township and begin redevelopment of the approximately 861 acre property. The majority of office and retail space, including the hotel/conference center, would be located on approximately 140 acres southwest of the runway. Approximately 300 acres of open space and recreation areas would be interspersed throughout the redevelopment area, including areas surrounding and at the ends of the runway that would remain clear for aircraft operations. It would be expected that full build-out would be implemented over a 20-year period.

Table 4.1-5 Alternative 3 – Land Use Districts[1]

Land Use District	Acres	Percent of Total
Large-lot, single-family residences	--	--
¼-acre lot, single-family residences	--	--
Small-lot, single-family residences	--	--
Townhomes	--	--
Apartments/condominiums	--	--
Town center	--	--
Bucks County Housing Group	11	1.3
Continuing Care Retirement Community (CCRC)	--	--
Hotel/conference center	15	1.7
Office park	90	10.5
Retail	32	3.7
Recreation center	12	1.4
School	--	--
Aviation museum	14	1.6
Parks/open space/fields/golf course	295	34.3
Airfield	276	32.1
Airfield operations	78	9.1
Roads/pedestrian paths/sidewalks/plazas	39	4.5
Total	**861**	**100**

Notes:
[1] Not all land use districts are included in each redevelopment alternative.

Implementation of Alternative 3 would impact the baseline land use conditions within the boundaries of the installation. These impacts would include changes to the existing built environment surrounding the runway and ancillary facilities, including the introduction of business and recreation land uses. Implementation of Alternative 3 would also result in open public access to the formerly secure and restricted military property. It would; however, retain the use of the runway and aircraft operations area.

4.1.3.2 Consistency with Local Zoning and Comprehensive Plans

Horsham Township Zoning Ordinance of 1995

Similar to Alternative 1, the proposed land uses under Alternative 3, including the runway and airfield facilities, would not be consistent with the Horsham Township Zoning Ordinance of 1995. For Alternative 3 to be consistent with the zoning ordinance, the zoning map and zoning ordinance would need to be amended to allow the various land uses under Alternative 3.

Horsham Township Comprehensive Plan Update 2011

Although portions of the installation would be redeveloped to support business, commercial, and recreation uses, retention of the airfield and runway would not be consistent with the Horsham Township Comprehensive Plan Update 2011, which encourages the redevelopment of the installation and discontinued use of the airfield. In addition, the portions of the installation surrounding the airfield would not be developed based on smart growth principles, and connectivity with the area surrounding the installation would be limited due to the continued use of the runway. Therefore, implementation of Alternative 3 would not be consistent with the comprehensive plan.

Connections – The Regional Plan for a Sustainable Future

Under Alternative 3, Horsham Township would have limited opportunity to implement the goals of the Connections plan because of the continued use of the airfield. Although portions of the installation would be redeveloped, these areas would not be developed in accordance with smart growth principles or feature a compact design and mixed uses including residential development. Therefore, Alternative 3 would not be consistent with the Connections plan.

HLRA Redevelopment Plan

Alternative 3 would not be consistent with the HLRA's Redevelopment Plan. Redevelopment at the former installation through reuse of the existing airfield was discussed in the Redevelopment Plan; however, it was dismissed from further analysis due to the results of an aviation market assessment and public opinion.

4.1.3.3 Land Use Build-out

Under Alternative 3, the built environment of the installation would be more densely developed compared to baseline conditions, but would not be as dense as under Alternatives 1 and 2. Redevelopment of the installation would introduce new land uses, business, and recreation land uses.

Full build-out of Alternative 3 would include only those residential units associated with BCHG's housing. It would also allow for 1,214,693 square feet of non-residential floor space and 299 acres of recreation, open space, and natural areas. The total build-out projection includes the reuse of six existing non-residential structures, comprising approximately 91,621 square feet of useable space. The remaining development would be comprised of non-residential construction. Table 4.1-6 identifies the maximum build-out 20 years from the baseline.

Table 4.1-6 Alternative 3 – Projected Maximum Build-out

Land Use	Maximum Build-out Projection
Residential	
Large-lot, single-family residences	-
¼-acre lot, single-family residences	-
Small-lot, single-family residences	-
Townhomes	-
Apartments/condominiums	-
Town center apartments/condominiums	-
CCRC independent living apartments	-
CCRC assisted living/nursing apartments	-
BCHG housing	70 units
Total Residential	**70 units**
Commercial and Mixed Use	
CCRC med office/amenities	-
Hotel/conference center	120,882 sq. ft.
Town center retail/service/restaurants	-
Town center office	-
Movies/entertainment	-
Office park	666,718 sq. ft.
Retail	427,093 sq. ft.
Total Commercial and Mixed Use	**1,214,693 sq. ft.**

Table 4.1-6 Alternative 3 – Projected Maximum Build-out

Land Use	Maximum Build-out Projection
Community Services and Recreation	
Regional recreation center	100,000 sq. ft.
School	-
Aviation museum	200,000 sq. ft.
Park/open space	-
Roads/sidewalks/paths, etc.	-
Airfield	-
Airfield operations	-
Total Community Services and Recreation Uses	**300,000 sq. ft.**
Totals	**70 Residential Units and 1,514,693 sq. ft. of Non-Residential Space**

The projected density of the development would not be expected to occur at once and would be implemented over a 20-year build-out period. The intent would be to develop new building space as future market conditions and improvements to on-site and off-site infrastructure capacity dictate. Considering the 20-year build-out period, the development projected under Alternative 3 would not be expected to result in direct impacts on land use; however, as stated previously, such development would be inconsistent with the existing zoning regulations.

Approved Public Benefit Conveyances

Approved PBCs, including properties for recreation, civic and cultural uses, and housing for the homeless, and impacts associated with the transfer of these properties would be similar to those under Alternative 1. In addition to these properties, buildings and facilities associated with the airfield could be transferred to an airport authority, including the Bucks County Aviation Authority or Montgomery County, both of which submitted an application for a PBC for the majority of the installation but were denied by the HLRA (RKG 2012; Hatboro-Horsham Patch 2011). PBC development associated with the airfield would be inconsistent with the Redevelopment Plan because reuse of the airfield was not included as a redevelopment option. PBCs associated with the airfield would be inconsistent with the Horsham Township Comprehensive Plan Update 2011 and zoning ordinance.

4.1.3.4 Surrounding Existing Land Uses and Consistency with Comprehensive Plans

Under Alternative 3, proposed land uses along the periphery of the installation would be compatible with baseline land uses adjacent to the installation (see Figure 4.1-3). Conversion of the former airfield to a civilian, general aviation airfield would require approval of an Airport Layout Plan (ALP) by the FAA. In addition, if any commercial air carrier activities were to be established, they would require additional certifications/approvals by the FAA. As noted in Section 3.1.2, the ACNOD that was in place due to the previous aircraft operations at NAS JRB Willow Grove was eliminated from the Horsham Township zoning ordinance in February 2013. Under Alternative 3, general aviation aircraft operations are proposed and in order to promote the health and safety and to protect the operational capability of the airfield, the local zoning ordinance would need to be reevaluated to establish land use and development controls.

Airport development and operations would be further regulated by the FAA and, if applicable, may require implementation of the following federal legislation and airport-related regulations:

- Aviation Safety and noise Abatement Act of 1979;
- Federal Aviation Regulation Part 150 Noise Compatibility Program;

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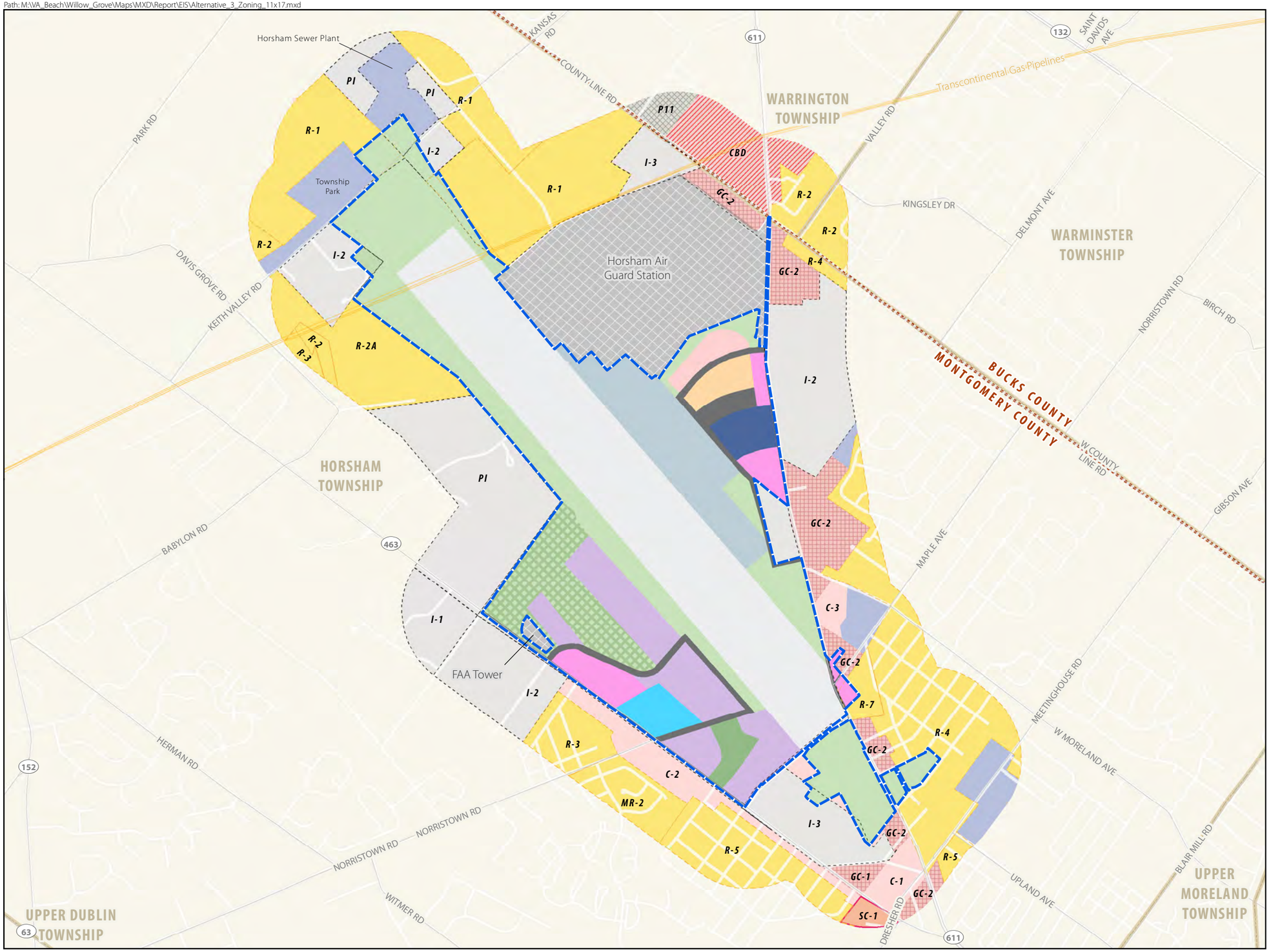

Figure 4.1-3

Alternative 3 - Zoning

on and surrounding former NAS-JB Willow Grove

(Airfield Reuse)

Horsham, PA

Legend

- Major Road
- Transcontinental Gas Pipelines
- NAS JRB Willow Grove
- County Boundary
- Township Boundary
- FAA Tower and Horsham Air Guard Station (not included in redevelopment)

Alternative 3 Land Uses

- Airfield
- Airfield Operations
- Aviation Museum
- Bucks County Housing Group
- Park
- Open Space
- Hotel/Conference Center
- Office Park
- Par 3 Golf Course
- Recreation Center
- Retail
- Roads/Parking

Existing Zoning

- Residential
- Central Business
- Commercial
- Commercial Neighborhood
- General Commercial
- Manufacturing
- Planned Industrial
- Municipal Property

N

SCALE

0 0.25 0.5 Miles

SOURCE: ESRI 2010; RKG 2012; Horsham Township 1995. Horsham Township Zoning Map; Warminster Township 2009. Warminster Township Zoning Map; Warrington Township 2006. Zoning in Warrington and Adjacent Municipalities. Warrington Township Comprehensive Plan Update 2006; Ecology and Environment 2013; National Pipeline Mapping System 2007; Tetra Tech 2012.

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- Airport and Airway Improvement Act of 1982;
- Airport noise and Capacity Act of 1990 (National Noise Policy);
- FAA Advisory Circular 150/5200-33, Hazardous Wildlife Attractants on or Near Airports;
- Federal Aviation Regulation Part 77; and AC 70/7460-2J Proposed Construction or Alteration of Objects that May Affect the Navigable Airspace.

Proposed open space, including the clear zones (i.e., runway protection zones) at each end of the runway, would separate the airfield from surrounding proposed and existing land uses. Land uses along Easton Road and Horsham Road are primarily commercial/retail, similar to the proposed land uses under Alternative 3. In addition, proposed open spaces and recreation areas would be located next to existing recreation areas, residential areas, commercial areas, and open spaces.

Full build-out of Alternative 3 would likely induce some indirect off-site land use impacts as a result of the commercial and recreational development that would occur on the former installation. Reuse of the airfield as a general aviation airport would limit development in the established runway protection zones. Other indirect off-site impacts would be similar to those under Alternative 1 but less substantial, because less housing and commercial space would be developed under Alternative 3. Similar to Alternative 1, full build-out could have the beneficial indirect effect of preserving natural open spaces and agricultural areas from being developed; however, it would be expected that less open space and agricultural areas would be preserved compared to Alternative 1 because less housing and commercial space would be provided under Alternative 3.

Proposed land uses along the periphery of the installation would be compatible with zoning designations on properties adjacent to the installation, which include industrial, commercial, and residential.

Warrington Township Comprehensive Plan Update

Impacts under Alternative 3 would be similar to those under Alternative 1.

Warminster Township Comprehensive Plan

Consistency with the Warminster Township Comprehensive Plan would be similar to Alternative 1; however, Alternative 3 would not alleviate as much pressure to develop infill areas with natural and cultural resources within Warminster Township because less land would be developed for commercial and office uses and no land would be provided for residential uses.

4.1.4 No Action Alternative

Under the No Action Alternative, the installation would be retained by the federal government in caretaker status, and redevelopment of the installation would not occur. The No Action Alternative would be compatible with adjacent land uses; however, it would be inconsistent with the Horsham Township Comprehensive Plan Update 2011, which encourages the redevelopment of the installation and discontinued use of the airfield. The No Action Alternative would be consistent with the Warrington Township Comprehensive Plan Update because it would not add additional commercial/retail space along Easton Road. Although implementation of the No Action Alternative would not necessarily be inconsistent with the Warminster Comprehensive Plan, maintaining the installation in caretaker status would not alleviate pressure to develop infill properties with natural and cultural resources, which would indirectly make it more difficult for the township to adhere to the comprehensive plan. In addition, the No Action Alternative would be inconsistent with the Connections plan because it would not provide for redevelopment of the underutilized installation and development of vacant, infill property, which could result in the loss of open space and agricultural areas to meet future residential and commercial needs.

4.2 Socioeconomics and Environmental Justice

This section provides a discussion of the impacts on socioeconomic conditions in the communities surrounding the former NAS JRB Willow Grove installation. For the purposes of projecting economic impacts, the local economic impact area is defined as Montgomery County, which contains Horsham Township, and Bucks County. Therefore, this section describes the potential socioeconomic impacts resulting from disposal and redevelopment of the former installation property under Alternative 1, Alternative 2, Alternative 3, and the No Action Alternative on these two counties and, where appropriate, on Horsham Township.

4.2.1 Alternative 1 (HLRA Plan - Preferred Alternative)

4.2.1.1 Economy, Employment, and Income

Implementation of Alternative 1, the Redevelopment Plan, would result in a beneficial impact, including both short- and long-term economic impacts on the local and regional economies. Positive short-term economic impacts would result from the one-time construction expenditures needed to implement the alternative, and positive long-term economic impacts would result from the increased economic activity that would occur at the redeveloped site.

Total construction expenditures needed to complete Alternative 1 at full build-out are estimated to be approximately $928.0 million (see Table 4.2-1). (All monetary amounts in the following tables and analysis are expressed in constant 2013 dollars). These expenditures include an estimated $783.7 million needed to build the new structures and $144.3 million to complete infrastructure requirements (such as roads, water mains, wastewater storage tanks and the demolition of runways and buildings).

Table 4.2-1 Estimated Construction Costs to Implement Alternative 1 (Full Build-out)[1]

Item	Construction Costs ($ millions [2013])
Structures	$783.7
Infrastructure	$144.3
Total	**$928.0**

Source: RKG 2012.

Notes:
[1] Construction cost estimates were developed by adapting information from the Redevelopment Plan (RKG 2012).

Direct economic impacts from the construction expenditures, in the form of increased output, employment, and earnings in the regional economy, would occur as firms and workers located in the region are hired for construction. Indirect economic impacts, in the form of increased output, employment, and earnings, would occur when local suppliers provide materials for the construction. Induced economic impacts, in the form of increased output, employment, and earnings at local businesses, would occur when the construction workers spend a portion of their incomes in the regional economy. Table 4.2-2 provides estimates of the total (i.e., the combination of direct, indirect, and induced) impacts of construction expenditures under Alternative 1 on output, employee earnings, and employment in the regional economy. These estimates were developed using the U.S. Bureau of Economic Analysis' economic modeling system known as the Regional Input-Output Modeling System "RIMS II" (U.S. Bureau of Economic Analysis 2013).

Table 4.2-2 Total Impacts (Direct, Indirect, and Induced) from Construction Expenditures under Alternative 1

Items	Total Impacts from Construction	Annual Impacts during the 20-Year Build-out Phase
Total construction expenditures ($ millions)	$928.0	$46.4
Total change in regional output ($ millions)	$1,765.3	$88.3
Total change in employment (jobs)	9,666	483
Total change in employee earnings ($ millions)	$452.1	$22.6

Total construction expenditures shown in Table 4.2-2 show the impact as a lump sum if assuming that these expenditures would all be spent all at one time. However, in actuality, construction would likely be spread over a 20-year time frame and residential units and commercial space would be built as market conditions dictate. Therefore, the results shown should be viewed as the total economic impacts that would occur as a result of construction, not the annual impacts. If construction expenditures would be evenly divided throughout a 20-year period, then the annual economic impacts of construction would be an average annual increase of $88.3 million in regional output, an additional 483 jobs per year, and an average annual increase of $22.6 million in employee earnings (see Table 4.2-2).

Since the construction costs are one-time expenditures, the positive economic impacts of construction would be temporary and last only while construction is occurring. Once these funds leave the region through such outlays as savings, taxes, or purchases of goods and services from outside the region, these positive economic effects would no longer occur.

In contrast, the positive economic impacts that would have a long-term impact on Montgomery and Bucks counties and on Horsham Township are those that would occur as a result of the ongoing operations from the built facilities. Assuming that the full build-out potential is met and that the former installation property would be used by business enterprises new to the region, Alternative 1 would directly generate an estimated 7,577 new jobs. The estimated number of new jobs was calculated using a methodology similar to that which was employed in the Redevelopment Plan (RKG 2012). Where specific types of business enterprises had been identified (e.g., nursing homes), employment estimates were based on typical employment needs for that type of business. In instances where more generic redevelopment plans were proposed (e.g., the construction of office space), standard demographic multipliers were used. These multipliers use an average number of employees based on a given amount of work space for non-residential uses. They were applied to the estimated square footage of the type of development expected to occur under Alternative 1 to project the total direct employment at full build-out (see Table 4.2-3).

In addition to the direct jobs expected to be generated under Alternative 1, indirect and induced employment impacts would be expected to occur as the increased employment and business activity stimulates the regional economy. As shown on Table 4.2-3, an additional 2,780 indirect and induced jobs would be expected to be generated under Alternative 1. In total, an estimated 10,357 direct, indirect, and induced jobs would be expected to be created under this alternative. The indirect and induced job estimates were developed using the U.S. Bureau of Economic Analysis' RIMS II modeling system and the total number of direct jobs estimated to be generated by redevelopment of the former installation (U.S. Bureau of Economic Analysis 2013).

Table 4.2-3 Estimated Number of Jobs Generated during the Operations Phase under Alternative 1 (Full Build-out)

Type	Jobs
Direct	7,577
Indirect and Induced	2,780
Total Direct, Indirect, and Induced	10,357

When compared to the 770,388 workers who were in the labor force in Montgomery and Bucks counties in 2011, these additional 10,357 jobs would amount to 1.34 percent of the total labor force for both counties.

4.2.1.2 Population

Implementation of Alternative 1 would have an impact on the population and demographic characteristics of Horsham Township. Evaluated at full build-out, a total of 1,486 new housing units, including single-family homes, townhouses, apartments/condominiums, independent living and assisted living facilities, nursing home units, and BCHG housing units and would be built in Horsham Township. Section 4.2.1.3 provides a more detailed discussion of the potential impacts on the local housing market that would occur under Alternative 1.

The proposed construction of 1,486 housing units would be expected to cause an influx of new residents to Horsham Township by increasing the number of available housing units in the township. Assuming that the new residents would have similar demographic characteristics as the baseline population and that each of these new housing units would be filled by individuals who currently live outside the township, the total population in Horsham Township would increase by an estimated 3,555 persons under Alternative 1.

The above figure was estimated using the quantities and types of housing units in the Redevelopment Plan and combining it with data on the average household size by type of housing unit for Horsham Township. The average household size for owner-occupied housing units in Horsham Township was 2.89 persons, while the average household size for renter-occupied units in Horsham Township was 1.96 persons during the same period (U.S. Census Bureau 2011b). For this analysis, it was assumed that all single-family homes and townhomes constructed on the site would be owner-occupied housing units and that all other housing units would be renter-occupied.

The increased employment opportunities that would occur under Alternative 1 as described in Section 4.2.1.1 would also have the potential to slightly increase regional population. However, given the large labor force in the greater Philadelphia area, the relatively high unemployment rates in local labor markets, and the moderate number of jobs created under Alternative 1 compared with the overall labor force in the Philadelphia MSA, it would be expected that most of these additional jobs would be filled by workers already residing in the region, resulting in little additional in-migration.

Consequently, Alternative 1 would be expected to have a moderate impact on the population of Horsham Township. While the expected increase in population of 3,555 persons would be equivalent to 14 percent of the township's 2010 total population, this increase would occur over a 20-year period. Therefore, the annual change in total population would be much less. In addition, based on the DVRPC's projections, Horsham Township is anticipated to experience large growth over the next 20 years. Between 2010 and 2030, total population in the township is expected increase by approximately 17.1 percent, or by nearly 5,500 residents, to 30,614 residents (DVRPC 2012a).

4.2.1.3 Housing and Commercial Property

Under Alternative 1, 1,486 new housing units would be constructed on the former installation at full build-out. Approximately 340 of these units would be single-family homes, 350 units would be townhomes, and 400 units would be condominiums or apartments. The remaining housing units would be housing for the BCHG or independent, assisted living, or skilled nursing housing units.

There would be an increase of 1,486 housing units (14.8 percent) in the total housing stock in Horsham Township. The construction of 340 single-family homes would be a 6.0 percent increase in these types of units in the township, while the 750 townhomes, apartments, and condominiums would be an increase of 17.3 percent in multi-family housing in the township over 2010 levels.

This increase in the supply of housing units in Horsham Township could have a slight impact on the price and availability of existing units as the additional units reduce demand for existing structures. However, given the extremely low homeowner vacancy rates and the low rental vacancy rates currently in the township and in the region as a whole, this impact would be expected to be minor. Because the proposed redevelopment would occur over a 20-year period, this would result in an annual change of only 75 new housing units a year, resulting in a negligible annual impact on the township's housing market.

Alternative 1 could have an impact on the commercial property market in Horsham Township. Construction of approximately 1.16 million square feet of office space at the former installation would increase the total office space in the township by 19.7 percent. Construction of approximately 200,200 square feet of retail space at the former installation would increase total retail space in the township by 12.5 percent.

The additional retail property would not be expected to have an impact on the market for retail space in Horsham Township; however, the addition of 1.16 million square feet of office space could impact the market for office properties. This additional supply could result in downward pressure on prices at existing office buildings in the area if new tenants from outside the region are not found for the proposed office buildings.

4.2.1.4 Taxes and Revenues

Implementation of Alternative 1 would have a positive impact through the generation of revenues within Horsham Township through increases in additional real estate tax revenues, school district tax revenues, and earned income tax revenues from residents and non-residents. In addition, other revenues sources could increase (e.g., licenses, permits, fees, etc.) due to the construction of new properties, expansion of the property tax base, and the creation of permanent jobs in the township. Table 4.2-4 shows the estimated amounts of such revenues at full build-out. The estimated total addition to tax revenues is $15.6 million per year at full build-out, which was adapted from calculations in the Redevelopment Plan (RKG 2012).

Table 4.2-4 Estimated Additional Annual Tax Revenues in Horsham Township under Alternative 1 (Full Build-out)

Type of Tax	Revenues ($ millions [2013])
Real estate taxes	$0.5
School district taxes	$13.0
Earned income taxes	$1.8
All other taxes[1]	$0.3
Total	**$15.6**

Note:
[1] All other taxes includes permits, licenses, fees, etc.

4.2.1.5 Environmental Justice and Protection of Children

Consistent with EO 12898 - Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (February 11, 1994), and EO 13045 - Environmental Health Risks and Safety Risks to Children (April 21, 1997), the U.S. Navy's policy is to identify and address any disproportionately high and adverse human health or environmental effects of its actions on minority and low-income populations and on persons under the age of 18 years.

Demographic and economic data for all census block groups that are adjacent to or wholly or partially within the former installation were compared with similar countywide demographic and economic data to determine whether the proposed action could have disproportionately high and adverse effects on minority or low-income populations or on children. When the percentage of the population that is either minority/low-income or under the age of 18 years within an affected area exceeds 50 percent or is "meaningfully greater" than the minority or low-income population percentage of the community of comparison, that population could potentially experience a disproportionately high and adverse effect.

Table 4.2-5 provides demographic data for all census block groups expected to be affected by the redevelopment proposed under Alternative 1. Figure 4.2-1 identifies the locations of the census tracts and census block groups that fall within the project area or that are directly adjacent to the project area. Table 4.2-6 provides economic information for all census tracts that would be affected by redevelopment under Alternative 1. Income statistics are not provided at the census block group level; therefore, it is presented in this section at the larger census tract level. These demographic and economic data were compared with similar demographic and economic data for Montgomery and Bucks counties as the area of comparison.

Table 4.2-5 Environmental Justice Demographic Data, by Block Group, under Alternative 1

County/Census Block Group	Total Population	Minority Population (%)	Hispanic or Latino Population (%)	Population Aged <18 Years (%)
Montgomery County	**799,874**	**18.9**	**4.3**	**22.9**
Census Tract 200501, Block Group 1	1,416	6.9	2.3	21.2
Census Tract 200502, Block Group 3	1,378	17.2	5.6	23.1
Census Tract 200502, Block Group 4	1,034	21.6	7.8	23.2
Census Tract 200505, Block Group 3	3,127	11.6	2.2	31.0
Census Tract 200506, Block Group 2	2,735	12.7	1.7	25.2
Census Tract 200507, Block Group 1	1,879	17.0	2.8	19.6
Bucks County	**625,249**	**10.8**	**4.3**	**23.0**
Census Tract 101803, Block Group 3	2,410	9.1	2.2	22.8
Census Tract 101808, Block Group 1	2,257	**14.1**	7.9	12.8

Source: U.S Census Bureau 2010a, 2010b, 2010c, 2010d.

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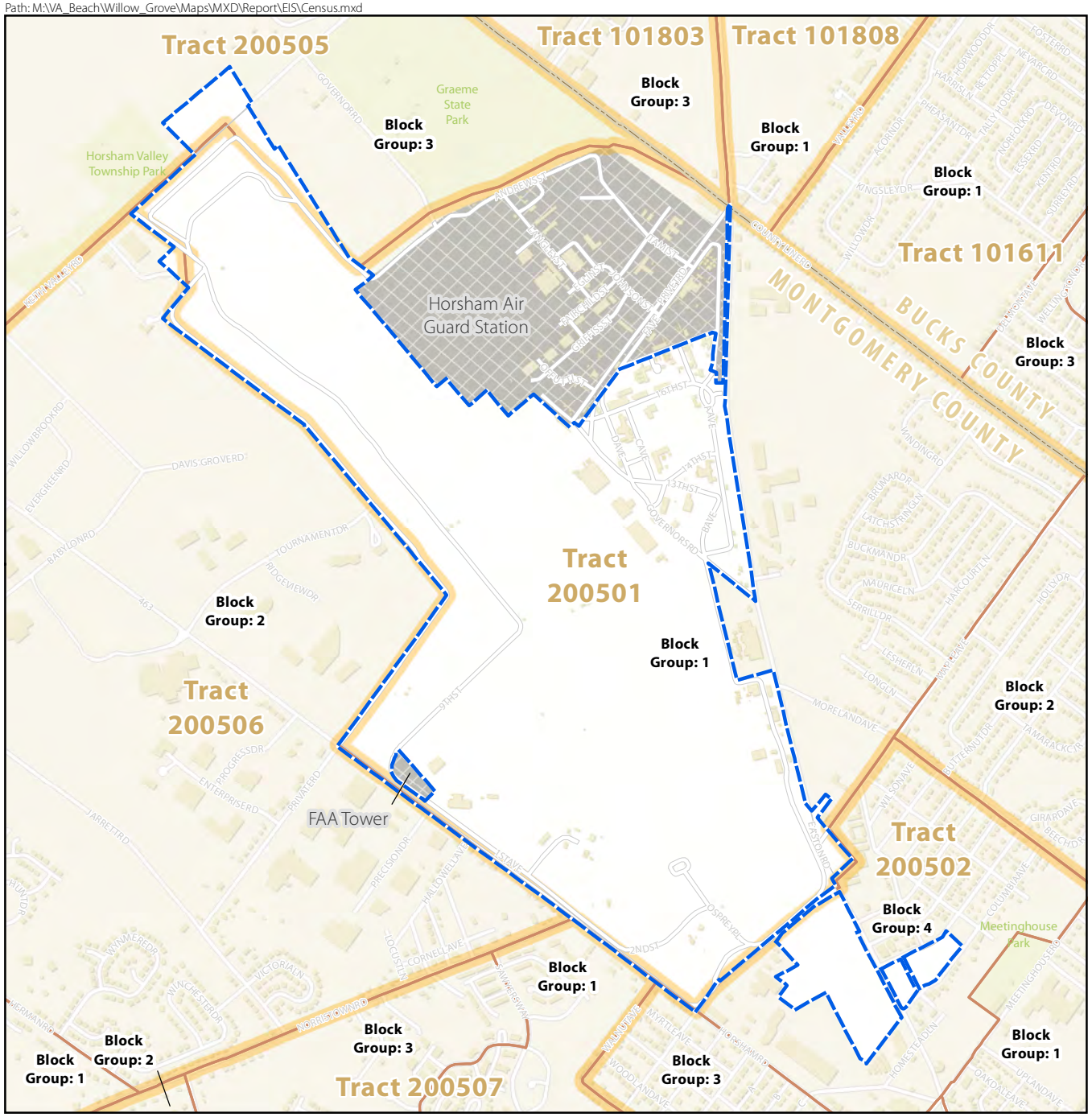

Figure 4.2-1

U.S. Census Tracts and Block Groups

on or surrounding former NAS-JB Willow Grove

Horsham, PA

Legend

- NAS JRB Willow Grove
- FAA Tower and Horsham Air Guard Station (not included in redevelopment)
- County Boundary
- Census Block Group
- Census Tract

N

SCALE

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SOURCE: Ecology and Environment 2013; ESRI 2010; Tetra Tech 2012; USDA NRCS 2009; US Census Bureau, 2012.

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Table 4.2-6 Environmental Justice Economic Data – Population Below Poverty Level, by Census Tract, under Alternative 1

Census Tract	Population Below Poverty Level (%)
Montgomery County	**5.7**
200501	1.3
200502	12.6
200505	5.3
200506	2.8
200507	3.6
Bucks County	**5.2**
101803	3.0
101808	2.4

Source: U.S. Census Bureau 2011c.

As shown in Tables 4.2-5 and 4.2-6, and based on the threshold levels described above, the Navy has determined the following:

- Census Tract 200502, Block Group 4, in Montgomery County has a higher minority and Hispanic/Latino population than the community of comparison;
- Census Tract 200502 in Montgomery County as a whole has a higher percentage of people living in poverty than the community of comparison;
- Census Tract 200505, Block Group 3, and Census Tract 200506, Block Group 2, in Montgomery County have higher percentages of people aged less than 18 years than the community of comparison; and
- Census Tract 101808, Block Group 1, in Bucks County includes a larger minority population and Hispanic/Latino population than the community of comparison.

Environmental justice communities are present within the study area. These areas contain percentages of minority and Hispanic populations, population living below the poverty level, or the residents identified as children that are higher in the affected census block groups and census tracts than in the counties as a whole.

However, there would not be a disproportionately high or adverse effect on these populations as the adverse effects (i.e., potential for increased traffic) would be spread throughout the community. In addition, the Redevelopment Plan was designed by the HLRA to provide economic benefit to the surrounding community, resulting in new jobs, additional housing units, and additional tax revenues for Horsham Township. Therefore, the overall impact of the redevelopment of the former installation property would promote positive economic development, which would benefit the entire township.

4.2.2 Alternative 2 (HLRA Plan with Increased Residential Development)

4.2.2.1 Economy, Employment, and Income

Implementation of Alternative 2 would have a beneficial impact, including positive short- and long-term economic impacts on the local and regional economies. Total construction costs would be slightly higher under Alternative 2 than those described in Alternative 1. Total construction expenditures for Alternative 2 would be estimated to be $944.7 million for the full build-out (see Table 4.2-7). Compared to Alternative 1, expenditures on structures would be higher under Alternative 2, because of a larger number

of housing units, and expenditures on infrastructure would be lower, with a larger area for parks and open spaces under Alternative 2. The methodology used in developing these estimates is the same as described for Alternative 1.

Table 4.2-7 Estimated Total Construction Costs to Implement Alternative 2 (Full Build-out)[1]

Item	Construction Costs ($ millions [2013])
Structures	$823.8
Infrastructure	$120.9
Total	**$944.7**

Source: RKG 2012.

Notes:
[1] Construction cost estimates were developed by adapting information from RKG 2012.

As a result of higher construction expenditures under Alternative 2, the positive short-term economic impacts from construction, in the form of increased regional output, employment, and employee earnings, would be larger under Alternative 2 than those estimated for Alternative 1. Total regional output would increase by $1.8 billion, total employment would increase by 10,098 jobs, and employee earnings would increase by $460.3 million (see Table 4.2-8).

Table 4.2-8 Total Impacts (Direct, Indirect, and Induced) from Construction Expenditures under Alternative 2

Items	Total Impacts from Construction	Annual Impacts During the 20-Year Build-out Phase
Total construction expenditures ($ millions)	$944.7	$47.2
Total change in regional output ($ millions)	$1,797.1	$89.9
Total change in employment (jobs)	9,840	492
Total change in employee earnings ($ millions)	$460.3	$23.0

If construction expenditures were evenly divided throughout a 20-year period, the annual economic impacts of the construction expenditures for Alternative 2 would be an average annual increase of $89.9 million in regional output, an additional 492 jobs per year, and an average annual increase of $23.0 million in employee earnings.

Alternative 2 would generate slightly fewer full-time permanent jobs than Alternative 1 as a result of the smaller amount of commercial development proposed under Alternative 2. At full build-out, implementation of Alternative 2 would create an estimated 9,760 jobs, including 7,131 direct jobs and 2,629 indirect and induced jobs (see Table 4.2-9). The methodology used in determining these employment impacts is the same as described for Alternative 1.

Table 4.2-9 Estimated Number of Jobs Generated during the Operations Phase under Alternative 2

Type	Jobs
Direct	7,131
Indirect and induced	2,629
Total	**9,760**

When compared to the 770,388 workers who were in the labor force in Montgomery and Bucks counties in 2011, these additional 9,760 estimated jobs would amount to 1.26 percent of the total labor force for both counties.

4.2.2.2 Population

Similar to Alternative 1, Alternative 2 would have an impact on the population and demographic characteristics of Horsham Township. If implemented as proposed, a total of 1,999 new housing units, including single-family homes, townhouses, apartments/condominiums, independent living and assisted living facilities, nursing home units, and BCHG units, would be built in Horsham Township. Section 4.2.2.3 provides a more detailed discussion of the potential impacts on the local housing market that would occur under Alternative 2.

The proposed construction of 1,999 housing units at the former installation under Alternative 2 would be expected to cause an influx of new residents to Horsham Township by increasing the number of available housing units in the township. Assuming that the new residents would have similar demographic characteristics as the baseline population and that each of these new housing units would be filled by individuals who currently lived outside the township, the total population in Horsham Township would increase by an estimated 4,653 persons. This increase in population would be equivalent to 18 percent of the township's 2010 total population.

The increased employment opportunities that would occur under Alternative 2 would also have the potential to slightly increase the regional population. However, given the large labor force in the greater Philadelphia area, the relatively high unemployment rates in local labor markets, and the moderate number of jobs created under Alternative 2, it would be expected that most of these additional jobs would be filled by workers already residing in the region, resulting in little additional in-migration to the township.

4.2.2.3 Housing and Commercial Property

Under Alternative 2, 1,999 new housing units would be expected to be constructed on the former installation property at full build-out. As described in this section, 396 of these units would be single-family homes, 396 units would be townhomes, and 759 would be condominiums or apartments. The remaining housing units would be for BCHG or independent, assisted living, or skilled nursing housing units.

There would be an addition of 1,999 housing units (19.8 percent) in the total housing stock in Horsham Township. The construction of 396 single-family homes would be a 7.0 percent increase in these types of units in the township, while the construction of 1,155 townhomes, apartments, and condominiums would be an increase of 26.6 percent in multi-family housing in the township over 2010 levels.

This increase in the supply of housing units in Horsham Township would be expected to have an impact on price and availability on existing units as the additional units reduce demand for existing structures. However, given the extremely low homeowner vacancy rates and the low rental vacancy rates currently in the township and in the region as a whole, this impact would be expected to be moderate. Because the proposed redevelopment would occur over a 20-year period, this would result in an annual change of only approximately 100 new housing units a year, resulting in a minor annual impact on the township's housing market.

Implementation of Alternative 2 could have an impact on the commercial property market in Horsham Township. Construction of approximately 1.13 million square feet of office space at the former installation would increase the total office space in the township by 19.2 percent. Construction of

approximately 139,100 square feet of retail space at the former installation would increase total retail space in the township by 8.7 percent.

The additional retail property would not be expected to have an impact on the market for retail space in Horsham Township; however, the addition of 1.25 million square feet of office space could impact the market for office properties. This additional supply could result in downward pressure on prices at existing office buildings in the area if new tenants from outside the region are not found for the proposed office buildings.

4.2.2.4 Taxes and Revenues

Implementation of Alternative 2 would also have a positive impact on the value of taxable real estate and personal income tax in Horsham Township. Estimates of the annual additional real estate tax revenues, school district tax revenues, earned income tax revenues from residents and non-residents, and other revenues sources (e.g., licenses, permits, fees, etc.) in Horsham Township that would result under Alternative 2 at full build-out are shown in Table 4.2-10. An addition of approximately $16.9 million in local government revenues would be anticipated each year.

Table 4.2-10 Estimated Additional Tax Revenues in Horsham Township under Alternative 2 (Full Build-Out)

Type of Tax	Revenues ($ millions [2013])
Real estate taxes	$0.6
School district taxes	$13.8
Earned income taxes	$2.1
All other taxes[1]	$0.4
Total	**$16.9**

Notes:
[1] All other taxes includes permits, licenses, fees, etc.

4.2.2.5 Environmental Justice and Protection of Children

The census tracts and census block groups that could be affected under Alternative 2 are the same as those that would be affected under Alternative 1. Therefore, the same environmental justice communities exist within the study area under Alternative 2 as noted under Alternative 1.

However, similar to Alternative 1, under Alternative 2 there would not be a disproportionately high or adverse effect on these populations as the adverse effects (i.e., potential for increased traffic) would be spread throughout the community. The redevelopment proposed under Alternative 2 was also designed by the HLRA to provide economic benefit to the surrounding community, resulting in new jobs, additional housing units, and additional tax revenues for Horsham Township. Therefore, the overall impact of the redevelopment of the former installation property would be to promote positive economic development, which would benefit the entire township.

4.2.3 Alternative 3 (Airfield Reuse)

4.2.3.1 Economy, Employment, and Income

Implementation of Alternative 3 would have a beneficial impact, including positive short- and long-term economic impacts on the local and regional economies. However, total construction costs would be substantially less under Alternative 3 than under Alternatives 1 and 2. Total construction expenditures for Alternative 3 are estimated to be $274.3 million at full build-out (see Table 4.2-11). Construction

expenditures would be substantially less under Alternative 3 than under Alternatives 1 and 2 due to the elimination of all proposed residential development, other than housing for the BCHG and the much smaller amount of proposed commercial development.

Table 4.2-11 Estimated Total Construction Costs to Implement Alternative 3 (Full Build-out)[1]

Item	Construction Costs ($ millions [2013])
Structures	$238.8
Infrastructure	$35.5
Total	**$274.3**

Source: RKG 2012.

Note:
[1] Construction cost estimates were developed by adapting information from the Redevelopment Plan (RKG 2012).

As a result of the lower construction expenditures under Alternative 3, the resulting positive short-term economic impacts from construction, in the form of increased regional output, employment, and employee earnings, are also lower than those estimated for Alternatives 1 and 2 (see Table 4.2-12).

Table 4.2-12 Total Impacts (Direct, Indirect, and Induced) from Construction Expenditures under Alternative 3

Item	Total Impacts from Construction	Annual Impacts during the 20 Year Build-out Phase
Total construction expenditures ($ millions)	$274.3	$13.7
Total change in regional output ($ millions)	$521.8	$26.1
Total change in employment (jobs)	2,857	143
Total change in employee earnings ($ millions)	$133.6	$6.7

If construction expenditures were evenly divided throughout a 20-year period, the annual economic impacts of the construction expenditures for Alternative 3 would be an average annual increase of $26.1 million in regional output, an additional 143 jobs per year, and an average annual increase of $6.7 million in employee earnings.

Implementation of Alternative 3 would be expected to result in the creation of fewer direct permanent jobs at full build-out during the operations phase than under Alternatives 1 and 2. An estimated 5,283 direct jobs would be created under Alternative 3. The methodology used in developing the estimates for commercial, office, and retail direct employment is the same as described for Alternative 1. However, unlike the other two alternatives, Alternative 3 also features the reuse of the airfield as a general aviation airport, which would create permanent direct jobs. Data contained in *The Economic Impact of Aviation in Pennsylvania* (Wilbur Smith and Associates, Inc. 2011) were used to determine a numerical relationship between employment and the number of takeoffs and landings at an airport. The numerical relationship and the estimate of the average annual aircraft operations assumed to occur in 2034 under this alternative (see Section 4.7, Noise and Appendix E for additional information on aircraft operations) were then multiplied together to estimate airfield direct employment. Based on the assumption that an estimated 48,511 fight operations would occur annually at the airport by 2034 under Alternative 3, the airport would employ 351 workers.

In total, an estimated 5,283 direct jobs would be created by implementation of Alternative 3. When the indirect and induced impacts are included, Alternative 3 would be expected to generate a total of 7,613 direct, indirect, and induced jobs (see Table 4.2-13).

Table 4.2-13 Estimated Number of Jobs Generated during the Operations Phase under Alternative 3 (Full Build-out)

Type of Job	Jobs
Direct	5,283
Indirect and induced	2,330
Total	**7,613**

When compared to the 770,388 workers who were in the labor force in Montgomery and Bucks counties in 2011, these additional 7,613 jobs would result in a 1.0 percent increase in the total labor force for both counties.

4.2.3.2 Population

Implementation of Alternative 3 would have only a very minor impact of the population of Horsham Township. The only residential development proposed under this alternative is 70 BCHG units. If it is assumed that these units would be filled by individuals who currently live outside of Horsham Township, then these additional residents would account for less than 0.1 percent of the township's 2010 population. If these units serve residents currently living in Horsham Township, there would be no increase in population as a result of residential development under this alternative.

The increased employment opportunities that would occur under Alternative 3 could also have the potential to slightly increase the regional population. However, given the large labor force in the greater Philadelphia area, the relatively high unemployment rates in local labor markets, and the moderate number of jobs created under Alternative 3, it would be expected that most of these additional jobs would be filled by workers already residing in the region, resulting in little additional in-migration to the township.

4.2.3.3 Housing and Commercial Property

As described in Section 2, under Alternative 3, very little residential housing would be constructed at the former installation, as only 70 units for BCHG is proposed. The construction of these units would have no impact on the price or availability of housing units in Horsham Township.

Implementation of Alternative 3 could have an impact on the commercial property market in Horsham Township. The approximately 667,000 square feet of office space proposed to be constructed at the former installation would increase total office space in the township by 11.3 percent. The construction of approximately 427,000 square feet of retail space at the former installation property would increase total retail space in the township by 26.7 percent.

The additional commercial and retail property could have an impact on the market for retail and office properties in Horsham Township. This additional supply could result in downward pressure on prices at existing office and retail buildings in the area if new tenants from outside the region are not found for the proposed spaces.

4.2.3.4 Taxes and Revenues

Implementation of Alternative 3 would also have a positive impact on the value of taxable real estate and personal income tax in Horsham Township. Estimates of the annual additional real estate tax revenues, school district tax revenues, earned income tax revenues from residents and non-residents, and other revenues sources (e.g., licenses, permits, fees, etc.) in Horsham Township that would result from the implementation of Alternative 3 at full build-out are shown on Table 4.2-14. It was assumed that an

airport fee structure would be implemented at the airfield under Alternative 3, which would create an additional source of revenue. An increase of approximately $4.2 million in local government revenues would be expected each year.

Table 4.2-14 Estimated Additional Tax Revenues in Horsham Township under Alternative 3 (Full Build-out)

Type of Tax	Revenues ($ millions [2013])
Real estate taxes	$0.1
School district taxes	$3.6
Earned income taxes	$0.4
All other taxes[1]	$0.1
Total	$4.2

Notes:
[1] All other taxes includes permits, licenses, fees, etc.

4.2.3.5 Environmental Justice and Protection of Children

Census tracts and census block groups that could be affected under Alternative 3 are the same as those that could be affected under Alternative 1. Therefore, the same environmental justice communities exist within the study area under Alternative 3 as noted under Alternative 1.

However, under Alternative 3 there would not be a disproportionately high or adverse effect on these populations, as the adverse effects (i.e., potential for increased traffic) would be spread throughout the community. Under Alternative 3, redevelopment of the former installation and reuse of the airfield would provide economic benefit to the surrounding community, resulting in new jobs and additional tax revenues for Horsham Township. Therefore, the overall impact of the redevelopment of the former installation property would promote positive economic development, which would benefit the entire township.

4.2.4 No Action Alternative

4.2.4.1 Economy, Employment, and Income

Under the No Action Alternative, the former installation would remain under federal government ownership and no development or additional economic activity would occur on the property. No expenditures would be made to develop the site, and no permanent jobs would be generated by activities on the property. Employment and income in Horsham Township and in Montgomery and Bucks counties would not increase compared to the baseline.

4.2.4.2 Population

Under the No Action Alternative, there would no residential development and no increase in economic activity that would influence in-migration. Therefore, there would be no impact on population in Horsham Township as a result for the No Action Alternative.

4.2.4.3 Housing and Commercial Property

Under the No Action Alternative, no redevelopment plan would be implemented and ownership of the properties would be retained by the federal government. There would be no residential or commercial development under the No Action Alternative; therefore, there would be no impact on the price or supply of housing or commercial property in Horsham Township.

4.2.4.4 Taxes and Revenues

Under the No Action Alternative, the former installation would remain under federal ownership and would be considered tax-exempt for local government taxing purposes. Therefore, no additional local government tax revenues would be generated under this alternative.

4.2.4.5 Environmental Justice and Protection of Children

Under the No Action Alternative, no redevelopment plan would be implemented and ownership of the former installation would be retained by the federal government. Since the No Action Alternative would generate no significant adverse environmental or human health impacts, there would be no disproportionate impacts on children, or on minority, Hispanic/Latino, or low-income populations.

4.3 Community Services

This section summarizes the potential impacts on community services that would result from the implementation of Alternative 1, Alternative 2, Alternative 3, or the No Action Alternative. It includes an examination of schools, police protection, fire protection, health services, and recreational facilities. The study area includes the Hatboro-Horsham School District for schools, Horsham Township for police and fire protection, a 7-mile radius around the former installation for health services, and Horsham Township for recreational facilities. The analysis of community services discussed is based on the potential direct population change associated with the residential build-out on the former installation.

4.3.1 Alternative 1 (HLRA Plan - Preferred Alternative)

4.3.1.1 Schools

Elementary and Secondary School Capacity

The analysis provided by the Hatboro-Horsham School District to RKG Associates for Redevelopment Plan (RKG 2012) was used to calculate the impacts of Alternative 1 on schools. The assumptions used include:

- An average of 0.75 school-age children per single-family home;
- An average of 0.40 school-age children per multi-family unit;
- No children would live in the senior housing (the independent living center and the assisted living center).

Table 4.3-1 lists the residential units proposed under Alternative 1 and the corresponding number of school-age children that would be expected.

The projected school-age population would not exceed the capacity of educational resources available in the Hatboro-Horsham School District. Upon closure of NAS JRB Willow Grove, enrollment within the school district declined as military members and their families were relocated out of the region, and available capacity within the school system was created by the loss of students. The projected school-age population (571 students) resulting from the full build-out of Alternative 1 would be expected to be absorbed by the school capacity created through the loss of students from military families when the former installation closed (see Table 4.3-2). It would be expected that private schools in the area also lost students because of the closure of NAS JRB Willow Grove and that this loss created capacity that can be filled when the former installation would be redeveloped.

Table 4.3-1 School-age Population Projections under Alternative 1 (Full Build-Out)

Type of Unit	Number of Units Proposed	Multiplier for School-age Children per Unit	Number of School-age Children[1]
Large-lot, single-family	90	0.75	68
Small-lot, single-family	250	0.15 and 0.75 [2]	28
Townhomes	350	0.75	263
Apartments	300	0.40	120
Town center apartment/condominium	100	0.40	40
Independent living	141	0	0
Assisted living	185	0	0
BCHG	70	0.75	53
Total	**1,486**	**N/A**	**571**

Notes:
[1] Totals may not sum exactly due to rounding.
[2] RKG Associates methodology applied both 0.15 and then 0.75.

Assumptions: No school-age populations would live in senior living facilities.

Table 4.3-2 School Enrollments: Net Enrollments and School Capacities under Alternative 1 (Full Build-Out)

School	Capacity (2011)	Enrollment (2011-2012)	Projected Gain (at Full Build-out)[1]	Projected 20-year Enrollment (Full Build-out)
All five elementary schools combined (kindergarten through grade 5)	**2,528**	1,970	234	**2,204**
Keith Valley Middle School (grades 6 through 8)	**1,363**	1,218	143	**1,361**
Hatboro-Horsham High School (grades 9 through 12)	**1,988**	1,655	194[2]	**1,849**

Notes:
[1] Projected gain at full build out was calculated by dividing the total of 571 school-age children (see Table 4.3-1) based on the current proportion of students in elementary, middle and high school.
[2] Note that some of these high school students could also attend the Eastern Center for Arts and Technology for part of the day.

The additional student enrollment from implementation of Alternative 1 would not be expected to exceed school capacity or result in the need to expand educational service capacity within the Hatboro-Horsham School District. The school enrollment in the district has recently been decreasing; therefore, it was assumed that enrollment levels would stay at 2011-2012 levels as a conservative prediction. Projected school enrollment levels at full build-out would be below capacity. Therefore, full build-out of Alternative 1 would not be expected to impact baseline school services and capacity.

School District Revenue/Expenses

Implementation of Alternative 1 would not be expected to have a long-term impact on school district revenues/expenses. Due to the closure of the former NAS JRB Willow Grove installation, the school district lost students and Federal Impact Aid of approximately $650,000 per year (Griffin 2012). However, this loss would likely be short term as enrollment would be expected to increase gradually over the 20-year build out as the former installation would be redeveloped and people begin to move onto the property.

The short-term decline in the student population, the loss of Federal Impact Aid revenues, and the costs associated with the eventual expansion of education services would be offset through the redevelopment of the former installation. While in operation, the installation was nontaxable federal property, generating no property or school tax revenues; however, Federal Impact Aid was provided per student. After disposal and reuse of the property, land not transferred to other federal agencies would become newly taxable land, expanding the total municipal property subject to tax collection and school tax base.

Growth in the school-age population resulting from Alternative 1 would be directly related to the rate of re-occupancy of the property by non-military personnel. It would be expected that increases in municipal expenses associated with an increased demand for educational services resulting from Alternative 1 would be offset by a proportional growth in the tax base as the former installation is redeveloped and people purchase or rent housing on the property.

Private schools did not receive Federal Impact Aid as the tuition was paid by the child's family. These schools would also be expected to see slight increases in enrollment and paid tuition as a result of full build-out under Alternative 1.

Transfer of Land to the Hatboro-Horsham School District

The Hatboro-Horsham School District submitted a Notice of Interest to the HLRA for 60 acres of property, which would be used for the construction of new educational and/or support facilities and athletic fields (Hatboro-Horsham School District n.d.). Alternative 1 calls for the transfer of approximately 40 acres to the Hatboro-Horsham School District, which would construct a new middle school at the site, along with administrative and recreational facilities.

A recent Comprehensive Feasibility Study of the Hatboro-Horsham School District's facilities found that the district needs to improve and expand its existing facilities to provide for current and projected educational program needs and to improve inefficiencies in plant operation costs and building utilization (Hatboro-Horsham School District n.d.). The land transfer proposed under Alternative 1 would have a beneficial impact on the school district by providing it with a site for new educational facilities with more energy-efficient structures and improved environmental conditions that would be aligned with current educational philosophies (Hatboro-Horsham School District n.d.), and that would be within walking distance of the new residential neighborhoods proposed under Alternative 1.

4.3.1.2 Police Protection

Under Alternative 1, the former installation would no longer be owned by the federal government. After disposal of the property, it would no longer be a secure military facility and access to the property would be open to the general public. The property would be under the jurisdiction of Horsham Township, which would be responsible for providing police protection. Disposal of the former installation would expand the service area of the Horsham Township Police Department by approximately 861 acres. This would include up to 1,486 new residential units as well as non-residential space, including offices, retail shops, a school, and recreational areas.

Expansion of the Horsham Township Police Department service area and the density of the proposed development would be expected to result in an increase in demand for police protection. This increased demand would trigger the need for future expansion of the existing resources of the Horsham Township Police Department (i.e., additional staff and equipment). However, the costs incurred through an expansion of the Horsham Township Police Department service area would be offset by redevelopment of the former installation. While in operation, the installation was nontaxable federal property, generating no property tax revenues for Horsham Township. After disposal, this property would become newly taxable land, expanding the municipal tax base. Growth in population resulting from Alternative 1 would be directly related to the redevelopment. It would be expected that municipal expenses associated with

this growth would be offset by a proportional growth in the tax base as the former installation would be redeveloped. In addition, the redevelopment of the former installation property would occur incrementally over a 20-year build-out period, allowing for the Horsham Township Police Department to expand and add services on an as-needed basis rather than all at one time. Therefore, implementation of Alternative 1, while necessitating an expansion of police protection services, would not result in a long-term impact on police protection.

4.3.1.3 Fire Protection

Under Alternative 1, the former installation would no longer be owned by the federal government. After disposal, the property would be under the jurisdiction of Horsham Township, which would be responsible for providing fire protection. Disposal of the installation would expand the service area of the Horsham Fire Company by approximately 861 acres. This would include up to 1,486 new residential units as well as non-residential space, including offices, retail shops, a school, and recreational areas.

Expansion of the Horsham Fire Company service area and the density of the proposed development would be expected to result in an increase in demand for fire protection. This increased demand would trigger the need for future expansion of the existing resources of the Horsham Fire Company (i.e., additional staff and equipment). However, the costs incurred by expansion of the Horsham Fire Company service area would be offset by redevelopment of the former installation. While in operation, the installation was nontaxable federal property, generating no property tax revenues for Horsham Township. After disposal, this property would become newly taxable land, expanding the municipal tax base. Growth in population resulting from Alternative 1 would be directly related to the redevelopment. It would be expected that municipal expenses associated with this growth would be offset by a proportional growth in the tax base as the former installation would be redeveloped. In addition, the redevelopment of the former installation property would occur incrementally over a 20-year build-out period, allowing for the Horsham Fire Company to expand and add services on an as-needed basis rather than all at one time. Therefore, implementation of Alternative 1, while necessitating an expansion of fire protection services, would not result in a long-term impact on fire protection.

4.3.1.4 Health Services

At full build-out, Alternative 1 would be projected to directly add 3,555 new residents to the population of Horsham Township. This growth in population would be expected to increase the demand for healthcare and medical services. Based on existing health service use rates, Alternative 1 at full build-out would be expected to generate 1,714 emergency room visits, 10,782 outpatient visits, and 2,734 inpatient visit days per year (Kaiser Family Foundation 2013a, 2013b, and 2013c). Table 4.3-3 presents the projected growth in healthcare service demand under Alternative 1.

Table 4.3-3 Alternative 1 – Healthcare Service Projections

Healthcare Service	Projected Population Growth (2034)[1]	Commonwealth of Pennsylvania Average Health Service Levels (per 1,000 residents)[2]	Projected Healthcare Service Demand[3]
Emergency room visits per year	3,555	482	1,714
Outpatient visits per year	3,555	3,033	10,782
Inpatient visit days per year	3,555	769	2,734

Notes:

[1] Population projections were based on the full build-out of the property under Alternative 1 and the full occupancy of all residential units.

[2] Commonwealth of Pennsylvania average per capita health service levels obtained from Kaiser Family Foundation 2013a, 2013b, and 2013c.

[3] Projected growth in healthcare service demand derived by multiplying projected population growth by Commonwealth of Pennsylvania average per capita health service levels.

Although the demand for healthcare would increase, it would be expected that given the 20-year incremental build-out, private healthcare and medical providers would be able to add capacity, as needed, to accommodate the additional demand for services.

4.3.1.5 Recreational Facilities

Full build-out of Alternative 1 would add approximately 270 acres of new recreation and open space land to Horsham Township. A portion would be used to construct a new regional indoor recreation center with several adjacent outdoor recreation fields. The indoor facility would include a swimming pool, gymnasium, basketball courts, climbing walls, tennis and racquetball courts, and health and fitness club. The majority of the acreage (approximately 240 acres) would be developed for a wide variety of public outdoor active and passive recreation, including a 9-hole golf course, public gardens, public parks, nature parks, a festival park, green corridors, and bicycle trails. New recreation, parks, and open space would represent a beneficial impact on recreation for residents. Upon disposal of the installation property, the party responsible for maintaining the recreation and open space land would need to be identified. Additional staff may need to be employed to maintain the facilities. This could be offset by the duration of the full build–out schedule and additional tax base generated if this would be a Town of Horsham function. Private entities would likely be able to add employees based on contract workload.

The existing Harold F. Pitcairn Wings of Freedom Aviation Museum (approximately 14 acres) would remain under Alternative 1 and would add new hangar facilities. The museum is being sponsored by Montgomery County, on behalf of the Delaware Valley Historical Aircraft Association. The site would include the museum and an associated park. Improvements to this facility would represent a beneficial impact on recreation for residents.

4.3.2 Alternative 2 (HLRA Plan with Increased Residential Development)

4.3.2.1 Schools

Elementary and Secondary School Capacity

The analysis provided by the Hatboro-Horsham School District to RKG Associates for the Redevelopment Plan (RKG 2012) was used to calculate the impacts of Alternative 2 on schools. The assumptions used include:

- An average of 0.75 school-age children per single-family home;
- An average of 0.40 school-age children per multi-family unit;

- No children would live in the senior housing (the independent living center and the assisted living center).

Table 4.3-4 lists the number of different types of residential units proposed under Alternative 2 and the corresponding number of school-age children that would be expected.

Table 4.3-4 School-age Population Projections under Alternative 2 (Full Build-out)

Type of Unit	Number of Units Proposed	Multiplier for School-age Children per Unit	Number of School-age Children[1]
¼-acre lot, single-family	169	0.75	127
Small-lot, single-family	227	0.15 and 0.75[2]	26
Townhomes	396	0.75	297
Apartments	645	0.40	258
Town center apartment/condominium	114	0.40	46
Independent living	126	0	0
Assisted living	252	0	0
BCHG	70	0.75	53
Total	**1,999**	**N/A**	**807**

Notes:
[1] Totals may not sum exactly due to rounding.
[2] RKG Associates methodology applied both 0.15 and then 0.75.

Assumptions: No school-age populations would live in senior living facilities.

The projected school-age population would not exceed the educational resources available in the Hatboro-Horsham School District. Upon closure of NAS JRB Willow Grove, enrollment within the school district declined as military members and their families were relocated out of the region, and available capacity within the school system was created by the loss of students. The projected school-age population (807 students) resulting from the full build-out of Alternative 2 would be expected to be absorbed by the school capacity created by the loss of students from military families when the former installation closed (see Table 4.3-5). It would be expected that private schools in the area also lost students because of the closure of NAS JRB Willow Grove and that this loss created capacity that can be filled when the former installation would be redeveloped.

The additional student enrollment from the implementation of Alternative 2 would not be expected to exceed school capacity or result in the need to expand educational service capacity within the Hatboro-Horsham School District. School enrollment in the district has recently been decreasing; therefore, it was assumed that enrollment levels would stay at 2011-2012 levels as a conservative prediction. With the exception of the middle school, projected school enrollment levels at full build-out would be below capacity. However, even though the middle school would be slightly over capacity, there would be a middle school proposed for Alternative 2, and it was assumed that the facility would be built to accommodate anticipated growth. Therefore, full build-out of Alternative 2 would not be expected to impact baseline school services and capacity.

Table 4.3-5 School Enrollments: Net Enrollments and School Capacities under Alternative 2 (Full Build-out)

School	Capacity (2011)	Enrollment (2011-2012)	Projected Gain (at Full Build-out)[1]	Projected 20-year Enrollment (Full Build-Out)
All five elementary schools combined (kindergarten through grade 5)	**2,528**	1,970	331	**2,301**
Keith Valley Middle School (grades 6 through 8)	**1,363**	1,218	202	**1,420**
Hatboro-Horsham High School (grades 9 through 12)	**1,988**	1,655	274[2]	**1,929**

Notes:

[1] Projected gain at full build-out was calculated by dividing the total of 807 school-age children (see Table 4.3-4) based on the current proportion of students in elementary, middle and high school.

[2] Note that some of these high school students also attend the Eastern Center for Arts and Technology for part of the day.

School District Revenue/Expenses

Alternative 2 would not be expected to have a long-term impact on school district revenues/expenses. Upon closure of the former NAS JRB Willow Grove installation, the school district lost students and Federal Impact Aid of approximately $650,000 per year (Griffin 2012). However, this loss would likely be a short-term loss as enrollment would be expected to increase gradually over the 20-year build out as the former installation would be redeveloped and people begin to move onto the property.

The short-term decline in the student population, the loss of Federal Impact Aid revenues, and the costs associated with the eventual expansion of education services would be offset through the redevelopment of the former installation. While in operation, the installation was nontaxable federal property, generating no property or school tax revenues; however, Federal Impact Aid was provided per student. After disposal and reuse of the property, land not transferred to other federal agencies would become newly taxable land, expanding the total municipal property subject to tax collection and school tax base.

Growth in the school-age population under Alternative 2 would be directly related to the rate of re-occupancy of the property by non-military personnel. It would be expected that increases in municipal expenses associated with an increased demand for educational services resulting from Alternative 2 would be offset by a proportional growth in the tax base as the former installation would be redeveloped and people purchase or rent housing on the property.

Private schools did not receive Federal Impact Aid as the tuition was paid by the child's family. These schools would also be expected to see slight increases in enrollment and paid tuition as a result of full build-out under Alternative 2.

Transfer of Land to the Hatboro-Horsham School District

Alternative 2 would transfer approximately 15 acres to the Hatboro-Horsham School District. This would be used for a new middle school, along with administrative and recreational facilities. Alternative 2 would transfer less land to the school district than Alternative 1; however, the size of the built facilities would be expected to remain the same as Alternative 1. The land transfer proposed under Alternative 2 would have a beneficial impact on the school district by providing it with a site for new educational facilities with more energy-efficient structures and improved environmental conditions that would be aligned with current educational philosophies (Hatboro-Horsham School District n.d.), and would be within walking distance of the new residential neighborhoods proposed under Alternative 2.

4.3.2.2 Police Protection

Impacts on police protection would be expected to be slightly greater under Alternative 2 than under Alternative 1 due to the higher number of residential units (1,999) proposed and the higher projected population. Expansion of the Horsham Township Police Department service area and the density of the proposed development would be expected to result in an increase in the demand for police protection currently provided by Horsham Township. This increased demand for services would necessitate the future expansion of the existing resources of the Horsham Township Police Department (i.e., additional staff and equipment). It would be expected that municipal expenses associated with this growth would be offset by a proportional growth in the tax base as the former installation would be redeveloped. In addition, the redevelopment of the former installation property would occur incrementally over a 20-year build-out period, allowing for the Horsham Township Police Department to expand and add services on an as-needed basis rather than all at one time. Therefore, implementation of Alternative 2, while necessitating an expansion of police protection services, would not result in a long-term impact on police protection.

4.3.2.3 Fire Protection

Impacts on fire protection would be expected to be slightly greater under Alternative 2 than under Alternative 1 due to the higher number of residential units (1,999) proposed and the higher projected population. Expansion of the Horsham Fire Company service area and the density of the proposed development would be expected to result in an increase in the demand for fire protection currently provided by Horsham Township. This increased demand for services would necessitate future expansion of the existing resources of the Horsham Fire Company (i.e., additional staff and equipment). It would be expected that municipal expenses associated with this growth would be offset by a proportional growth in the tax base as the installation would be redeveloped. In addition, the redevelopment of the former installation property would occur incrementally over a 20-year build-out period, allowing for the Horsham Fire Company to expand and add services on an as-needed basis rather than all at one time. Therefore, implementation of Alternative 2, while necessitating an expansion of fire protection services, would not result in a long-term impact on fire protection.

4.3.2.4 Health Services

At full build-out, Alternative 2 would be projected to directly add 4,653 new residents to the population of Horsham Township. This growth in population under Alternative 2 would be expected to increase the demand for healthcare and medical services. Based on existing health service use rates, under Alternative 2 at full build-out would be expected to generate 2,243 emergency room visits, 14,113 outpatient visits, and 3,578 inpatient visit days per year (Kaiser Family Foundation 2013a, 2013b, and 2013c). Table 4.3-6 presents the projected growth in healthcare service demand under Alternative 2.

The higher number of residential units proposed under Alternative 2 would result in a greater increase in demand for healthcare and medical services compared with Alternative 1. Although the demand for healthcare would increase, it would be expected that given the 20-year incremental build-out, private healthcare and medical providers would be able to add capacity, as needed, to accommodate the additional demand for services.

Table 4.3-6 Alternative 2 – Healthcare Service Projections

Healthcare Service	Projected Population Growth (2034)[1]	Commonwealth of Pennsylvania Average Health Service Levels (per 1,000 residents)[2]	Projected Healthcare Service Demand[3]
Emergency room visits per year	4,653	482	2,243
Outpatient visits per year	4,653	3,033	14,113
Inpatient visit days per year	4,653	769	3,578

Notes:

[1] Population projections are based on the full build-out of the property under Alternative 2 and the full occupancy of all residential units.

[2] Commonwealth of Pennsylvania average per capita health service levels obtained from Kaiser Family Foundation 2013a, 2013b, and 2013c.

[3] Projected growth in healthcare service demand derived by multiplying projected population growth by Commonwealth of Pennsylvania average per capita health service levels.

4.3.2.5 Recreational Facilities

Full build-out of Alternative 2 would add approximately 350 acres of new recreation and open space land to Horsham Township. A portion (approximately 20 acres) would be used to construct a new regional indoor recreation center with several adjacent outdoor recreation fields. The indoor facility would include a swimming pool, gymnasium, basketball courts, climbing walls, tennis and racquetball courts, and health and fitness club. The majority of acreage (approximately 320 acres) would be developed for a wide variety of public outdoor active and passive recreation, including a 9-hole golf course, public gardens, public parks, nature parks, a festival park, green corridors, and bicycle trails. New recreation, parks, and open space would represent a beneficial impact on recreation for residents. Upon disposal of the installation property, the party responsible for maintaining the recreation and open space land would need to be identified. Additional staff may need to be employed to maintain the facilities. This could be offset by the duration of the full build–out schedule and additional tax base generated if this would be a Town of Horsham function. Private entities would likely be able to add employees based on contract workload.

The existing Harold F. Pitcairn Wings of Freedom Aviation Museum (approximately 15 acres) would remain under Alternative 1 and would add new hangar facilities. The museum is being sponsored by Montgomery County, on behalf of the Delaware Valley Historical Aircraft Association. The site would include the museum and an associated park. Improvements to this facility would represent a beneficial impact on recreation for residents.

4.3.3 Alternative 3 (Airfield Reuse)

4.3.3.1 Schools

Elementary and Secondary School Capacity

The analysis provided by the Hatboro-Horsham School District to RKG Associates for the Redevelopment Plan (RKG 2012) was used to calculate the impacts of Alternative 3 on schools. The assumptions used include:

- An average of 0.75 school-age children per single-family home;
- An average of 0.40 school-age children per multi-family unit;
- No children would live in the senior housing (the independent living center and the assisted living center).

Table 4.3-7 lists the residential units proposed under Alternative 1 and the corresponding number of school-age children that would be expected.

Table 4.3-7 School-age Population Projections under Alternative 3 (Full Build-Out)

Type of Unit	Number of Units Proposed	Multiplier for School-age Children per Unit	Number of School-age Children
BCHG	70	0.75	53
Total	**70**	**N/A**	**53**

The projected school-age population would not exceed the capacity of educational resources available in the Hatboro-Horsham School District. Upon closure of NAS JRB Willow Grove, enrollment within the school district declined as military members and their families were relocated out of the region, and available capacity within the school system was created by the loss students. The projected school-age population (53 students) resulting from the full build-out of Alternative 3 would be expected to be absorbed by the school capacity created through the loss of students from military families when the former installation closed (see Table 4.3-8). It would be expected that private schools in the area also lost students because of the closure of NAS JRB Willow Grove and that this loss created capacity that can be filled when the former installation would be redeveloped.

Table 4.3-8 School Enrollments: Net Enrollments and School Capacities under Alternative 3 (Full Build-Out)

School	Capacity (2011)	Enrollment (2011-2012)	Projected Gain (at Full Build-out)[1]	Projected 20-year Enrollment (Full Build-out)
All five elementary schools combined (Kindergarten through grade 5)	**2,528**	1,970	22	**1,992**
Keith Valley Middle School (grades 6 through 8)	**1,363**	1,218	13	**1,231**
Hatboro-Horsham High School (grades 9 through 12)	**1,988**	1,655	18[2]	**1,673**

Notes:
[1] Projected gain at full build-out was calculated by dividing the total of 53 school-age children (see Table 4.3-7) based on the current proportion of students in elementary, middle and high school.
[2] Note that some of these high school students would also attend the Eastern Center for Arts and Technology for part of the day.

Alternative 3 would not be expected to result in the need to expand educational service capacity within the Hatboro-Horsham School District. Projected school enrollment levels at full build-out are below capacity. Therefore, full build-out of Alternative 3 would not be expected to impact baseline school services and capacity.

School District Revenue/Expenses

Alternative 3 would not be expected to have a long-term impact on school district revenues/expenses. Upon closure of the former NAS JRB Willow Grove installation, the school district lost and Federal Impact Aid of approximately $650,000 per year (Griffin 2012). Because Alternative 3 would exclude all residential development land uses except for the BCHG, it would not be expected to substantially increase enrollment. The decline in the student population, the loss of Federal Impact Aid revenues, would reduce enrollment that would not be replaced by the redevelopment of the former installation. It would be

assumed that taxes would still be collected from the general aviation airport and from the other commercial space proposed under Alternative 3.

There would be a slight increase in student enrollment due to implementation of Alternative 3, which would not exceed school capacity or result in the need to expand educational service capacity within the Hatboro-Horsham School District. School enrollment in the district has recently been decreasing; therefore, it was assumed that enrollment levels would stay at 2011-2012 levels as a conservative prediction. Projected school enrollment levels at full build-out would be below capacity. Therefore, full build-out of Alternative 3 would not be expected to impact baseline school services and capacity. Private schools did not receive Federal Impact Aid as the tuition was paid by the child's family. These schools would not be expected to see increases in enrollment and paid tuition through the full build-out under Alternative 3, because the BCHG housing would be built to help the homeless, who would not be expected to send their children to private schools.

Transfer of Land to the Hatboro-Horsham School District

Although the Hatboro-Horsham School District submitted a Notice of Interest to the HLRA for property to be used for the construction of new educational and/or support facilities and athletic fields, it would not receive property under Alternative 3 because educational facilities would not be compatible with the reuse of the installation as a general aviation airport. The Hatboro-Horsham School District would need to either renovate its existing facilities or find new sites for new facilities under Alternative 3. While Alternative 3 would only result in a small number of potentially new students to the district, it would not provide property to modernize some facilities. Therefore, Alternative 3 would impact the school district's future plans for improving facilities.

4.3.3.2 Police Protection

Under Alternative 3, the former installation would no longer be owned by the federal government. After disposal of the property, it would no longer be a secure military facility, and access to the property would be open to the general public, expanding the service area of the Horsham Township Police Department. Under Alternative 3, approximately 41 percent of the land would be associated with the airfield or aircraft operations. Presumably, the airfield would provide its own security, and the police would likely only occasionally have to assist the airfield security through a mutual aid agreement. The 59 percent of the land would be offices, retail, a hotel conference center, recreational facilities, and a small amount of housing (the 70 BCHG units). Expansion of the Horsham Township Police Department service area to cover this proposed development would be expected to result in a minor increase in the demand for police protection. This increased demand would be less than that experienced under Alternatives 1 and 2 due to the lower amount of residential and non-residential space proposed and the lower number of individuals utilizing the former installation property. However, it is assumed that municipal expenses associated with this minor growth would be offset by a proportional growth in the tax base in the redeveloped areas. Therefore, implementation of Alternative 3, while necessitating a slight expansion of police protection services, would not result in a long-term impact on police protection.

4.3.3.3 Fire Protection

Under Alternative 3, the former installation would no longer be owned by the federal government. Horsham Township, expanding the service area of the Horsham Fire Company. Under Alternative 3, approximately 41 percent of the land would be an airfield. Airfields have special crash-related fire considerations, and the airfield management would need to work out an agreement with the Horsham Fire Company regarding who will provide these specialized fire-fighting services. The former installation's fire station building could be reused, potentially by an airfield fire company or the Horsham Fire Company. The provider of airfield fire protection services also would need extra equipment and training.

The 59 percent of the former installation that would not be used as airfield would be redeveloped as offices, retail shops, a hotel conference center, recreational facilities, and a small amount of housing (the 70 BCHG units). Expansion of the Horsham Fire Company service area to cover this proposed development would be expected to result in a slight increase in the demand for fire protection. This increased demand would trigger the need for future expansion of the existing resources of the Horsham Fire Company (i.e., additional staff and equipment). However, it would be expected that municipal expenses associated with this growth would be offset by a proportional growth in the tax base in the redeveloped areas. In addition, the redevelopment of the former installation property would occur incrementally over a 20-year build-out period, allowing for the Horsham Fire Company to expand and add services on an as-needed basis rather than all at one time. Therefore, implementation of Alternative 3, while necessitating an expansion of fire protection services, would not result in a long-term impact on fire protection.

4.3.3.4 Health Services

Alternative 3 would be expected to result in less of an increase in the demand for local and regional healthcare and medical services than Alternatives 1 and 2. At full build-out, it would be projected that Alternative 3 would directly add 137 new residents to the population of Horsham Township. Growth in population resulting from implementation of Alternative 3 would be expected to increase the demand for healthcare and medical services on the existing healthcare system. Based on existing health service use rates, under Alternative 3 at full build-out would be expected to generate 66 emergency room visits, 416 outpatient visits, and 105 inpatient visit days per year (Kaiser Family Foundation 2013a, 2013b, and 2013c). Table 4.3-9 presents the projected growth in healthcare service demand under Alternative 3.

Table 4.3-9 Alternative 3 – Healthcare Service Projections

Healthcare Service	Projected Population Growth (2034)[1]	Commonwealth of Pennsylvania Average Health Service Levels (per 1,000 residents)[2]	Projected Healthcare Service Demand[3]
Emergency room visits per year	137	482	66
Outpatient visits per year	137	3,033	416
Inpatient visit days per year	137	769	105

Notes:

[1] Population projections are based on the full build-out of the property under Alternative 3 and the full occupancy of BCHG residential units.

[2] Commonwealth of Pennsylvania average per capita health service levels obtained from Kaiser Family Foundation 2013a, 2013b, and 2013c.

[3] Projected growth in healthcare service demand derived by multiplying projected population growth by Commonwealth of Pennsylvania average per capita health service levels.

Although the demand for healthcare would increase slightly, it would be expected that given the 20-year incremental build-out, private healthcare and medical providers would be able to add capacity, as needed, to accommodate the additional demand for services.

4.3.3.5 Recreational Facilities

Full build-out of Alternative 3 would add approximately 320 acres of new recreation and open space land to Horsham Township, the most acreage when comparing the action alternatives. A portion (approximately 12 acres [the same as proposed under Alternative 1]) would be used to construct a new regional indoor recreation center with a swimming pool, gymnasium, basketball courts, climbing walls, tennis and racquetball courts, and health and fitness club, along with several adjacent outdoor recreation fields. The remaining acreage would be designated for open space and public outdoor active and passive recreation. The 9-hole golf course and a nature park would be developed as part of Alternative 3; however, much of the land would be green space buffering the airfield, and some types of recreational

uses proposed under Alternatives 1 and 2 would not be included under Alternative 3 (e.g., the festival park). New recreation, parks, and open space would represent a beneficial impact on recreation for residents. Upon disposal of the installation property, the party responsible for maintaining the recreation and open space land would need to be identified. Additional staff may need to be employed to maintain the facilities. This could be offset by the duration of the full build–out schedule and additional tax base generated if this would be a Town of Horsham function. Private entities would likely be able to add employees based on contract workload.

The existing Harold F. Pitcairn Wings of Freedom Aviation Museum (approximately 14 acres) would remain under Alternative 1 and would add new hangar facilities. The museum is being sponsored by Montgomery County, on behalf of the Delaware Valley Historical Aircraft Association. The site would include the museum and an associated park. Improvements to this facility would represent a beneficial impact on recreation for residents.

Under Alternative 3, if the former installation property were to be redeveloped into a general aviation airport, Section 4(f) of the U.S. Department of Transportation Act of 1966 (now codified in 49 U.S.C. § 303 and 23 U.S.C. § 138 and implemented by the Federal Highway Administration in 23 CFR 774) would apply. Section 4(f) states that the Secretary of Transportation will not approve any program that requires the use of any publicly owned land or park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance unless there is no feasible and prudent alternative to the use of such land and such program, and the project includes all possible planning to minimize harm resulting from the use. FAA approval of the Airport Layout Plan for the airfield under this alternative would trigger a Section 4(f) determination. Section 4.7 presents the projected noise contours associated with the potential reuse of the airfield under Alternative 3. None of the projected 65 dB DNL noise contours impact publicly owned land or park, recreation areas or wildlife refuges; therefore, no potential Section 4(f) impacts are anticipated.

4.3.4 No Action Alternative

4.3.4.1 Schools

Elementary and Secondary School Capacity

No redevelopment would occur under the No Action Alternative; therefore, no residential units would be built at the former installation, and there would be no corresponding increase in the number of school-age children. Thus, there would be no impact on educational resources available in the Hatboro-Horsham School District. The No Action Alternative would not result in a need to expand educational service capacity within the Hatboro-Horsham School District related to the proposed action, it would not provide property to modernize some facilities. Therefore, Alternative 3 would impact the school district's future plans for improving facilities.

School District Revenue/Expenses

Upon closure of the former NAS JRB Willow Grove installation, the school district lost students and Federal Impact Aid of approximately $650,000 per year (Griffin 2012). Under the No Action Alternative the former NAS JRB Willow Grove property would be retained by the federal government in caretaker status, it would be tax exempt and the district would not gain new students or any tax revenues. Alternative 3 would not provide property to modernize some facilities. Therefore, Alternative 3 would impact the school district's future plans for improving facilities.

Private schools did not receive Federal Impact Aid as the tuition was paid by the child's family. These schools would not see an increase in enrollment and associated tuition through the No Action Alternative because the former installation would be retained by the federal government in caretaker status, rather

than being redeveloped into housing units for new owners/renters who may want to send their children to private schools.

Transfer of Land to the Hatboro-Horsham School District

Although the Hatboro-Horsham School District submitted a Notice of Interest to the HLRA for property to be used for the construction of new educational and/or support facilities and athletic fields, it would not receive property under the No Action Alternative, because the former installation would be retained by the federal government in caretaker status and would remain secured with no public access allowed. The Hatboro-Horsham School District would need to either renovate its existing facilities or find new sites for new facilities under this alternative.

4.3.4.2 Police Protection

Under the No Action Alternative, the former installation would not be reused or redeveloped and would be retained by the federal government in caretaker status. The Horsham Township Police Department's responsibility for public police protection would remain unchanged under the No Action Alternative.

4.3.4.3 Fire Protection

Under the No Action Alternative, the former installation would not be reused or redeveloped and would be retained by the federal government in caretaker status. The Horsham Fire Company's responsibility for public fire protection would remain unchanged under the No Action Alternative.

4.3.4.4 Health Services

Under the No Action Alternative, the former installation would not be reused or redeveloped and would be retained by the federal government in caretaker status. The population would not grow as a result of the No Action Alternative, and the demand on local and regional healthcare and medical services would remain unchanged.

4.3.4.5 Recreational Facilities

Under the No Action Alternative, the former installation would not be reused or redeveloped and would be retained by the federal government in caretaker status. The installation would remain secured with no public access allowed. No new parks or recreational facilities would be developed, and there would be no public use of existing recreational amenities within the fence line of the former installation. The existing Harold F. Pitcairn Wings of Freedom Aviation Museum is on the edge of the former installation, outside the fence line. It is accessed by the public via Easton Road (SR 611). This museum would remain in place and open under the No Action Alternative. In conclusion, the No Action Alternative would not change existing recreational facilities in Horsham Township.

4.4 Transportation

This section summarizes the potential transportation impacts that could result from construction and redevelopment of the former NAS JRB Willow Grove property under Alternative 1, Alternative 2, Alternative 3, and the No Action Alternative. The evaluation of transportation impacts is based on the *Traffic Assessment Study: NAS-JRB Willow Grove* conducted by TechniQuest Corporation (see Appendix C).

Potential transportation impacts were estimated by evaluating how the proposed redevelopment alternatives could affect traffic volumes, circulation patterns, and levels of service (LOS) on roadways within the project study area. Traffic volumes were estimated and assessed based on the following:

- Full build-out of the proposed redevelopment would occur over a 20-year period.

- A background growth factor of 0.73 provided by PennDOT, which accounts for regional growth in traffic volumes over the 20-year build-out period.
- The multipliers presented in the Institute of Transportation Engineers' *Trip Generation Manual*, 8th Edition, were used to estimate the traffic volumes that would result from the proposed land uses for the three redevelopment action alternatives. Baseline travel patterns on roadways in the vicinity of the former installation were used to determine the distribution of trips for each alternative.
- A capacity analysis performed by TechniQuest Corporation identified the LOS for each of the 15 intersections studied under baseline and alternative conditions. LOS is a qualitative measure of operational conditions within a traffic stream, generally in terms of speed, travel times, traffic interruptions, etc.
- Morning peak hours were assumed to be 7 a.m. to 9 a.m. and evening peak hours 4 p.m. to 6 p.m. (see Section 3.4.2).
- Adverse impacts on roadways were defined as conditions that prevent a road from operating at its full design capacity.

PennDOT recommends that the growth factors not be used to project traffic beyond a 20-year period. The redevelopment of the former installation is anticipated to occur over a 20-year period. PennDOT policies recommend analyzing traffic at the design horizon year; defined as five years after the opening year of the development (full build-out). However, the redevelopment of the installation would be dictated by market conditions and it could occur more rapidly during certain time periods. Based upon the long-term redevelopment of the former installation property, the 20-year application of the PennDOT growth factors, and that the majority of the redevelopment would occur in the first 15 years of redevelopment, the analysis was conducted for the 20-year build-out conditions.

4.4.1 Alternative 1 (HLRA Plan - Preferred Alternative)

Under Alternative 1, the property would be accessed at seven locations, including six existing intersections; final construction design would dictate the precise locations of future access points onto the property. Horsham Road would be intersected by three of the access roads at the existing intersections of Privet Road, Precision Road, and Norristown Road. Three additional access roads would intersect Easton Road at what are currently Gates 1 and 2 and at Maple Avenue. An access road on the north side of the property would create a new intersection with Keith Valley Road. Internal roadways would be created that would connect access points and provide circulation throughout the property (see Figure 2-1). The seven intersections analyzed were included in the EIS to be representative access points; however, the road layout has not been finalized and would likely include additional access points and internal roadways. Any additional access points would be expected to reduce projected traffic volumes at the seven access points studied.

Construction-related traffic would consist primarily of delivery trucks, dump trucks, heavy equipment, and vehicles driven by construction crews. This could result in short-term impacts on traffic from additional truck trips and slower-moving vehicles. Construction at the former installation would not occur all at the same time, and impacts would be focused on roadways in proximity to individual construction projects.

4.4.1.1 Projected Traffic Volumes

Full build-out of Alternative 1 would be projected to generate 47,078 new trips per weekday. Due to the size and mixed-use nature of the proposed alternative, an internal capture rate was applied to the weekday trip generation to account for trips between land uses (e.g., trip from office park to town center). Based on the estimated capture rate (23 percent) of the 47,078 weekday trips generated, 36,250 would enter and

exit the former property (TechniQuest 2013). This would include a total of 2,820 vehicles entering and exiting the property during the morning peak hours, and 3,719 vehicles entering and exiting the property during the evening peak hours. A majority of the trips would be generated by retail activities, including the use of shops in the town center, and would account for over 18,000 weekday trips. The proposed office park would be the next largest trip generator, with over 12,500 trips. The combined residential uses would be projected to generate over 8,500 weekday trips. The remaining commercial and mixed uses would generate 4,355 weekday trips, and the combined community services and recreation uses would generate 3,303 trips. The office park would generate the highest morning and evening peak-hour volumes, while retail uses would generate similar volumes in the evening peak hours. Table 4.4-1 shows the weekday total volumes and morning and evening peak-hour trips generated for each proposed land use on the property.

Table 4.4-1 Former NAS JRB Willow Grove Trip Distribution - Alternative 1

Land Use	Weekday Daily Total	Morning Peak Hour			Evening Peak Hour		
		Enter	Exit	Total	Enter	Exit	Total
Residential							
Large lot, single family	861	17	51	68	57	34	91
Small lot, single Family	2,393	47	141	188	159	93	253
Townhomes	2,034	26	128	154	122	60	182
Apartments/condominiums	1,743	22	110	132	105	51	156
Town center apartments/condominiums	581	7	37	44	35	17	52
CCRC independent living	396	16	9	25	20	21	41
CCRC assisted living/nursing	520	21	12	33	26	28	54
Commercial and Mixed Use							
CCRC medical office/amenities	903	45	12	58	23	63	87
Hotel/conference center	996	47	33	79	51	34	85
Town center retail/service/restaurants	11,683[1]	157	101	258	391[1]	407[1]	798[1]
Town center office	923	44	5	50	9	53	62
Movies/entertainment	1,533	7	2	9	232	214	445
Office park	12,528	1,529	189	1,718	212	1,303	1,515
Retail	6,681[1]	142	90	232	338[1]	353[1]	691[1]
Community Services and Recreation							
Regional recreation center	1,085	14	9	23	28	42	69
BCHG Housing	670	13	39	53	45	26	71
School	1,548	297	243	540	88	92	180
Aviation museum[2]	-	-	-	-	-	-	-
Park/open space[2]	-	-	-	-	-	-	-
Total trips generated	**47,078**	**2,452**	**1,210**	**3,662**	**1,940**	**2,890**	**4,830**
Total trips generated (adjusted for internal capture rate)[3]	**36,250**	**1,888**	**931**	**2,820**	**1,494**	**2,225**	**3,719**

Source: TechniQuest 2013.
Notes:
[1] Includes pass-by percentage
[2] Trips were assumed to occur during off-peak hours and were not included.
[3] Internal Capture Rate of 23 percent was applied to account for trips generated that would occur between proposed land uses.

At full build-out of Alternative 1, traffic volumes at all of the existing intersections would be expected to increase compared to baseline conditions. Trip projections for Alternative 1 and the No Action Alternative take into account an annual background growth based on population projections from the DVRPC. Table 4.4-2 compares traffic volumes for Alternative 1 with the No Action Alternative and

demonstrates that much of the increase in traffic volumes between baseline conditions and Alternative 1 can be attributed to background growth. Volumes during the evening peak hours would be expected to be greater than the morning peak hours for each intersection, with the exception of the proposed new roadway off Keith Valley Road (Intersection 9). Most of the intersections under Alternative 1 would see peak-hour volumes increase by over 1,000 trips over baseline conditions. The one exception would be the intersection of Keith Valley Road and County Line Road (Intersection 10), which would experience an increase of 419 trips during the morning peak hours and 538 trips during the evening peak hours. Under Alternative 1, the greatest volume increase would occur at the two Easton Road and Horsham Road intersections (Intersections 1 and 2), both of which would be projected to have more than 1,900 additional morning peak-hour trips and an additional 2,382 evening peak-hour trips. The largest trip percentage increase (74 percent) would occur at the intersection of Privet Road and Horsham Road (Intersection 7).

Table 4.4-2 Former NAS JRB Willow Grove Peak-Hour Intersection Trips - Alternative 1

Intersection ID	Intersection	Baseline Conditions		No Action Alternative Peak-Hour Volume		Alternative 1 Peak-Hour Volume	
		Morning	Evening	Morning	Evening	Morning	Evening
1	Easton Road/SR 611 and Horsham Road/SR 463	3,140	3,886	3,689	4,565	5,063	6,268
2	Easton Road/SR 611 and Horsham Road/SR 463	3,106	3,885	3,649	4,564	5,023	6,267
3	Horsham Road/SR 463 and Dresher Road	3,630	4,558	4,265	5,355	4,894	6,155
4	Maple Avenue and Horsham Road/SR 463	3,190	3,677	3,748	4,320	4,536	5,358
5	Norristown Road and Horsham Road/SR 463	3,072	3,432	3,609	4,032	4,576	5,382
6	Easton Road/SR 611 and Home Depot Drive	3,523	5,002	4,139	5,876	5,320	7,097
7	Privet Road and Horsham Road/SR 463	2,176	2,513	2,556	2,952	3,560	4,362
8	Horsham Road/SR 463 and Keith Valley Road	1,758	2,080	2,016	2,444	2,847	3,520
9	Off Keith Valley Road	N/A	N/A	N/A	N/A	798	408
10	Keith Valley Road/Kansas Road and County Line Road	1,879	2,260	2,207	2,655	2,298	2,798
11	County Line Road and Easton Road/SR 611	3,333	3,508	3,916	4,121	4,327	4,736
12	Off Easton Road/SR 611	2,752	2,785	3,233	3,272	4,023	4,354
13	West Moreland Avenue and Easton Road/SR 611	2,715	2,726	3,190	3,203	4,089	4,376
14	Maple Avenue and Easton Road/SR 611	2,980	3,574	3,501	4,199	4,344	5,250
15	Meetinghouse Road and Easton Road/SR 611	3,528	4,269	4,145	5,015	5,023	5,918

Key:
N/A – not available. Intersection 9 does not currently exist as it is a proposed new intersection associated with Alternative 1.

Figures 4.4-1 and 4.4-2 compare morning and evening peak-hour traffic volumes for the baseline conditions, the No Action Alternative, and Alternative 1.

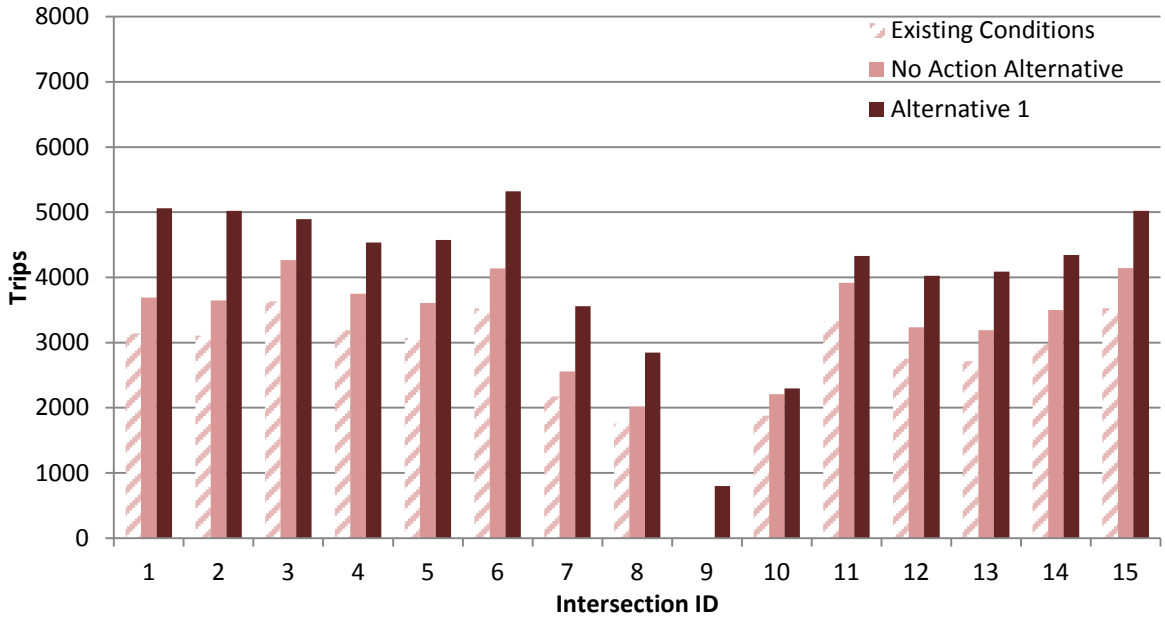

Figure 4.4-1 Morning Peak-Hour Traffic Volumes - Alternative 1

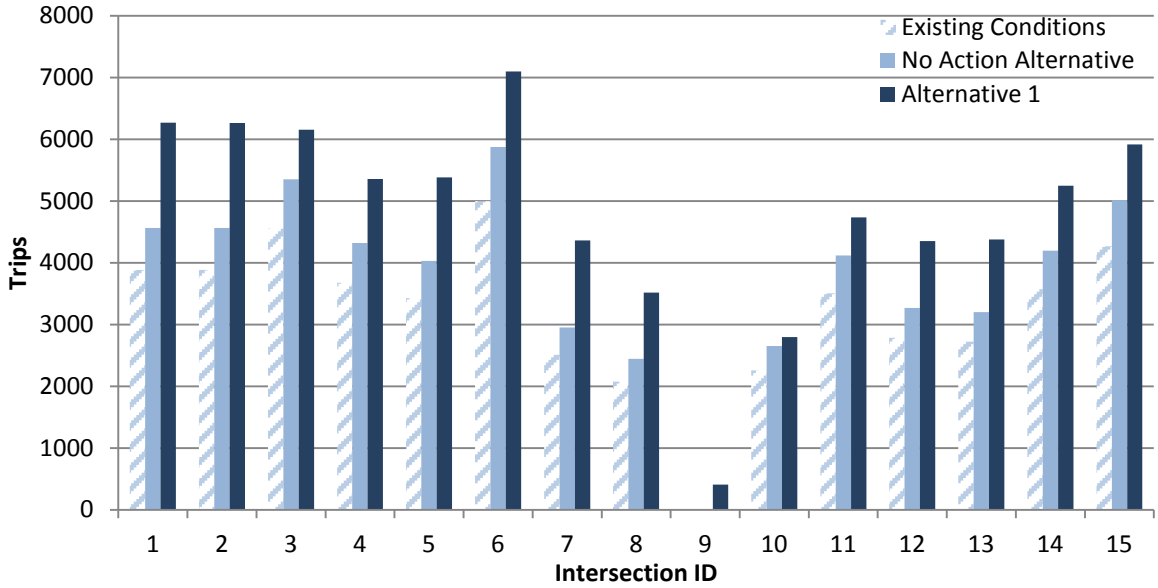

Figure 4.4-2 Evening Peak-Hour Traffic Volumes - Alternative 1

4.4.1.2 Projected Level of Service

Under Alternative 1, a majority of intersections with a current LOS of E or better would be expected to experience a drop in LOS during both the morning and evening peak hours. Most of these intersections would be expected to operate with an LOS of F, with significant seconds of delay per vehicle. PennDOT's *Policies and Procedures for Transportation Impact Studies* requires mitigation when an intersection experiences a drop in overall LOS and the average delay increases by more than 10 seconds (PennDOT 2009). This mitigation requirement compares LOS and delay after 20 years (2033), with and without redevelopment. For intersections that would operate at LOS F without development at 20 years, an increase in delay of more than 10 seconds would also require mitigation. Under Alternative 1, 13 of the 15 intersections would experience a drop in LOS and an increase in delay of more than 10 seconds over the No Action Alternative (see Table 4.4-3).

The projected increase in the number of traffic trips on the roadway network surrounding the former NAS JRB Willow Grove property and the resulting changes to the LOS for the roadways and intersections would result in a significant and unavoidable impact under Alternative 1. Through the implementation of potential mitigation measures, the overall impact may be reduced to levels comparable to those presented under the future No Action Alternative (i.e., no build; however accounting for background growth in traffic).

Table 4.4-3 Former NAS JRB Willow Grove Peak-Hour Intersection LOS - Alternative 1

			Baseline Conditions		No Action Alternative LOS		Alternative 1 LOS	
	Intersection		Morning Peak Hour	Evening Peak Hour	Morning Peak Hours	Evening Peak Hours	Morning Peak Hours	Evening Peak Hours
1	Easton Road/SR 611 and Horsham Road/SR 463		D (36.7)	E (58.9)	E (73.6)	F (103.9)	F (275.6)	F (282.7)
2	Easton Road/SR 611 and Horsham Road/SR 463		C (25.5)	C (32.2)	D (41)	E (72.5)	F (112.8)	F (190.8)
3	Horsham Road and Dresher Road		F (86.9)	F (180.6)	F (149.1)	F (265.2)	F (204.9)	F (343.2)
4	Maple Avenue and Horsham Road/SR 463		E (74.3)	F (148.4)	F (145.9)	F (283.0)	F (290.4)	F (666.1)
5	Norristown Road and Horsham Road/SR 463		F (83.6)	F (134.9)	F (131.7)	F (201.5)	F (140.4)	F (218.3)
6	Easton Road/SR 611 and Home Depot Drive		D (35.2)	F (92.8)	D (45.8)	F (150.8)	E (63.1)	F (223.0)
7	Privet Road and Horsham Road/SR 463		B (17.8)	C (33.3)	C (28.5)	D (45.2)	C (30.2)	F (87.2)
8	Horsham Road/SR 463 and Keith Valley Road		D (51.6)	C (24.8)	F (98.5)	E (73.7)	F (219.6)	F (207.4)
9	Off Keith Valley Road		N/A	N/A	N/A	N/A	B (10.2)	A (9.2)
10	Keith Valley Road/Kansas Road and County Line Road		C (29.8)	C (26.4)	E (67.0)	D (35.3)	F (80.8)	D (41.3)
11	County Line Road and Easton Road/SR 611		E (55.7)	E (60.8)	F (98.9)	F (111.5)	F (161.7)	F (228.9)
12	Off Easton Road/SR 611		E (71.2)	C (23.0)	F (124.6)	D (36.4)	F (158.1)	F (185.5)
13	West Moreland Avenue and Easton Road/SR 611	SB-L	B (12.7)	C (17.8)	C (15)	D (26.4)	C (19.5)	D (28.2)
		WB-LTR	B (14.3)	C (16.9)	C (16.7)	C (21.2)	C (17.9)	C (22.1)

Table 4.4-3 Former NAS JRB Willow Grove Peak-Hour Intersection LOS - Alternative 1

		Baseline		No Action		Alternative 1 LOS	
14	Maple Avenue and Easton Road/SR 611	C (24.6)	F (140.9)	D (48.7)	F (193.8)	F (147.7)	F (287.6)
15	Meetinghouse Road and Easton Road/SR 611	D (45.0)	F (92.9)	F (88.3)	F (159.5)	F (143.4)	F (233.4)

Source: TechniQuest 2013.

Notes:
- Cells shaded light blue indicate a drop in LOS and a delay increase of more than 10 seconds compared to baseline conditions, or a delay increase of more than 10 seconds if the intersection operates at LOS F under baseline conditions.
- Cells shaded light red indicate non-State Route designated intersections that would experience both a drop in LOS and delay increase of more than 10-seconds compared to No Action Alternative or only a delay increase of more than 10 seconds if the intersection operates at LOS F under the No Action Alternative.
- Cells shaded dark red indicate State Route designated intersections that would experience both a drop in LOS and delay increase of more than 10 seconds compared to No Action Alternative, or only delay increase of more than 10 seconds if the intersection operates at LOS F under the No Action Alternative.

Key:
N/A = not available. Intersection 9 does not currently exist as it is a proposed new intersection associated with Alternative 1.

4.4.1.3 Mitigation

Based on PennDOT requirements, 12 of the 15 intersections under Alternative 1 would require mitigation (noted in dark red in Table 4.4-3), which is described below. Potential mitigation measures include dedicated right-turn lanes, additional left-turn lanes, and additional through lanes as well adjustments in signal timing. Mitigation measures are also included for intersections that do not require mitigation per PennDOT; however, these measures may improve overall traffic flow. Potential mitigation measures for Intersection #s 1 through 15 include:

Easton Road and Horsham Road (Intersection #1): Add an additional northbound through lane, an additional southbound through lane, and a double left-turn lane for the southbound approach. The Horsham Road leg of the intersection must be widened by one lane to accept the southbound double left-turn traffic.

Easton Road and Horsham Road (Intersection #2): Add a third right-turn lane for the eastbound approach and an additional through lane for the southbound approach. The southbound Easton Road must be widened to three lanes to accept the traffic from the three right-turn lanes from eastbound Horsham Road.

Horsham Road and Dresher Road (Intersection #3): Add an additional through lane for the eastbound, westbound, and southbound approaches. The northbound left-turn lane should be widened to accommodate a double left-turn lane. The departure lanes of the east, west, and south legs of the intersection must be widened to accept the additional through lanes.

Maple Avenue and Horsham Road (Intersection #4): Add an additional eastbound left-turn lane. The northbound approach should be a separate left-turn and a shared through-right lane. Reconfiguration of the southbound right-turn lane would be needed so that the right-turn lane traffic can turn right on red.

Norristown Road and Horsham Road (Intersection #5): The new access roadway would require one exclusive left-turn lane, one through lane, and one right-turn lane with two lanes entering the site. The westbound approach would require a second left-turn lane, resulting in the need to widen the southbound departure lanes of Norristown Road to two lanes. The westbound approach would also require an exclusive right-turn lane to enter the site. The eastbound approach would require a double left-turn lane

to enter the site and an exclusive right-turn lane for traffic turning onto Norristown Road. The northbound approach would require one exclusive left-turn lane, one through lane, and one right-turn lane.

Easton Road and Home Depot Drive (Intersection #6): Add an additional southbound through lane.

Privet Road and Horsham Road (Intersection #7): The proposed site driveway would consist of an exclusive left-turn lane, a through lane, and an exclusive right-turn lane. A new northbound right-turn lane would be required.

Horsham Road and Keith Valley Road (Intersection #8): An additional through lane for the eastbound and westbound approaches of Horsham Road would be needed. The eastbound approach would require an exclusive right-turn lane to accommodate the second eastbound through lane. The eastbound and westbound departure legs would need to be widened to accommodate the additional through lane.

Off Keith Valley Road (Intersection #9): The proposed intersection of Graeme Park Road with Keith Valley Road would consist of one lane in each direction along Keith Valley Road and one single entering and one single lane exiting the proposed site access on Graeme Park Road. No mitigation would be required.

Keith Valley Road/Kansas Road and County Line Road (Intersection #10): A northbound through lane would be needed on Keith Valley Road. The northern leg of Kansas Road would need to be widened to two northbound lanes to accommodate the additional through lane.

County Line Road and Easton Road (Intersection #11): An additional northbound Easton Road left-turn lane would be required. An additional exclusive through lane for all four approaches would also be required to mitigate some of the traffic impacts.

Off Easton Road (Intersection #12): An additional left-turn lane and an exclusive right-turn lane with two lanes entering the site would be required. The southbound approach of Easton Road would require widening to accommodate an additional through lane. The southbound departure of Easton Road would also need to be widened to accommodate the additional southbound through lane.

West Moreland Avenue and Easton Road (Intersection #13): Signalization of this intersection would be required. A northbound left-turn lane on Easton Road would be needed.

Maple Avenue and Easton Road (Intersection #14): An additional northbound left-turn lane and an additional northbound through lane would be needed, as well as double left lanes and one shared through-right lane for the Maple Avenue approach. The northbound departure would need to be widened to accommodate the additional northbound through lane.

Meetinghouse Road and Easton Road (Intersection #15): An additional through lane on northbound and southbound Easton Road would be needed. The departure lanes of southbound and northbound Easton Road also would require widening to accommodate the additional through lane.

Four of the 13 intersections would still have a drop in LOS that would be worse than the No Action Alternative, and three of these would fail to meet PennDOT requirements (see Table 4.4-4).

Table 4.4-4 Former NAS JRB Willow Grove Peak-Hour Intersection LOS - Alternative 1 with Mitigation

	Intersection		No Action Alternative LOS		Alternative 1 LOS		Alternative 1 LOS with Mitigation	
			Morning Peak Hours	Evening Peak Hours	Morning Peak Hours	Evening Peak Hours	Morning Peak Hours	Evening Peak Hours
1	Easton Road/SR 611 and Horsham Road/SR 463		E (73.6)	F (103.9)	F (275.6)	F (282.7)	F (98.9)	F (99.2)
2	Easton Road/SR 611 and Horsham Road/SR 463		D (41)	E (72.5)	F (112.8)	F (190.8)	D (47.3)	E (55.7)
3	Horsham Road and Dresher Road		F (149.1)	F (265.2)	F (204.9)	F (343.2)	F (121.8)	F (135.1)
4	Maple Avenue and Horsham Road/SR 463		F (145.9)	F (283.0)	F (290.4)	F (666.1)	D (50.6)	F (97.0)
5	Norristown Road and Horsham Road/SR 463		F (131.7)	F (201.5)	F (140.4)	F (218.3)	F (114.2)	F (189.4)
6	Easton Road/SR 611 and Home Depot Drive		D (45.8)	F (150.8)	E (63.1)	F (223.0)	B (19.3)	D (42.5)
7	Privet Road and Horsham Road/SR 463		C (28.5)	D (45.2)	C (30.2)	F (87.2)	B (14.4)	D (37.1)
8	Horsham Road/SR 463 and Keith Valley Road		F (98.5)	E (73.7)	F (219.6)	F (207.4)	D (38.5)	D (40.4)
9	Off Keith Valley Road		N/A	N/A	B (10.2)	A (9.2)	N/A	N/A
10	Keith Valley Road/Kansas Road and County Line Road[1]		E (67.0)	D (35.3)	F (80.8)	D (41.3)	E (74.2)	D (42.4)
11	County Line Road and Easton Road/SR 611		F (98.9)	F (111.5)	F (161.7)	F (228.9)	F (100.2)	F (134.1)
12	Off Easton Road/SR 611		F (124.6)	D (36.4)	F (158.1)	F (185.5)	B (13.1)	D (44.2)
13	West Moreland Avenue and Easton Road/SR 611	SB-L	C (15)	D (26.4)	C (19.5)	D (28.2)	C (24.5)	C (33.4)
		WB-LTR	C (16.7)	C (21.2)	C (17.9)	C (22.1)		
14	Maple Avenue and Easton Road/SR 611		D (48.7)	F (193.8)	F (147.7)	F (287.6)	C (20.9)	F (243.0)
15	Meetinghouse Road and Easton Road/SR 611		F (88.3)	F (159.9)	F (143.4)	F (233.4)	D (41.4)	F (83.2)

Source: TechniQuest 2013.

Notes:
- Cells shaded dark red indicate State Route designated intersections with mitigation that still would experience both a drop in LOS and delay increase of more than 10 seconds compared to No Action Alternative, or only delay increase of more than 10 seconds if the intersection operates at LOS F under the No Action Alternative.
- In some cases, the overall intersection without mitigation shows a better traffic flow performance than the overall intersection with mitigation. This is primarily due to the application of signal timing adjustments that attempt to improve low-performing intersection approaches. This necessitates reassigning signal time from higher-performing approaches. In some cases, the overall intersection with mitigation appears to have a lower rating, but the individual approaches and turning movements are generally better.

[1] Keith Valley Road and Kansas Road are not designated State Routes.

Key:
N/A – not available. Intersection 9 does not currently exist, as it is a proposed new intersection associated with Alternative 1, and would not require mitigation.

4.4.2 Alternative 2 (HLRA Plan with Increased Residential Development)

The same access points analyzed for Alternative 1 were assumed for Alternative 2. Figure 2-2 shows additional roadways and access points for Alternative 2. These potential access points were not assessed as part of the traffic assessment study for any of the alternatives because the final road layout may change. Any additional access points would be expected to reduce projected traffic volumes at the seven access points studied.

Construction-related traffic would consist of delivery trucks, dump trucks, heavy equipment, and vehicles driven by construction crews. This could result in short-term impacts on traffic from additional truck trips and slower-moving vehicles. Construction at the former installation would not occur all at the same time, and impacts would be focused on roadways in proximity to individual construction projects.

4.4.2.1 Projected Traffic Volumes

Full build-out of Alternative 2 is projected to generate a total of 49,076 new trips per weekday, of which 35,335 would use roadways surrounding the former installation property. Similar to Alternative 1, the combined retail land use and town center retail/service/restaurants account for the largest percentage of weekday trips (15,618), followed by the office park (12,192). The combined residential uses would generate 11,561 weekday trips. The other commercial and mixed uses would generate 5,498 trips. The regional recreation center would generate 1,988 trips, BCHG housing would generate 670 trips, and the proposed school would generate 1,548 trips. A total of 3,913 (2,817 external) trips would be generated during the morning peak hours, and 4,989 (3,592 external) trips would be generated during the evening peak hours. The greatest number of morning and evening peak-hour trips would originate from the office park (morning: 1,674; evening: 1,475). Table 4.4-5 shows the weekday total volumes and morning and evening peak-hour trips generated for each proposed land use on the property.

Table 4.4-5 Former NAS JRB Willow Grove Trip Distribution - Alternative 2

Land Use	Weekday Daily Total	Morning Peak Hour			Evening Peak Hour		
		Enter	Exit	Total	Enter	Exit	Total
Residential							
¼ Acre lot, single family	1,617	32	95	127	108	63	171
Small lot, single family	2,172	43	128	170	144	85	229
Townhomes	2,301	30	145	174	138	68	206
Apartments/condominiums	3,747	48	236	284	225	111	335
Town center apartments/condominiums	662	9	42	50	40	20	59
CCRC independent living	354	15	8	23	18	19	37
CCRC assisted living/nursing	708	29	16	45	35	38	73
Commercial and Mixed Use							
CCRC medical office/amenities	2,114	106	28	135	55	148	202
Hotel/conference center	1,188	56	39	95	61	41	101
Town center retail/service/ restaurants	11,510[1]	156	100	256	386[1]	402[1]	788[1]
Town center office	969	47	6	52	10	55	64
Movies/entertainment	1,227	6	1	7	185	171	356
Office park	12,192	1489	184	1674	207	1269	1475
Retail	4,108[1]	114	73	187	252[1]	262[1]	514[1]
Community Services and Recreation							
Regional recreation center	1,988	25	17	42	51	76	127
BCHG Housing	670	13	39	53	45	26	71
School	1,548	297	243	540	88	92	180
Aviation museum[2]	-	-	-	-	-	-	-

Table 4.4-5 Former NAS JRB Willow Grove Trip Distribution - Alternative 2

	Weekday Daily	Morning Peak Hour			Evening Peak Hour		
Park/open space[2]	-	-	-	-	-	-	-
Total	**49,076**	**2,514**	**1,399**	**3,913**	**2,045**	**2,944**	**4,989**
Total trips generated (adjusted for internal capture rate)[3]	**35,335**	**1,810**	**1,008**	**2,817**	**1,473**	**2,120**	**3,592**

Source: TechniQuest 2013.
Notes:
[1] Includes pass-by percentage.
[2] Trips were assumed to occur during off-peak hours and were not included.
[3] Internal Capture Rate of 28 percent was applied to account for trips generated that would occur between proposed land uses.

Each of the existing intersections would experience an increase in peak-hour volumes under Alternative 2 (see Table 4.4-6). As discussed under Alternative 1, background growth accounts for traffic volume increases. The two Easton Road/Horsham Road intersections (Intersections 1 and 2) would experience the greatest volume increases, with both intersections projected to have an additional 1,900 morning peak-hour trips and 2,300 evening peak-hour trips compared to baseline conditions. The highest percentage increase would occur at the intersection of Privet Road and Horsham Road (Intersection 7), which would experience a 62 percent increase in volume during morning peak hours and a 72 percent increase during evening peak hours over baseline conditions. As under Alternative 1, the intersection of Keith Valley Road and County Line Road (Intersection 10) would experience the lowest increase in traffic volume (morning: 422; evening: 532).

Table 4.4-6 Former NAS JRB Willow Grove Peak Hour Intersection Trips - Alternative 2

		Baseline Conditions		No Action Alternative Peak-Hour Volume		Alternative 2 Peak-Hour Volume	
	Intersection	Morning Peak Hour	Evening Peak Hour	Morning Peak Hour	Evening Peak Hour	Morning Peak Hour	Evening Peak Hour
1	Easton Road/SR 611 and Horsham Road/SR 463	3,140	3,886	3,689	4,565	5,053	6,211
2	Easton Road/SR 611 and Horsham Road/SR 463	3,106	3,885	3,649	4,564	5,013	6,210
3	Horsham Road and Dresher Road	3,630	4,558	4,265	5,355	4,887	6,128
4	Maple Avenue and Horsham Road/SR 463	3,190	3,677	3,748	4,320	4,531	5,322
5	Norristown Road and Horsham Road/SR 463	3,072	3,432	3,609	4,032	4,574	5,335
6	Easton Road/SR 611 and Home Depot Drive	3,523	5,002	4,139	5,876	5,295	7,063
7	Privet Road and Horsham Road/SR 463	2,176	2,513	2,556	2,952	3,564	4,312
8	Horsham Road/SR 463 and Keith Valley Road	1,758	2,080	2,016	2,444	2,852	3,483
9	Off Keith Valley Road	N/A	N/A	N/A	N/A	798	402
10	Keith Valley Road/Kansas Road and County Line Road	1,879	2,260	2,207	2,655	2,301	2,792
11	County Line Road and Easton Road/SR 611	3,333	3,508	3,916	4,121	4,327	4,715
12	Off Easton Road/SR 611	2,752	2,785	3,233	3,272	4,022	4,318
13	West Moreland Avenue and Easton Road/SR 611	2,715	2,726	3,190	3,203	4,088	4,337

Table 4.4-6 Former NAS JRB Willow Grove Peak Hour Intersection Trips - Alternative 2

		Baseline Conditions		No Action Alternative Peak-Hour Volume		Alternative 2 Peak-Hour Volume	
14	Maple Avenue and Easton Road/SR 611	2,980	3,574	3,501	4,199	4,341	5,216
15	Meetinghouse Road and Easton Road/SR 611	3,528	4,269	4,145	5,015	4,886	5,888

Source: TechniQuest 2013.
N/A – not available. Intersection 9 does not currently exist as it is a proposed new intersection associated with Alternative 2.

Figures 4.4-3 and 4.4-4 compare morning and evening peak-hour traffic volumes for the baseline conditions, the No Action Alternative, and Alternative 2.

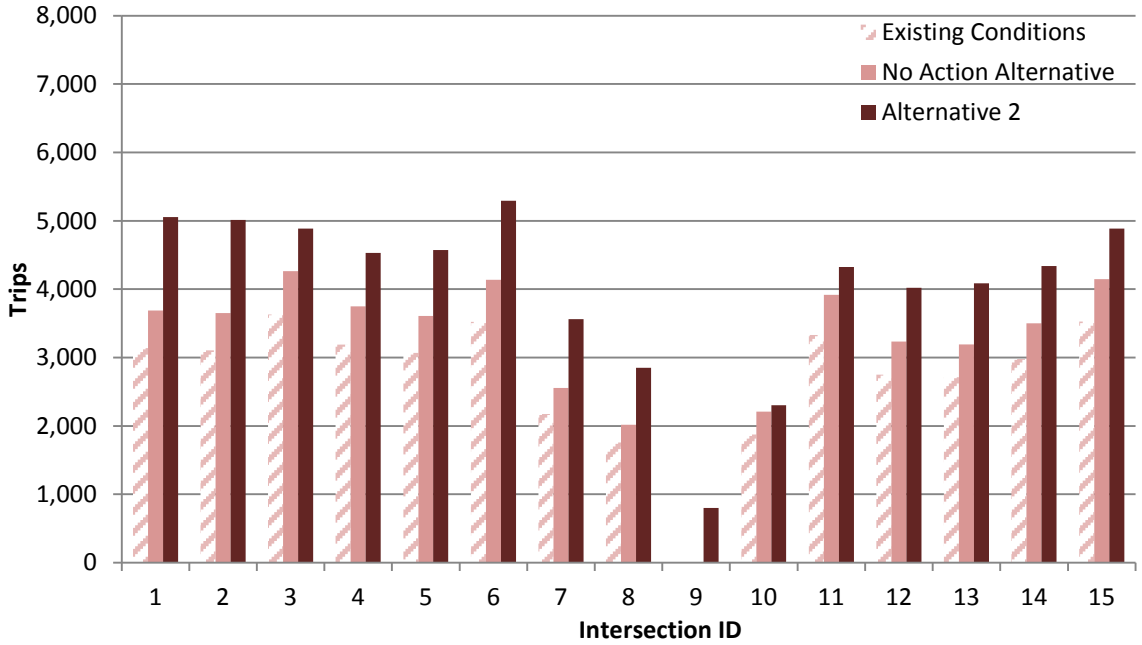

Figure 4.4-3 Morning Peak Hour Traffic Volumes - Alternative 2

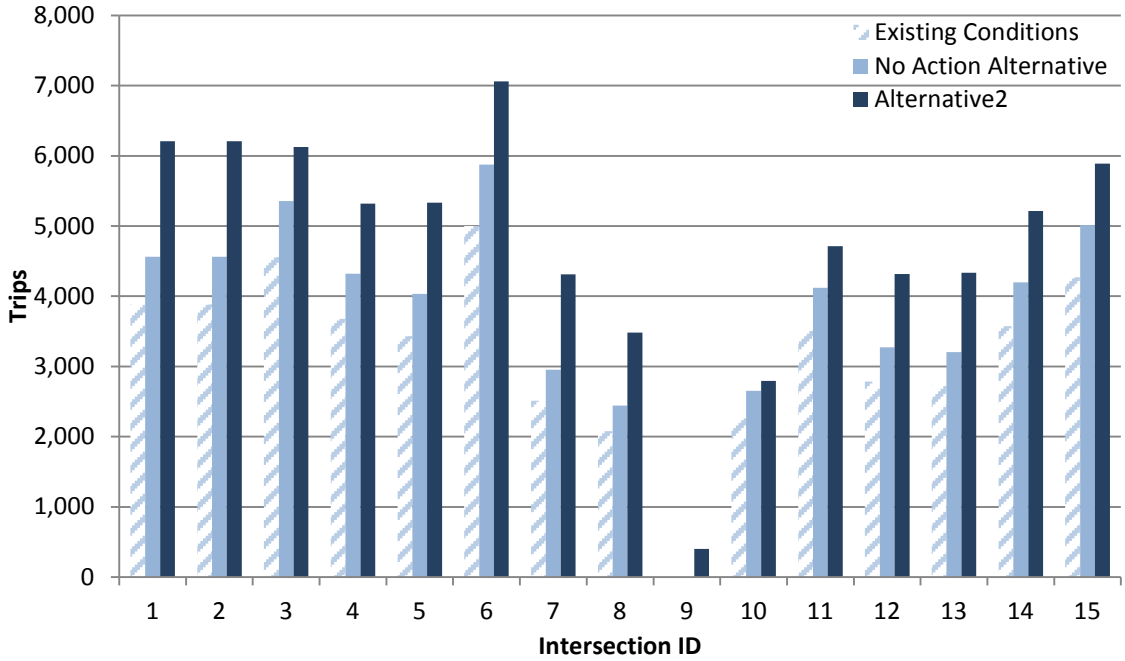

Figure 4.4-4 Evening Peak Hour Traffic Volumes - Alternative 2

4.4.2.2 Projected Level of Service

Under Alternative 2, intersections currently operating at LOS E or better would experience a drop in LOS during the morning and evening peak hours. Thirteen intersections would experience a drop in LOS compared to the No Action Alternative. Table 4.4-7 shows the LOS and associated delay in seconds for baseline conditions, the No Action Alternative, and Alternative 2. A majority of intersections would operate at LOS F during both peak-hour periods. The new proposed road off of Keith Valley Road (Intersection 9) is the only intersection projected to operate at LOS A. Privet Road and Horsham Road (Intersection 7) would operate at LOS C during morning peak hours, and both approaches of the West Moreland Avenue and Easton Road intersection (Intersection 13) would operate at LOS D or better.

The projected increase in the number of traffic trips on the roadway network surrounding the former NAS JRB Willow Grove property and the resulting changes to the LOS for the roadways and intersections would result in a significant and unavoidable impact under Alternative 2. Through the implementation of potential mitigation measures, the overall impact may be reduced to levels comparable to those presented under the future No Action Alternative (i.e., no build; however accounting for background growth in traffic).

Table 4.4-7 Former NAS JRB Willow Grove Peak-Hour Intersection LOS - Alternative 2

	Intersection		Baseline Conditions		No Action Alternative LOS		Alternative 2 LOS	
			Morning Peak Hour	Evening Peak Hour	Morning Peak Hour	Evening Peak Hour	Morning Peak Hour	Evening Peak Hour
1	Easton Road/SR 611 and Horsham Road/SR 463		D (36.7)	E (58.9)	E (73.6)	F (103.9)	F (271.2)	F (276.9)
2	Easton Road/SR 611 and Horsham Road/SR 463		C (25.5)	C (32.2)	D (41)	E (72.5)	F (110.4)	F (184.4)
3	Horsham Road/ SR 463 and Dresher Road		F (86.9)	F (180.6)	F (149.1)	F (265.2)	F (203.6)	F (339.5)
4	Maple Avenue and Horsham Road/SR 463		E (74.3)	F (148.4)	F (145.9)	F (283.0)	F (288.2)	F (653.5)
5	Norristown Road and Horsham Road/SR 463		F (83.6)	F (134.9)	F (131.7)	F (201.5)	F (148.6)	F (219.8)
6	Easton Road/SR 611 and Home Depot Drive		D (35.2)	F (92.8)	D (45.8)	F (150.8)	E (65.4)	F (219.1)
7	Privet Road and Horsham Road/SR 463		B (17.8)	C (33.3)	C (28.5)	D (45.2)	C (29.5)	F (84.6)
8	Horsham Road/SR 463 and Keith Valley Road		D (51.6)	C (24.8)	F (98.5)	E (73.7)	F (213.1)	F (201.4)
9	Off Keith Valley Road		N/A	N/A	N/A	N/A	B (10.2)	A (9.2)
10	Keith Valley Road/Kansas Road and County Line Road		C (29.8)	C (26.4)	E (67.0)	D (35.3)	F (80.5)	D (41.0)
11	County Line Road and Easton Road/SR 611		E (55.7)	E (60.8)	F (98.9)	F (111.5)	F (158.9)	F (224.7)
12	Off Easton Road/SR 611		E (71.2)	C (23.0)	F (124.6)	D (36.4)	F (168.7)	F (162.1)
13	West Moreland Avenue and Easton Road/SR 611	SB-L	B (12.7)	C (17.8)	C (15)	D (26.4)	B (14)	D (27.9)
		WB-LTR	B (14.3)	C (16.9)	C (16.7)	C (21.2)	C (17.8)	C (22.0)
14	Maple Avenue and Easton Road/SR 611		C (24.6)	F (140.9)	D (48.7)	F (193.8)	F (147.4)	F (285.4)
15	Meetinghouse Road and Easton Road/SR 611		D (45.0)	F (92.9)	F (88.3)	F (159.9)	F (144.0)	F (230.1)

Source: TechniQuest 2013.

Notes:
- Existing intersections that would include an additional approach as a result of Alternative 2 may see improvements in traffic flow over the No-Action Alternative due to redistribution of traffic volumes.
- Cells shaded light blue indicate a drop in LOS and a delay increase of more than 10 seconds compared to baseline conditions, or a delay increase of more than 10 seconds if the intersection operates at LOS F under baseline conditions.
- Cells shaded light red indicate non-State Route designated intersections that would experience both a drop in LOS and delay increase of more than 10-seconds compared to No Action Alternative or only a delay increase of more than 10 seconds if the intersection operates at LOS F under the No Action Alternative.
- Cells shaded dark red indicate State Route designated intersections that would experience both a drop in LOS and delay increase of more than 10 seconds compared to No Action Alternative, or only delay increase of more than 10 seconds if the intersection operates at LOS F under the No Action Alternative.

Key:
N/A – not available. Intersection 9 does not currently exist as it is a proposed new intersection associated with Alternative 2.

4.4.2.3 Mitigation

Based on PennDOT requirements, 12 of the 15 intersections under Alternative 2 would require mitigation (noted in dark red in Table 4.4-7). Proposed mitigation would be include the same measures proposed for Alternative 1 (see Section 4.4.1.3) and are also included for intersections that do not necessarily require mitigation per PennDOT. However, three of the 12 intersections would still fail to meet PennDOT requirements even with mitigation, as shown in Table 4.4-8.

Table 4.4-8 Former NAS JRB Willow Grove Peak-Hour Intersection LOS - Alternative 2 with Mitigation

			No Action Alternative LOS		Alternative 2 LOS		Alternative 2 with Mitigation	
	Intersection		Morning Peak Hours	Evening Peak Hours	Morning Peak Hours	Evening Peak Hours	Morning Peak Hours	Evening Peak Hours
1	Easton Road/SR 611 and Horsham Road/SR 463		E (73.6)	F (103.9)	F (271.2)	F (276.9)	E (55.9)	D (46.5)
2	Easton Road/SR 611 and Horsham Road/SR 463		D (41)	E (72.5)	F (110.4)	F (184.4)	D (46.7)	D (42.4)
3	Horsham Road and Dresher Road		F (149.1)	F (265.2)	F (203.6)	F (339.5)	F (121.5)	F (132.8)
4	Maple Avenue and Horsham Road/SR 463		F (145.9)	F (283.0)	F (288.2)	F (653.5)	E (60.6)	F (96.5)
5	Norristown Road and Horsham Road/SR 463		F (131.7)	F (201.5)	F (148.6)	F (219.8)	F (114.0)	F (187.0)
6	Easton Road/SR 611 and Home Depot Drive		D (45.8)	F (150.8)	E (65.4)	F (219.1)	B (19.4)	D (41.6)
7	Privet Road and Horsham Road/SR 463		C (28.5)	D (45.2)	C (29.5)	F (84.6)	B (14.9)	C (29.9)
8	Horsham Road/SR 463 and Keith Valley Road		F (98.5)	E (73.7)	F (213.1)	F (201.4)	D (36.5)	C (32.5)
9	Off Keith Valley Road		N/A	N/A	B (10.2)	A (9.2)	N/A	N/A
10	Keith Valley Road/Kansas Road and County Line Road[1]		E (67.0)	D (35.6)	F (80.5)	D (41.0)	E (74.0)	D (39.4)
11	County Line Road and Easton Road/SR 611		F (98.9)	F (111.5)	F (158.9)	F (224.7)	F (105.6)	F (147.0)
12	Off Easton Road/SR 611		F (124.6)	D (36.4)	F (168.7)	F (162.1)	D (41.5)	D (48.5)
13	West Moreland Avenue and Easton Road/SR 611	SB-L	C (15)	D (26.4)	B (14)	D (27.9)	C (24.5)	C (31.9)
		WB-LTR	C (16.7)	C (21.2)	C (17.8)	C (22.0)		

Table 4.4-8 Former NAS JRB Willow Grove Peak-Hour Intersection LOS - Alternative 2 with Mitigation

		No Action Alternative LOS		Alternative 2 LOS		Alternative 2 with Mitigation	
	Intersection	Morning Peak Hours	Evening Peak Hours	Morning Peak Hours	Evening Peak Hours	Morning Peak Hours	Evening Peak Hours
14	Maple Avenue and Easton Road/SR 611	D (48.7)	F (193.8)	F (147.4)	F (285.4)	B (19.2)	F (253.5)
15	Meetinghouse Road and Easton Road/SR 611	F (88.3)	F (159.9)	F (144.0)	F (230.1)	D (47.2)	F (109.7)

Source: TechniQuest 2013.

Notes:
- Cells shaded dark red indicate State Route designated intersections with mitigation that would still experience both a drop in LOS and delay increase of more than 10 seconds compared to No Action Alternative, or only delay increase of more than 10 seconds if the intersection operates at LOS F under the No Action Alternative.
- In some cases, the overall intersection without mitigation shows a better traffic flow performance than the overall intersection with mitigation. This is primarily due to the application of signal timing adjustments that attempt to improve low-performing intersection approaches. This necessitates reassigning signal time from higher-performing approaches. In some cases, the overall intersection with mitigation appears to have a lower rating, but the individual approaches and turning movements are generally better.

[1] Keith Valley Road and Kansas Road are not designated State Routes.

Key:
N/A – not available. Intersection 9 does not currently exist as it is a proposed new intersection associated with Alternative 2.

4.4.3 Alternative 3 (Airfield Reuse)

Under Alternative 3, the property would be accessed at six intersections. Access points would be similar to those under Alternatives 1 and 2; however, under this alternative, there would be no new roadway intersecting Keith Valley Road. Internal roadways would provide circulation to land uses but would not connect across the airfield (see Figure 2-3).

Construction-related traffic would consist of delivery trucks, dump trucks, heavy equipment, and vehicles driven by construction crews. This could result in short-term impacts on traffic from additional truck trips and slower-moving vehicles. Construction at the former installation would not occur all at the same time, and impacts would be focused on roadways in proximity to individual construction projects.

4.4.3.1 Projected Traffic Volumes

Full build-out of Alternative 3 would be projected to generate 25,563 new trips per weekday, of which 23,126 would be external trips. A majority of the trips would originate from the use of retail land (15,574) and the office park (7,356). The use of hotel/conference land would generate 879 weekday trips, the recreation center would generate 1,085 trips, the BCHG housing would generate 670 trips, and airfield operations would generate 716 trips. A total of 1,546 morning peak-hour trips would be generated, 1,456 of which would be external trips; a total of 2,378 evening peak-hour trips would be generated, 2,203 of which would be external trips. The office park would produce the highest volume of morning peak-hour trips, while retail land use would produce the highest volume of evening peak-hour trips. Table 4.4-9 shows the weekday total volumes and morning and evening peak-hour trips generated for each proposed land use on the property.

Table 4.4-9 Former NAS JRB Willow Grove Trip Distribution - Alternative 3

Land Use	Weekday Daily Total	Morning Peak Hour			Evening Peak Hour		
		Enter	Exit	Total	Enter	Exit	Total
Commercial and Mixed Use							
Hotel/conference	879	41	29	70	45	35	70
Office park	7,356	924	114	1,038	127	782	909
Retail[1]	15,574[1]	221	141	363	614[1]	639[1]	1,254[1]
Community Services and Recreation							
Regional recreation center	1,085	14	9	23	28	42	69
BCHG Housing	670	13	39	53	45	26	71
Aviation museum[2]	-	-	-	-	-	-	-
Airfield operations [3]	716	95	13	108	21	104	125
Total	**25,563**	**1,213**	**333**	**1,546**	**859**	**1,519**	**2,378**
Total trips generated (adjusted for internal capture rate)	**23,126**	**1,152**	**304**	**1,456**	**775**	**1,428**	**2,203**

Source: TechniQuest 2013.

Notes:
[1] Includes pass-by percentage.
[2] Trips were assumed to occur during off-peak hours and were not included.
[3] An internal capture rate of 12 percent was applied to account for trips generated that would occur between proposed land uses.

Under Alternative 3, all of the intersections studied would be projected to experience an increase in traffic volume (see Table 4.4-10). The intersections of Easton Road and Horsham Road (Intersections 1 and 2) would experience the greatest volume increase during the morning and evening peak hours. The Keith Valley Road and County Line Road intersection (Intersection 10) would experience the smallest volume increase. The largest percentage increase (57 percent) would occur during the evening peak hours at the intersection of Privet Road and Horsham Road (Intersection 7).

Table 4.4-10 Former NAS JRB Willow Grove Peak Hour Intersection Trips - Alternative 3

	Intersection	Baseline Conditions		No Action Alternative Peak-Hour Volume		Alternative 3 Peak-Hour Volume	
		Morning Peak Hour	Evening Peak Hour	Morning Peak Hour	Evening Peak Hour	Morning Peak Hour	Evening Peak Hour
1	Easton Road/SR 611 and Horsham Road/SR 463	3,140	3,886	3,689	4,565	4,602	5,719
2	Easton Road/SR 611 and Horsham Road/SR 463	3,106	3,885	3,649	4,564	4,562	5,718
3	Horsham Road and Dresher Road	3,630	4,558	4,265	5,355	4,707	5,906
4	Maple Avenue and Horsham Road/SR 463	3,190	3,677	3,748	4,320	4,286	5,033
5	Norristown Road and Horsham Road/SR 463	3,072	3,432	3,609	4,032	4,296	5,040
6	Easton Road/SR 611 and Home Depot Drive	3,523	5,002	4,139	5,876	4,973	6,686

Table 4.4-10 Former NAS JRB Willow Grove Peak Hour Intersection Trips - Alternative 3

		Baseline Conditions		No Action Alternative Peak-Hour Volume		Alternative 3 Peak-Hour Volume	
7	Privet Road and Horsham Road/SR 463	2,176	2,513	2,556	2,952	3,207	3,947
8	Horsham Road/SR 463 and Keith Valley Road	1,758	2,080	2,016	2,444	2,534	3,172
9	Off Keith Valley Road[1]	--	--	--	--	--	--
10	Keith Valley Road/Kansas Road and County Line Road	1,879	2,260	2,207	2,655	2,220	2,703
11	County Line Road and Easton Road/SR 611	3,333	3,508	3,916	4,121	4,173	4,535
12	Off Easton Road/SR 611	2,752	2,785	3,233	3,272	3,727	3,999
13	West Moreland Avenue and Easton Road/SR 611	2,715	2,726	3,190	3,203	3,752	3,991
14	Maple Avenue and Easton Road/SR 611	2,980	3,574	3,501	4,199	4,034	4,901
15	Meetinghouse Road and Easton Road/SR 611	3,528	4,269	4,145	5,015	4,616	5,618

Source: TechniQuest 2013.

Note:
[1] Access point off of Keith Valley Road is not proposed under Alternative 3.

Figures 4.4-5 and 4.4-6 compare morning and evening peak-hour traffic volumes for the baseline conditions, the No Action Alternative, and Alternative 3.

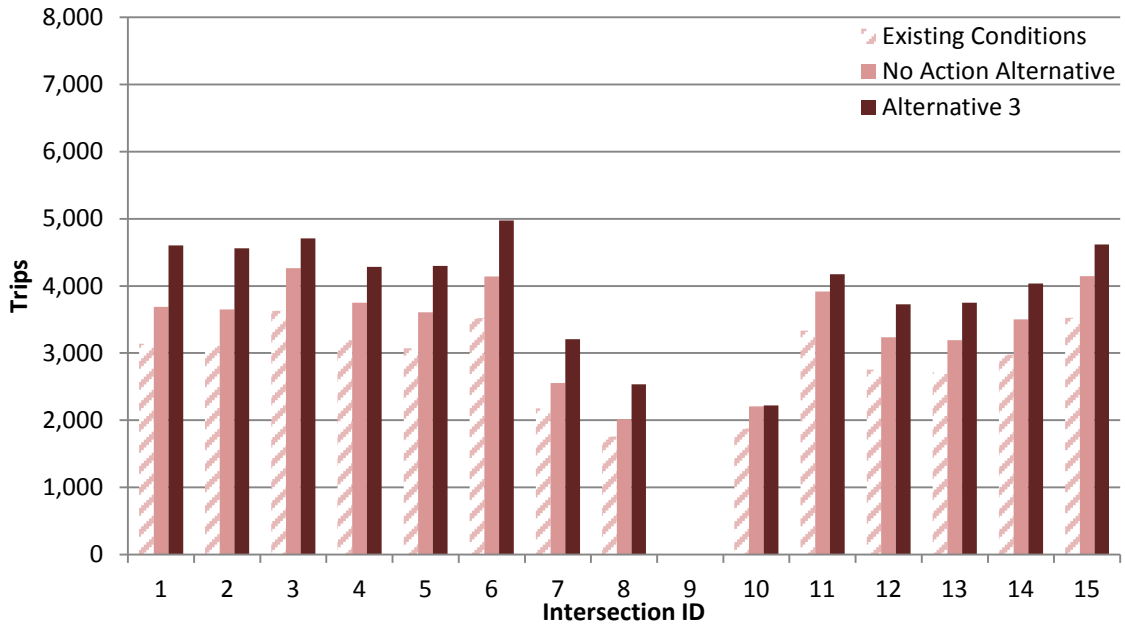

Figure 4.4-5 Morning Peak Hour Traffic Volumes - Alternative 3

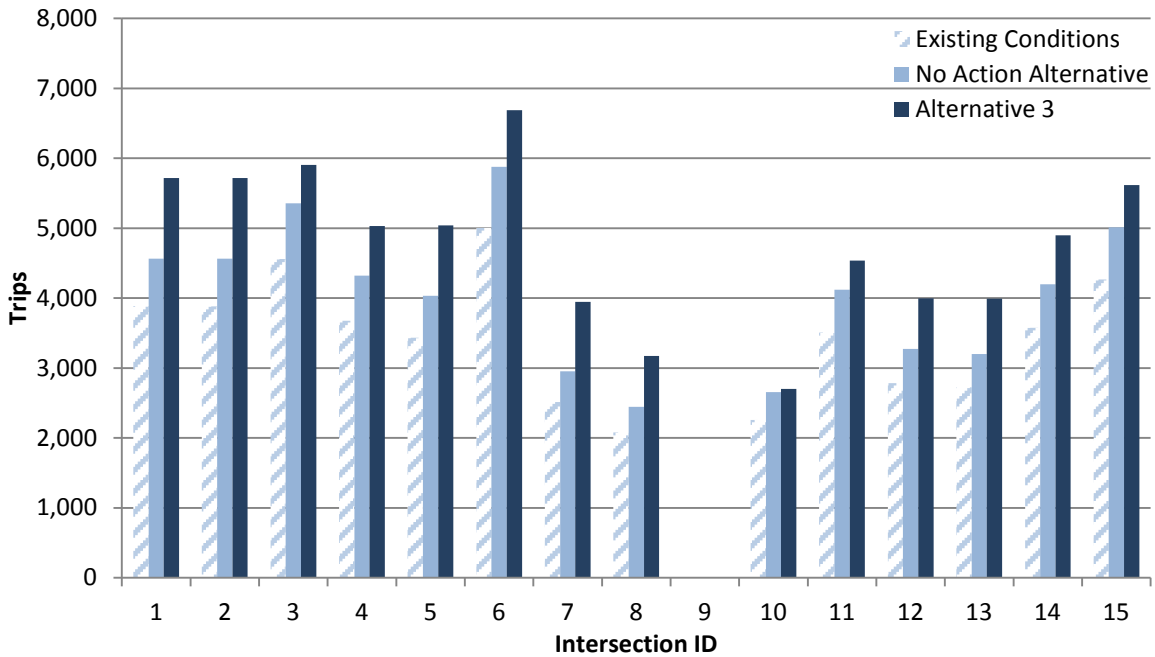

Figure 4.4-6 Evening Peak Hour Traffic Volumes - Alternative 3

4.4.3.2 Projected Level of Service

Similar to the other alternatives, intersections with a current LOS of E or better would be projected to experience a drop in LOS under Alternative 3. Of these, 12 intersections would be projected to experience a drop in LOS compared to the No Action Alternative. Table 4.4-11 shows the projected LOS and associated delay in seconds for baseline conditions, the No Action Alternative, and Alternative 3. Ten intersections would operate at LOS F during both peak-hour periods. Privet Road and Horsham Road would operate at LOS C and LOS E during morning and evening peak hours respectively, Keith Valley Road and County Line Road would operate at LOS E during morning peak hours, and West Moreland Avenue would operate at LOS C or better during both peak hour periods.

The projected increase in the number of traffic trips on the roadway network surrounding the former NAS JRB Willow Grove property and the resulting changes to the LOS for the roadways and intersections would result in a significant and unavoidable impact under Alternative 3, although not to the degree as presented under Alternatives 1 and 2. Through the implementation of potential mitigation measures, the overall impact may be reduced to levels comparable to those presented under the future No Action Alternative (i.e., no build; however accounting for background growth in traffic).

Table 4.4-11 Former NAS JRB Willow Grove Peak-Hour Intersection LOS - Alternative 3

	Intersection		Baseline Conditions		No Action Alternative LOS		Alternative 3 LOS	
			Morning Peak Hour	Evening Peak Hour	Morning Peak Hour	Evening Peak Hour	Morning Peak Hour	Evening Peak Hour
1	Easton Road/SR 611 and Horsham Road/SR 463		D (36.7)	E (58.9)	E (73.6)	F (103.9)	F (211.3)	F (220.7)
2	Easton Road/SR 611 and Horsham Road/SR 463		C (25.5)	C (32.2)	D (41)	E (72.5)	F (96.7)	F (157.7)
3	Horsham Road and Dresher Road		F (86.9)	F (180.6)	F (149.1)	F (265.2)	F (184.7)	F (314.0)
4	Maple Avenue and Horsham Road/SR 463		E (74.3)	F (148.4)	F (145.9)	F (283.0)	F (257.1)	F (493.8)
5	Norristown Road and Horsham Road/SR 463		F (83.6)	F (134.9)	F (131.7)	F (201.5)	F (136.5)	F (203.6)
6	Easton Road/SR 611 and Home Depot Drive		D (35.2)	F (92.8)	D (45.8)	F (150.8)	D (50.4)	F (203.7)
7	Privet Road and Horsham Road/SR 463		B (17.8)	C (33.3)	C (28.5)	D (45.2)	C (22.7)	E (60.4)
8	Horsham Road/SR 463 and Keith Valley Road		D (51.6)	C (24.8)	F (98.5)	E (73.7)	F (203.9)	F (158.9)
9	Off Keith Valley Road		N/A	N/A	N/A	N/A	N/A	N/A
10	Keith Valley Road/Kansas Road and County Line Road		C (29.8)	C (26.4)	E (67.0)	D (35.3)	E (66.7)	D (37.0)
11	County Line Road and Easton Road/SR 611		E (55.7)	E (60.8)	F (98.9)	F (111.5)	F (141.6)	F (180.9)
12	Off Easton Road/SR 611		E (71.2)	C (23.0)	F (124.6)	D (36.4)	F (141.0)	F (106.5)
13	West Moreland Avenue and Easton Road/SR 611	SB-L	B (12.7)	C (17.8)	C (15)	D (26.4)	C (15.4)	C (24.7)
		WB-LTR	B (14.3)	C (16.9)	C (16.7)	C (21.2)	C (16.9)	C (20.5)
14	Maple Avenue and Easton Road/SR 611		C (24.6)	F (140.9)	E (55.4)	F (193.8)	F (99.4)	F (248.1)
15	Meetinghouse Road and Easton Road/SR 611		D (45.0)	F (92.9)	F (88.3)	F (159.9)	F (112.3)	F (204.5)

Source: TechniQuest 2013.

Notes:

- Existing intersections that would include an additional approach as a result of Alternative 3 may see improvements in traffic flow over the No-Action Alternative due to redistribution of traffic volumes.
- Cells shaded light blue indicate a drop in LOS and a delay increase of more than 10 seconds compared to baseline conditions, or a delay increase of more than 10 seconds if the intersection operates at LOS F under baseline conditions.
- Cells shaded light red indicate non-State Route designated intersections that would experience both a drop in LOS and delay increase of more than 10-seconds compared to No Action Alternative or only a delay increase of more than 10 seconds if the intersection operates at LOS F under the No Action Alternative.
- Cells shaded dark red indicate State Route designated intersections that would experience both a drop in LOS and delay increase of more than 10 seconds compared to No Action Alternative, or only delay increase of more than 10 seconds if the intersection operates at LOS F under the No Action Alternative.

Key:
N/A – not available. Intersection 9 does not currently exist nor is it proposed under Alternative 3.

4.4.2.3 Mitigation

Based on PennDOT requirements, 11 of the 14 intersections under Alternative 3 would require mitigation (noted in dark red in Table 4.4-11). Proposed mitigation would include the same measures proposed for Alternative 1 (see Section 4.4.1.3) and are also included for intersections that do not necessarily require mitigation per PennDOT. With mitigation, all of the intersections would have an LOS comparable to or better than the No Action Alternative and would meet PennDOT requirements, as shown in Table 4.4-12.

Table 4.4-12 Former NAS JRB Willow Grove Peak-Hour Intersection LOS - Alternative 3 with Mitigation

			No Action Alternative LOS		Alternative 3 LOS		Alternative 3 with Mitigation	
	Intersection		Morning Peak Hours	Evening Peak Hours	Morning Peak Hours	Evening Peak Hours	Morning Peak Hours	Evening Peak Hours
1	Easton Road/SR 611 and Horsham Road/SR 463		E (73.6)	F (103.9)	F (211.3)	F (220.7)	D (52.7)	C (27.5)
2	Easton Road/SR 611 and Horsham Road/SR 463		D (41)	E (72.5)	F (96.7)	F (157.7)	C (32.8)	C (32.2)
3	Horsham Road and Dresher Road		F(149.1)	F (265.2)	F (184.7)	F (314.0)	F (85.0)	F (83.3)
4	Maple Avenue and Horsham Road/SR 463		F (145.9)	F (283.0)	F (257.1)	F (493.8)	D (42.2)	F (83.6)
5	Norristown Road and Horsham Road/SR 463		F (131.7)	F (201.5)	F (136.5)	F (203.6)	E (64.1)	F (85.0)
6	Easton Road/SR 611 and Home Depot Drive		D (45.8)	F (150.8)	D (50.4)	F (203.7)	C (21.6)	D (37.6)
7	Privet Road and Horsham Road/SR 463		C (28.5)	D (45.2)	C (22.7)	E (60.4)	A (9.8)	C (28.7)
8	Horsham Road/SR 463 and Keith Valley Road		F (98.5)	E (73.7)	F (203.9)	F (158.9)	C (22.1)	B (17.6)
9	Off Keith Valley Road[1]		N/A	N/A	N/A	N/A	N/A	N/A
10	Keith Valley Road/Kansas Road and County Line Road		E (67.0)	D (35.3)	E (66.7)	D (37.0)	E (61.4)	C (34.5)
11	County Line Road and Easton Road/SR 611		F (98.9)	F (111.5)	F (141.6)	F (180.9)	C (33.5)	D (42.1)
12	Off Easton Road/SR 611		F (124.6)	D (36.4)	F (141.0)	F (106.5)	A (7.0)	C (31.5)
13	West Moreland Avenue and Easton Road/SR 611	SB-L	C (15)	D (26.4)	C (15.4)	C (24.7)	C (21.1)	C (31.5)
		WB-LTR	C (16.7)	C (21.2)	C (16.9)	D (20.5)		

Table 4.4-12 Former NAS JRB Willow Grove Peak-Hour Intersection LOS - Alternative 3 with Mitigation

		No Action Alternative LOS		Alternative 3 LOS		Alternative 3 with Mitigation	
	Intersection	Morning Peak Hours	Evening Peak Hours	Morning Peak Hours	Evening Peak Hours	Morning Peak Hours	Evening Peak Hours
14	Maple Avenue and Easton Road/SR 611	E (55.4)	F (193.8)	F (99.4)	F (248.1)	B (17.1)	D (43.0)
15	Meetinghouse Road and Easton Road/SR 611	F (88.3)	F (159.9)	F (112.3)	F (204.5)	F (80.9)	F (103.6)

Source: TechniQuest 2013.

Note:
- In some cases, the overall intersection without mitigation shows a better traffic flow performance than the overall intersection with mitigation. This is primarily due to the application of signal timing adjustments that attempt to improve low-performing intersection approaches. This necessitates reassigning signal time from higher-performing approaches. In some cases, the overall intersection with mitigation appears to have a lower rating, but the individual approaches and turning movements are generally better.

[1] Access point off of Keith Valley Road is not proposed under Alternative 3.

Key:
- Cells shaded dark red indicate State Route designated intersections with mitigation that would still experience both a drop in LOS and delay increase of more than 10 seconds compared to No Action Alternative, or only delay increase of more than 10 seconds if the intersection operates at LOS F under the No Action Alternative.

4.4.4 No Action Alternative

Projected Traffic Volumes

No trips would be generated as a result of the No Action Alternative. Changes in traffic volumes under the No Action Alternative would be the result of the projected population growth that would be expected to occur through the year 2033. Each of the intersections evaluated would be expected to experience an increase in peak-hour volumes.

Projected Level of Service

The projected LOS would be expected to drop at 11 of the 14 existing intersections under the No Action Alternative due to increases in traffic from background growth in the region. Ten of these intersections would operate at LOS F during one or both of the peak-hour periods, and two of the existing intersections currently operate at LOS F during both peak-hour periods and could not drop further as a result of the background growth. An increase in delay of greater than 10 seconds would be expected to occur at 13 of the 14 existing intersections.

4.5 Environmental Management

Several environmental management requirements pertaining to the transfer of real property outside the federal government could have potential impacts on the implementation of the redevelopment alternatives.

CERCLA requires federal agencies to conduct any needed response actions to clean up contamination from past releases of hazardous substances that pose an unacceptable risk to human health and the environment. In preparing to dispose of the former NAS JRB Willow Grove property, the Navy will follow the provisions of CERCLA, Section 120(h). These provisions require that the deed transferring the property contain a covenant warranting that all remedial actions necessary to protect human health and the environment with respect to contaminants remaining on the property has been taken prior to the date of transfer (see Section 3.5.1 for additional information).

Whenever the DOD enters into a transfer of real property outside the federal government where CERCLA 120(h)(3) hazardous substances were stored for one year or longer, known to have been released, or disposed of, Section 120(h) of CERCLA applies. Any deed transferring title to real property shall contain, to the extent required by law, the notices, descriptions, and covenants specified in Section 120(h). While all property must comply with Section 120 (h) requirements for transfer, the cleanup itself may proceed under CERCLA or RCRA, when appropriate (DOD 2006). All such remedial action is considered to have been taken if the construction and installation of an approved remedial design has been completed and the remedy has been demonstrated to EPA to be operating properly and successfully.

Since 1995, when the former NAS JRB Willow Grove property was placed on the NPL, investigations and remedial actions have been performed at the installation under the ER Program. This program was undertaken in compliance with CERCLA and is ongoing, regardless of whether the installation was recommended for disposal under BRAC. In total, 12 sites have been identified to date at the installation and have been or are being investigated.

A Restoration Advisory Board (RAB) consisting of community representatives and state and federal regulators was formed to advise the Navy on environmental cleanup strategies as NAS JRB Willow Grove progresses toward disposal as designated under the authority of BRAC.

In support of the BRAC process, the Navy has prepared an Environmental Condition of Property (ECP) Report (Navy 2006) documenting existing hazardous materials and waste sites located on the installation. The ECP provides baseline information to the BRAC PMO to support disposal decisions and to prospective developers.

Section 120(h)(4) of CERCLA, the Community Environmental Response Facilitation Act (CERFA) requires the federal government to identify "uncontaminated property" at BRAC facilities scheduled for transfer (Tetra Tech 2007a). The CERFA must be completed no later than 18 months after the date on which the real property is selected for closure (Tetra Tech 2007a). The CERFA for the former NAS JRB Willow Grove property was substantially completed in April 2007 and is considered completed upon concurrence with the results from the EPA (Tetra Tech 2007b). The purpose of this process is to determine which real property is uncontaminated and can subsequently be transferred.

Prior to the transfer or lease of the former NAS JRB Willow Grove property, the Navy will prepare a Finding of Suitability to Lease (FOSL) or Finding of Suitability to Transfer (FOST). The FOSL/FOST summarizes how the applicable requirements and notifications for hazardous substances, petroleum products, and other regulated materials have been satisfied and whether the property is environmentally suitable for transfer or lease. Information is also provided regarding any long-term remedies and the responsibilities for maintenance and reporting (DOD 2006). The FOSL will document that the property is suitable for lease in that the uses contemplated for the lease are consistent with protection of human health and the environment, and that there are adequate assurances that all necessary remedial action has been taken or will be taken after the execution of the lease. The FOSL/FOST will be forwarded to the EPA and PADEP for review, as appropriate (DOD 2006).

Potentially contaminated property can still be transferred under the early transfer process of CERCLA. The Navy can also prepare a Finding of Suitability for Early Transfer (FOSET) to transfer property prior to cleanup actions. In these cases, the Navy or the property recipient may conduct cleanup actions. The benefit of a FOSET is that the property can be transferred sooner in order to begin redevelopment while still being assured of property cleanup.

The Navy prepares an annual Site Management Plan (SMP) update for planning, reviewing, and setting priorities for all CERCLA remedial activities to be performed at the facility (Tetra Tech 2012b).

The Navy is coordinating with the EPA and PADEP to address environmental restoration related to transferring parcels of the former NAS JRB Willow Grove property under the reuse alternatives. The Navy will inform future property owners of the locations of any hazardous waste 90-day accumulation areas and universal waste storage areas at the installation. The Navy will be required to close or transfer these areas in accordance with CERCLA, RCRA, and all other applicable federal, state, and local laws and regulations. Where appropriate, restrictions, notifications, or covenants in deeds related to ACM, lead, PCBs, radon, pesticides, and other regulated materials will be included in property transfer documents to ensure the protection of human health and the environment.

4.5.1 Alternative 1 (HLRA Plan - Preferred Alternative)

4.5.1.1 Hazardous Materials and Waste

Implementation of Alternative 1 at the former NAS JRB Willow Grove property would not have an impact on the environment related to hazardous materials and waste. Prior to the transfer or lease of the former NAS JRB Willow Grove property, the Navy will prepare a Finding of Suitability to Lease (FOSL) or Finding of Suitability to Transfer (FOST).

RCRA Hazardous Materials and Waste

Under Alternative 1, the quantity of hazardous materials used, generated, stored, and disposed of would be expected to be less than the quantity generated during the Navy's operations at the former NAS JRB Willow Grove property. Redevelopment of the property under Alternative 1 would result in primarily residential and commercial land uses. The property owner/developer would be required to manage hazardous materials and wastes in accordance with applicable federal and state regulations.

Storage Tanks and Oil/Water Separators

Under Alternative 1, redevelopment of the installation property would have to consider the locations of USTs, ASTs, and OWS. Storage tanks and OWSs would likely require removal during the demolition of on-site buildings or to accommodate development such as laying of foundations for new buildings or relocating utility lines.

Some storage tanks and OWSs are associated with buildings recommended for reuse under Alternative 1 and may remain in place, depending on the needs identified in the land use districts. In addition, some commercial or industrial developments may require the installation of new USTs, ASTs, or OWSs. The developer will need to comply with all applicable federal, state, and local laws and regulations. Any storage tanks and OWSs that would be installed must comply with applicable PADEP regulations.

In general, under Alternative 1 there would be a beneficial long-term impact on the environment related to storage tanks and OWSs based on the assumption that numerous storage tanks and OWSs would be removed during redevelopment.

ACM and LBP

Alternative 1 includes the renovation and reuse of six existing non-residential structures that were would be reused. ACM and PACM were identified in some of the on-base buildings investigated at the former NAS JRB Willow Grove property (see Section 3.5.3), including Building 109 Quarters A, 110 Quarters B, 110A, 111 Quarters C, 112 Quarters D, 112A, 113 Quarters E, 113A, and 114 Quarters F (Michael Baker Jr. Inc. 2011a). ACM surveys and testing have been performed on both housing and non-housing buildings.

LBP hazards were identified only in Building 5 windows (Michael Baker Jr., Inc. 2011a). The Department of Housing and Urban Development (HUD) Lead Safe Housing rule requires abatement of

LBP hazards in housing units constructed before 1960 before the sale of the property (Michael Baker Jr., Inc. 2011a). Where abatement of LBP hazards is not completed before the transfer, the Navy will be responsible for ensuring that the abatement is carried out before occupancy of the property as housing. In buildings constructed after 1960, the Navy is required to disclose all knowledge of LBP and LBP hazards (Michael Baker Jr., Inc. 2011a). According to DOD policy, inspection and abatement are not required when (1) the building is scheduled for demolition by the transferee and the transfer document prohibits occupation of the building prior to the demolition; (2) the building is scheduled for non-residential use or non-child-occupied use; or (3) if the building is scheduled for residential use and the transferee conducts renovation consistent with the regulatory requirements for the abatement of LPB hazards (DOD 1994, 2006).

Additional ACM and PACM may be present on the property, since destructive-tests were not performed (Michael Baker Jr., Inc. 2011b), and additional LBP may be present based on the age of many of the buildings on the property and the fact that LBP inspections and risk assessments at the property have focused primarily on housing units.

Any modification, renovation, and/or demolition of existing buildings at the installation will require contractors to test for and remedy ACM and LBP as required by Federal and state regulations. Contractors will need to comply with regulatory requirements during renovation projects on structures containing ACM and LBP. Contractors will also need to comply with regulatory requirements during the demolition of structures and materials containing ACM and LBP. These requirements address engineering controls and protective measures that must be employed during demolition to ensure that ACM and LBP are removed by qualified contractors in a manner that prevents the airborne release of asbestos and lead and that these materials are disposed of properly. The National Emissions Standards for Hazardous Air Pollutants (NESHAPs) (40 CFR Part 61) require owners or operators engaged in a demolition activity subject to NESHAPs to remove regulated ACM from the facility being demolished prior to any activity that would break up, dislodge, or disturb these materials. Contractual specifications for demolition involving ACM also will be developed by an accredited Asbestos Hazard Emergency Response Act (AHERA) professional to further ensure the proper removal of regulated ACM.

In accordance with RCRA, demolition waste streams that potentially contain lead would be evaluated, either by applying knowledge of the waste or by testing using the toxicity characteristic leaching procedure (TCLP), to determine whether hazardous waste disposal regulations are applicable. Hazardous wastes generated from demolition that containing LBP would be temporarily stored on-site in compliance with RCRA requirements before being transported and disposed of off-site by a licensed contractor. In general, new construction would not involve the introduction of these materials, although some materials may contain some ACM or LBP.

Under Alternative 1, there would be a beneficial long-term impact on the environment from the removal of ACM and LBP because it would no longer be present, or would be present but in minimal quantities, within the built environment.

PCBs

As discussed in Section 3.5.3.6, all PCB-containing transformers and equipment formerly located at the installation were reportedly removed in the late 1990s (Navy 2006); however, no record of these removals is available. PCB soil contamination was addressed at IRP Site 1 – Privet Road (refer to Section 3.5.3.6).

PCBs may be in various building materials, including window and masonry joint caulk, paints, mastics, sealants, adhesives, and specialty coatings. PCBs in caulk are more likely to be found in buildings built between 1950 and 1980 (EPA 2012b). Due to the age of the buildings on the installation, some building materials may contain PCBs. PCB-containing materials encountered during renovation or demolition

must be removed and disposed of in accordance with current PCB regulations published pursuant to TSCA and found in Subpart D of 40 CFR 761 (EPA 2012b).

Under Alternative 1, environmental impacts related to PCBs would be temporary and minor.

Radon

Radon is primarily a concern in indoor air. The results of radon testing of nonresidential structures on the installation showed concentrations in indoor air to be above the EPA action level in Buildings 113, 137, and 601 (see Section 3.5.3.7). These three buildings were not recommended for re-use under Alternative 1 and would be demolished (RKG 2012).

Any available and relevant radon assessment data pertaining to the former NAS JRB Willow Grove property will be included in property transfer documents, in accordance with DOD policy (DOD 1994). However, DOD policy is not to perform radon assessment and mitigation prior to transfer of BRAC property unless otherwise required by applicable law (DOD 1994, 2006).

Radon screening by the developer would be recommended in any building retained for reuse or constructed in place of Buildings 113, 137, and 601.

Pesticides

Under Alternative 1, pesticide use would likely continue on lawns and landscaped areas, especially the proposed golf course. Certain pesticides may be applied only by or under the direct supervision of a certified pest control applicator (EPA 2012c).

As discussed in Section 3.5.3.8, documentation was unavailable relating to actual past use, spills, or misuse of pesticides and herbicides on the installation. Residual pesticide concentrations have been detected at IRP sites, presumably from past use (Navy 1991).

The presence of arsenic at the installation, which is a contaminant of concern in Pennsylvania, could impact land use under Alternative 1. The concentrations of arsenic detected in most soil samples collected in IRP Site 7 in 2008 exceeded the risk-based concentration but were within background levels for soil (Tetra Tech 2012b). The elevated arsenic concentrations are most likely due to natural causes, not to pesticide use.

Radioactive Materials Sites

The HRA (Naval Sea Systems Command 2013) identified 18 impacted sites with a low to moderate potential for residual radioactive contamination. These impacted sites have been recommended for a scoping study to determine whether residual radioactive contamination is present. Although an impacted site may be remediated and released as free from residual contamination, the site is not generally reclassified as non-impacted.

The scoping survey will determine whether contamination in excess of current release criteria exists. Chapter 7 of the HRA discusses actions which can occur following the scoping survey. Based on the preliminary information for the “potential” for contamination recorded in the HRA, it appears that under Alternative 1, most of the sites with a “likely” or “unknown” potential for contamination occur in areas designated as open space/park/golf course, hotel/conference center/office center, and town center. However, Buildings 80 and 680 are located within areas designated as single-family housing and school space.

4.5.1.2 Environmental Restoration Program

Under Alternative 1, the Navy will continue environmental remediation as required under CERCLA; therefore, there would be no impact on the environment concerning the environmental restoration program under Alternative 1.

Figure 4.5-1 identifies the locations of the IRP sites relative to the proposed land use under Alternative 1. Table 4.5-1 summarizes the IRP sites and the proposed land use districts under Alternative 1. On-base remedial activities impose various land use controls on the development of certain parcels of the property.

Table 4.5-1 IRP Impacts under Alternative 1

Site	Site Name	Alternative 1 Land Use	Potential Impact[1]
Site 1	Privet Road Compound	Transferred to Horsham Air Guard Station[2]	Development at site and above contaminated groundwater plume subject to land use controls and other constraints.[3]
Site 2	Antenna Field Landfill	Town center, open space, roads/parking, office park	Recommend geotechnical evaluation by future developer for building foundations due to the potential presence of subsurface landfill materials.
Site 3	Ninth Street Landfill	Par 3 golf course, office park	New structures and facilities would need to be sited to avoid or minimize disturbance. Subject to land use controls and other constraints [3]
Site 4	North End Landfill	Open space	Recommend geotechnical evaluation by future developer for building foundations due to the potential presence of subsurface landfill materials.
Site 5	Fire Training Area	Office park, par 3 golf course, roads/parking[2]	Development at site and above contaminated groundwater plume subject to land use controls and other constraints.[3]
Site 6	Abandoned Rifle Range No. 1	Office park	No impact.
Site 7	Abandoned Rifle Range No. 2	Open space, large-lot, single-family residences	No impact.
Site 8	Building 118 Abandoned Fuel Tank	Open space, roads/parking	Buried-in-place UST may need to be removed to accommodate development.
Site 9	Steam Plant Building 6 Tank Overfill	Transferred to Horsham Air Guard Station	No impact.
Site 10	Navy Fuel Farm	Transferred to Horsham Air Guard Station	No impact; complies with industrial land use requirement.[4]
Potential Site 11	Aircraft Parking Apron	Transferred to Horsham Air Guard Station	No impact.

Table 4.5-1 IRP Impacts under Alternative 1

Site	Site Name	Alternative 1 Land Use	Potential Impact[1]
Site 12	South Landfill	Town center, roads/sidewalks, park, office park	New structures and facilities would need to be sited to avoid or minimize disturbance. Subject to land use controls and other constraints.[3]

Source: RKG 2012.

Notes:
[1] Current status as of 2012.
[2] Land use pertains to site boundary only, not to the extent of the VOC-contaminated groundwater plume(s).
[3] Constraints are described in Section 4.5.1.2.
[4] No Further Action agreement based on continued use as a commercial/industrial property.

Key:
VOC = volatile organic compound.

Reuse Constraints from Properties Owned/Transferred to Horsham Air Guard Station

IRP sites located on the property owned and/or transferred to establish the Horsham Air Guard Station would not be impacted under Alternative 1, as it is a separate process and not covered in this analysis (RKG 2012). Property which was transferred to the Air Force as part of the BRAC 2005 requirement included Sites 1, 9, 10, and 11 (Tetra Tech 2012a). However, while the land where IRP Site 1 is located was transferred to the Horsham Air Guard Station property, several land use constraints are applicable to future reuse of the property due to off-site VOC-contamination.

Reuse Constraints from VOC-Contaminated Groundwater

VOC-contaminated groundwater plumes have been detected at IRP Sites 1 and 5. Institutional and land use controls at Sites 1 and 5 preclude the unrestricted use of the sites and site groundwater (Tetra Tech 2012a, 2012b). Remedial activities at these sites are on-going and require engineering controls to remain in place until remediation is complete. Development in these areas will be constrained to prevent damage to and removal of groundwater monitoring wells and to maintain access to the wells and/or treatment systems for maintenance and monitoring purposes. In addition, institutional controls include the requirement to mitigate the potential for vapor intrusion from the surface into structures. Existing and future buildings located in the vicinity of the groundwater plumes will be subject to a vapor intrusion investigation. Unless the vapor intrusion investigation shows that an unacceptable risk to future occupants is not present at the structure, a system must be installed to mitigate potential intrusion of VOCs from subsurface into the structure. Commonly installed systems include sub-slab depressurization systems that vent sub-slab vapors above the roofline of the building, and vapor barriers that are constructed below the foundation prior to construction of the building. These institutional and land use controls will apply until contaminants in groundwater are at levels that allow for unlimited use and unrestricted exposure.

Reuse Constraints from Landfilled Material

Landfilled materials remain in-place at IRP Sites 2, 3, 4, and 12. No remedial action is required for Site 2 to allow unrestricted current and future land use. At Site 4, EPA, PADEP, and the Navy reached a consensus agreement that no action or further investigation is required. A geotechnical evaluation for building foundations is recommended for Sites 2 and 4 due to the potential presence of subsurface landfill materials. Remedial activities at the landfills at Sites 3 and 12 are on-going and there will be land use constraints for future development. New structures and facilities will need to be sited to avoid or minimize disturbance of Sites 3 and 5.

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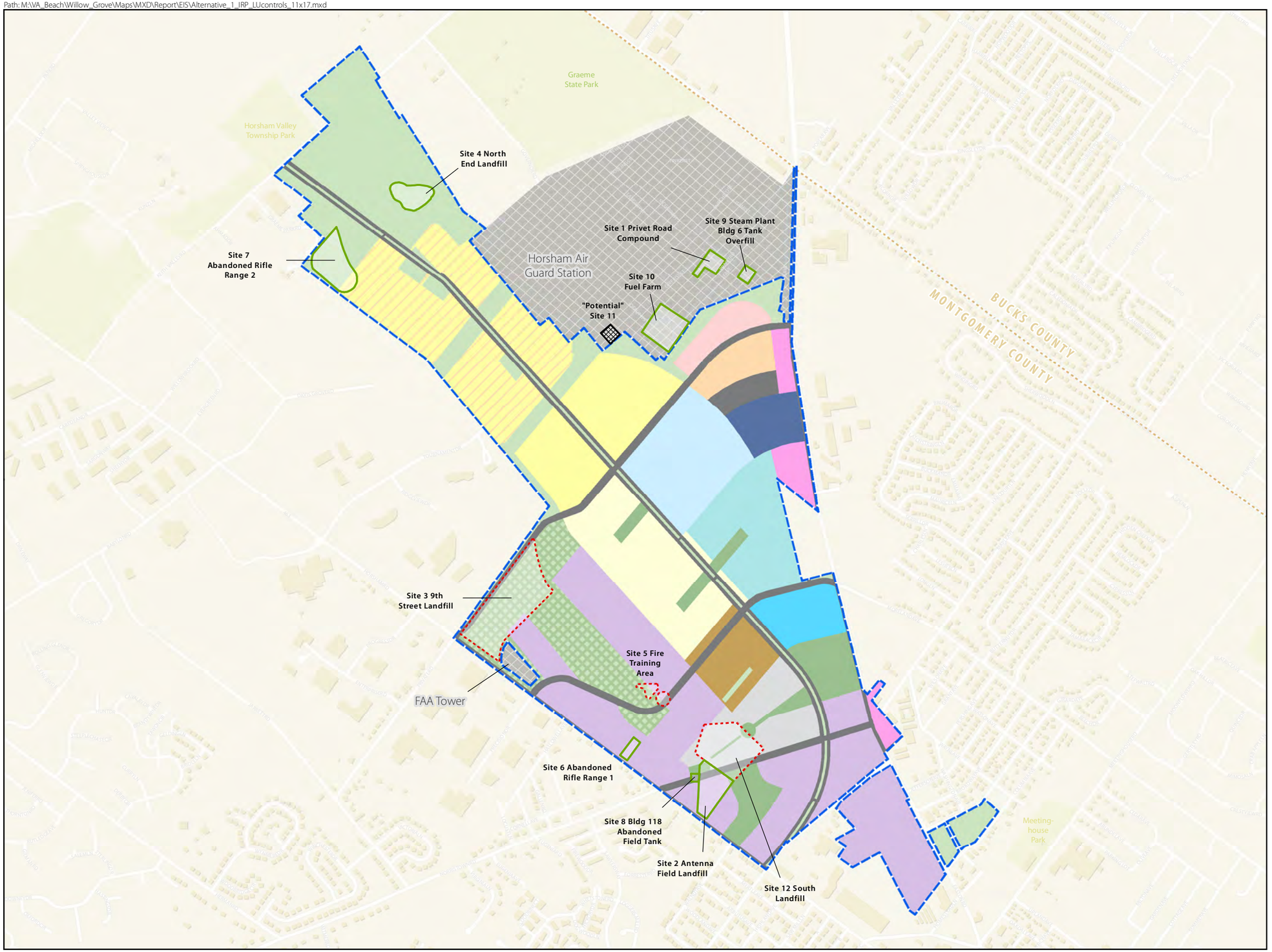

Figure 4.5-1
Alternative 1 - IRP Sites
(HLRA Plan - Preferred Alternative)
Horsham, PA

Legend

- County Boundary
- NAS JRB Willow Grove
- FAA Tower and Horsham Air Guard Station (not included in redevelopment)
- IRP Sites - Eliminated from Consideration (no action needed)
- IRP Sites - Investigations Underway
- IRP Sites - Records of Consensus Agreement No Action Decision

Land Use

- Townhomes
- Small-Lot Single-Family
- Large-Lot Single-Family
- Apartments/ Condominiums
- Aviation Museum
- Bucks County Housing Group
- Continuing Care Retirement Community
- Hotel/Conference/ Office Center
- Office Park
- Open Space
- Par-3 Golf Course
- Park
- Recreation Center
- Retail
- Roads/Paths /Parking
- School
- Town Center

SCALE

0 0.25 0.5 Miles

SOURCE: ESRI 2010; RKG 2012; Ecology and Environment 2013; Tetra Tech 2012.

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The formerly leaking UST at IRP Site 8 was emptied and buried in place (Tetra Tech 2012b). Excavation and disposal may be required in conjunction with the construction of new structures in that location.

Integration of Constraints with Reuse Alternatives

The Navy is coordinating with the EPA and PADEP to address the environmental restoration related to transferring parcels of the former NAS JRB Willow Grove property under Alternative 1. The proposed land use districts in Alternative 1 were integrated with known environmental constraints, where appropriate. The following planning concepts were incorporated into Alternative 1 to minimize the impacts of IRP sites on human health and the environment:

- Locating the proposed golf course over IRP Site 3 to provide a valuable land use (recreation) compatible with potential engineering controls that will be selected by the Record of Decision (ROD) (e.g., a cap or landfill-gas venting controls);
- Conserving open space in the location of IRP Site 4 where landfilled material may preclude the suitability of the soil for building foundations;
- Minimizing residential development in areas with known environmental contamination;
- Minimizing the number of structures in areas with known VOC contamination to maintain indoor air quality and reduce risks to human health; and
- Continued use of IRP Site 10 as a commercial/industrial property, in accordance with the No Further Action consensus agreement through transfer to the Horsham Air Guard Station.

Development of the transportation system, including pedestrian trails, could impact the IRP sites. The future property owner/developer will be informed of the location of IRP sites. Roads and pedestrian trails will need to be sited to avoid or minimize disturbance of these sites.

Alternative 1 would be compatible with the ongoing IRP as a result of the reuse planning process with respect to selecting compatible land uses and redevelopment options.

4.5.2 Alternative 2 (HLRA Plan with Increased Residential Development)

Implementation of Alternative 2 at the former NAS JRB Willow Grove property would not have an impact on the environment related to hazardous materials and waste. Prior to the transfer or lease of the former NAS JRB Willow Grove property, the Navy will prepare a FOSL or FOST.

4.5.2.1 Hazardous Materials and Waste

The impacts of disposal and redevelopment of the former NAS JRB Willow Grove property under Alternative 2 would be the same as the impacts discussed under Alternative 1.

Storage Tanks and Oil/Water Separators

The impacts of disposal and redevelopment of the former NAS JRB Willow Grove property under Alternative 2 would be the same as the impacts discussed under Alternative 1.

ACM and LBP

The impacts of disposal and redevelopment of the former NAS JRB Willow Grove property under Alternative 2 would be the same as the impacts discussed under Alternative 1.

PCBs, Radon, and Pesticides

The impacts of disposal and redevelopment of the former NAS JRB Willow Grove property under Alternative 2 would be the same as the impacts discussed under Alternative 1.

Radioactive Materials Sites

The impacts of disposal and redevelopment of the former NAS JRB Willow Grove property under Alternative 2 would be the same as the impacts discussed under Alternative 1.

The scoping survey will determine whether contamination in excess of current release criteria exists. Chapter 7 of the HRA discusses actions which can occur following the scoping survey. Using the information for the "potential" for contamination recorded in the HRA, it appears that under Alternative 2, the sites with a "likely" or "unknown" potential for contamination occur in areas designated as open space/park/golf course, hotel/conference center/office center, and town center.

4.5.2.2 Environmental Restoration Program

Under Alternative 2, the Navy will continue environmental remediation as required under CERCLA; therefore, there would be no impact on the environment concerning the environmental restoration program under Alternative 2.

Figure 4.5-2 identifies the locations of the IRP sites relative to the proposed land use districts identified under Alternative 2. Table 4.5-2 summarizes the IRP sites and the proposed land use districts under Alternative 2. On-base remedial activities impose various land use controls on the development of certain parcels of the property; land use controls would be the same as those discussed under Alternative 1.

Alternative 2 would be compatible with the ongoing IRP as a result of the reuse planning process with respect to selecting compatible land uses and redevelopment options.

Table 4.5-2 IRP Impacts under Alternative 2

Site	Site Name	Alternative 2 Land Use	Potential Impact[1]
Site 1	Privet Road Compound	Transferred to Horsham Air Guard Station[2]	Development at site and above contaminated groundwater plume subject to land use controls and other constraints.[3]
Site 2	Antenna Field Landfill	Office park, roads/parking, park	Recommend geotechnical evaluation by future developer for building foundations due to the potential presence of subsurface landfill materials.
Site 3	Ninth Street Landfill	Par 3 golf course, roads/parking	New structures and facilities would need to be sited to avoid or minimize disturbance until restoration is complete. Subject to land use controls and other constraints.[3]
Site 4	North End Landfill	Open space	Recommend geotechnical evaluation by future developer for building foundations due to the potential presence of subsurface landfill materials.

Table 4.5-2 IRP Impacts under Alternative 2

Site	Site Name	Alternative 2 Land Use	Potential Impact[1]
Site 5	Fire Training Area	Par 3 golf course, office park[2]	Development at site and above contaminated groundwater plume subject to land use controls and other constraints.[3]
Site 6	Abandoned Rifle Range No. 1	Office park, ground floor retail	No impact.
Site 7	Abandoned Rifle Range No. 2	Open space, ¼-acre lot residential	No impact.
Site 8	Building 118 Abandoned Fuel Tank	Office park	Buried-in-place UST may need to be removed to accommodate development.
Site 9	Steam Plant Building 6 Tank Overfill	Transferred to Horsham Air Guard Station	No impact.
Site 10	Navy Fuel Farm	Transferred to Horsham Air Guard Station	No impact; complies with industrial land use requirement.[4]
Potential Site 11	Aircraft Parking Apron	Transferred to Horsham Air Guard Station, open space	No impact.
Site 12	South Landfill	Office park, town center, park, roads/parking, ground floor retail	New structures and facilities would need to be sited to avoid or minimize disturbance until restoration is complete. Subject to land use controls and other constraints [3]

Source: RKG 2012.

Notes:
[1] Current status as of 2012.
[2] Land use pertains to site boundary only, not to the extent of the VOC-contaminated groundwater plume(s).
[3] Constraints are described in Section 4.5.1.2.
[4] No Further Action agreement based on continued use as a commercial/industrial property.

Key:
VOC = volatile organic compound.

4.5.3 Alternative 3 (Airfield Reuse)

4.5.3.1 Hazardous Materials and Waste

Implementation of Alternative 3 at the former NAS JRB Willow Grove property would not have an impact on the environment concerning hazardous materials and waste. Prior to the transfer or lease of the former NAS JRB Willow Grove property, the Navy will prepare a FOSL or FOST.

RCRA Hazardous Materials and Waste

Under Alternative 3, the quantity of hazardous materials used, generated, stored, and disposed of would be expected to be less than the quantity generated during the Navy's operations at the former NAS JRB Willow Grove property. The property owner/developer would be required to manage hazardous materials and wastes in accordance with applicable federal and state regulations.

The impacts of disposal and redevelopment under Alternative 3 would be larger than the impacts discussed under Alternatives 1 and 2. This is based on the amount of industrial land use relating to the

airfield and airfield operations (approximately 350 acres) under Alternative 3, compared to the primarily residential and commercial land uses under Alternatives 1 and 2.

Storage Tanks and Oil Water Separators

The impacts of disposal and redevelopment of the former NAS JRB Willow Grove property under Alternative 3 would be the same as the impacts discussed under Alternative 1.

ACM and LBP

The impacts of disposal and redevelopment of the former NAS JRB Willow Grove property under Alternative 3 would be the same as the impacts discussed under Alternative 1.

PCBs, Radon, and Pesticides

The impacts of disposal and redevelopment of the former NAS JRB Willow Grove property under Alternative 3 would be the same as the impacts discussed under Alternative 1.

Radioactive Materials Sites

The impacts of disposal and redevelopment of the former NAS JRB Willow Grove property under Alternative 3 would be similar to the impacts discussed under Alternative 1.

The scoping survey will determine whether contamination in excess of current release criteria exists. Chapter 7 of the HRA discusses actions which can occur following the scoping survey. Using the information for the "potential" for contamination recorded in the HRA, it appears that under Alternative 3, the sites with a "likely" or "unknown" potential for contamination occur in areas designated as open space/golf course, office space, airfield, and airfield operations.

4.5.3.2 Environmental Restoration Program

Under Alternative 3, the Navy will continue environmental remediation as required under CERCLA; therefore, there would be no impact on the environment concerning the environmental restoration program under Alternative 3.

Figure 4.5-3 identifies the locations of the IRP sites relative to the proposed land use districts identified in Alternative 3. Table 4.5-3 summarizes the IRP sites and the proposed land use districts under Alternative 3. On-base remedial activities impose various land use controls on the development of certain parcels of the property; land use controls are the same as those discussed under Alternative 1.

Alternative 3 would be compatible with the ongoing IRP as a result of the reuse planning process with respect to selecting compatible land uses and redevelopment options.

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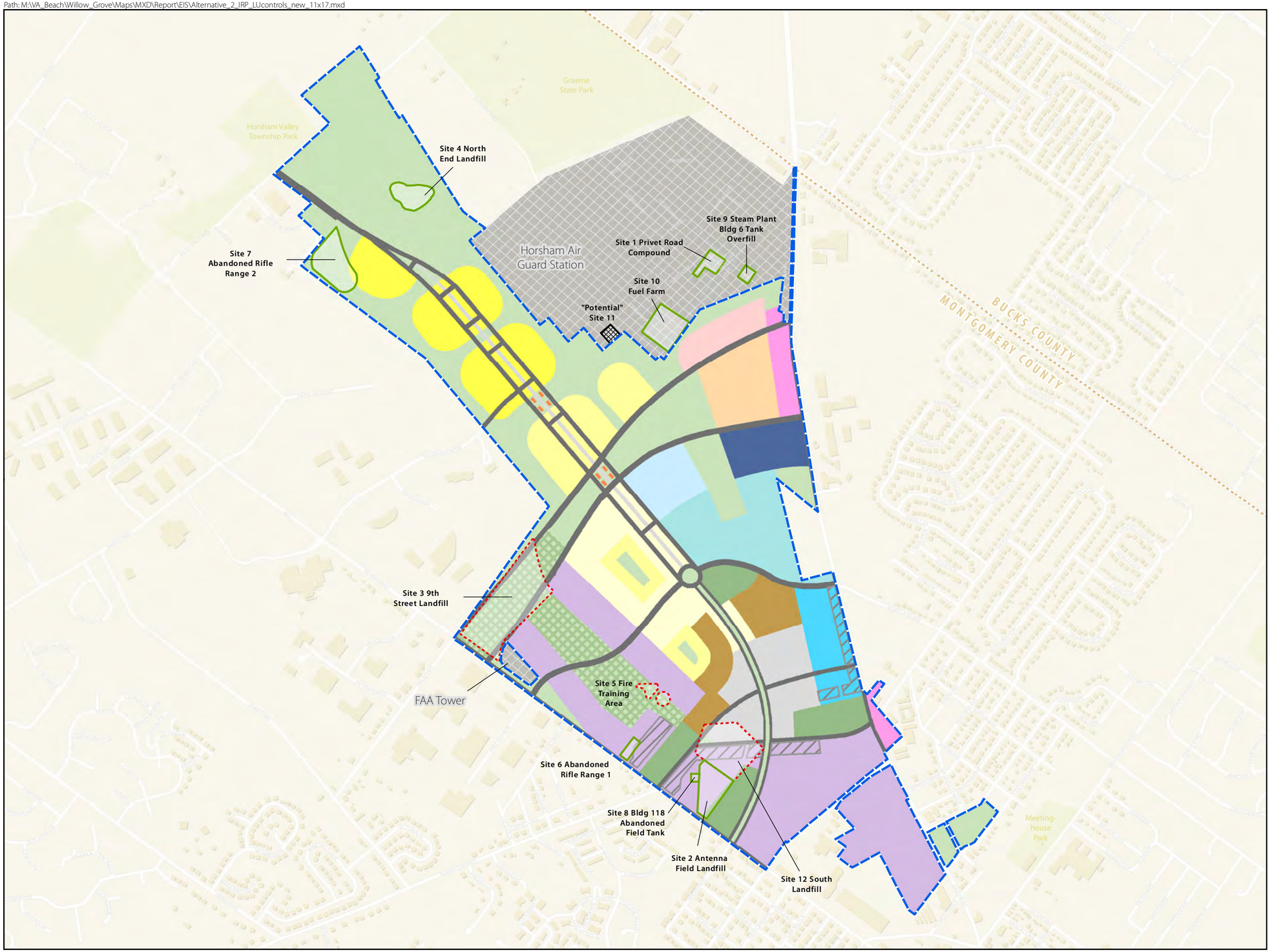

Figure 4.5-2

Alternative 2 - IRP Sites

(HLRA Plan with Increased Residential Devlopment)

Horsham, PA

Legend

- County Boundary
- NAS JRB Willow Grove
- FAA Tower and Horsham Air Guard Station (not included in redevelopment)
- Potential Future Land Use Controls
- IRP Sites - Eliminated from Consideration (no action needed)
- IRP Sites - Investigations Underway
- IRP Sites - Records of Consensus Agreement No Action Decision

Alternative 2 Land Uses

- Bucks County Housing Group
- Townhomes
- Small-Lot Single-Family
- 1/4 Acre Residential
- Apartments/ Condominiums
- Continuing Care Retirement Community
- Aviation Museum
- Hotel Conference Center
- Office Park
- Courts
- Open Space
- Par-3 Golf Course
- Park
- Pedestrian Path /Plaza
- Recreation Center
- Retail
- Roads/Plazas
- School
- Town Center
- Indicates Ground Floor Retail

SCALE

0 0.25 0.5 Miles

SOURCE: ESRI 2010; RKG 2012; Ecology and Environment 2013; Tetra Tech 2012.

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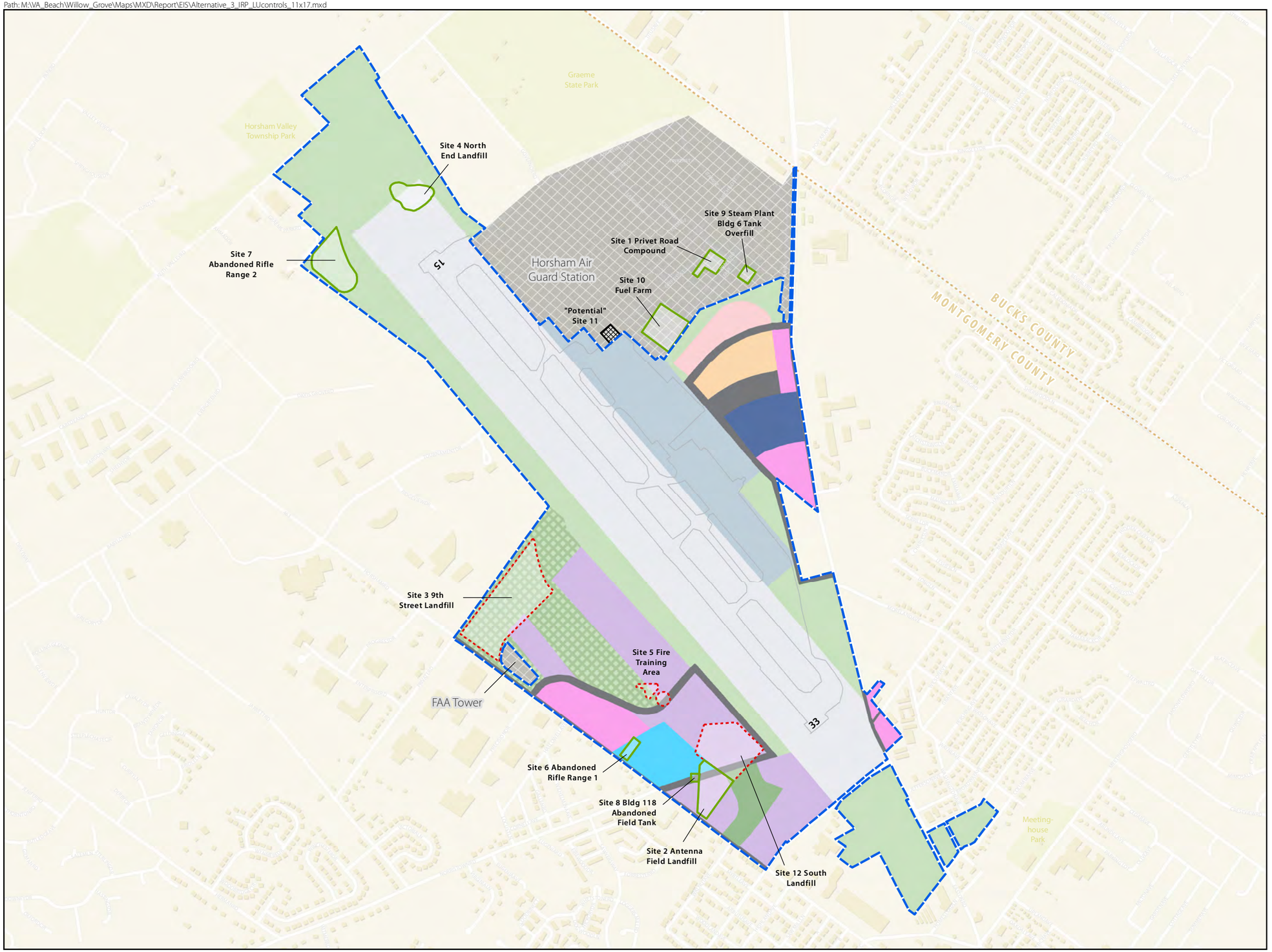

Figure 4.5-3
Alternative 3 - IRP Sites
(Airfield Reuse)
Horsham, PA

Legend

- County Boundary
- NAS JRB Willow Grove
- FAA Tower and Horsham Air Guard Station (not included in redevelopment)
- Runways, Taxiways, Parking Aprons
- IRP Sites - Eliminated from Consideration (no action needed)
- IRP Sites - Investigations Underway
- IRP Sites - Records of Consensus Agreement No Action Decision

Alternative 3 Land Uses

- Airfield
- Airfield Operations
- Aviation Museum
- Bucks County Housing Group
- Park
- Open Space
- Hotel/Conference Center
- Office Park
- Par-3 Golf Course
- Recreation Center
- Retail
- Roads/Parking

SCALE

0 0.25 0.5 Miles

SOURCE: ESRI 2010; RKG 2012; Ecology and Environment 2013; Tetra Tech 2012.

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Table 4.5-3 IRP Impacts under Alternative 3

Site	Site Name	Alternative 3 Land Use	Potential Impact[1]
Site 1	Privet Road Compound	Transferred to Horsham Air Guard Station[2]	Development at site and above contaminated groundwater plume subject to land use controls and other constraints.[3]
Site 2	Antenna Field Landfill	Office park, roads/parking, hotel/conference center, park	Recommend geotechnical evaluation by future developer for building foundations due to the potential presence of subsurface landfill materials.
Site 3	Ninth Street Landfill	Par 3 golf course, office park	New structures and facilities would need to be sited to avoid or minimize disturbance until restoration is complete. Subject to land use controls and other constraints[3]
Site 4	North End Landfill	Open space and airfield	Recommend geotechnical evaluation by future developer for building foundations due to the potential presence of subsurface landfill materials.
Site 5	Fire Training Area	Office park, par 3 golf course, roads/parking[2]	Development at site and above contaminated groundwater plume subject to land use controls and other constraints.[3]
Site 6	Abandoned Rifle Range No. 1	Hotel/conference center, retail	No impact.
Site 7	Abandoned Rifle Range No. 2	Open space	No impact.
Site 8	Building 118 Abandoned Fuel Tank	Roads/parking, hotel/conference center	Buried-in-place UST may need removed to accommodate development.
Site 9	Steam Plant Building 6 Tank Overfill	Transferred to Horsham Air Guard Station	No impact.
Site 10	Navy Fuel Farm	Transferred to Horsham Air Guard Station	No impact; complies with industrial land use requirement.[4]
Potential Site 11	Aircraft Parking Apron	Transferred to Horsham Air Guard Station	No impact.
Site 12	South Landfill	Office park, park, roads/parking, hotel/conference center	New structures and facilities would need to be sited to avoid or minimize disturbance until restoration is complete. Subject to land use controls and other constraints[3]

Source: RKG 2012.

Note:
1 Current status as of 2012.
2 Land use pertains to site boundary only, not to the extent of the VOC-contaminated groundwater plume(s).
3 Constraints are described in Section 4.5.1.2.
4 No Further Action agreement based on continued use as a commercial/industrial property.

Key:
VOC = volatile organic compound.

4.5.4 No Action Alternative

Under this alternative, the former NAS JRB Willow Grove property would be retained by the federal government in caretaker status. The No Action Alternative would not take advantage of the site's location, physical characteristics, and infrastructure and would not foster any local redevelopment. Reuse or redevelopment of existing structures and land on the former NAS JRB Willow Grove property would not occur. Compliance with applicable or relevant and appropriate requirements, laws, and regulations would still be necessary.

Under the No Action Alternative, the Navy would be required to close all facilities in accordance with RCRA standards. As part of the building layaway process, the USTs would be closed in accordance with PADEP regulations, thereby reducing environmental liability and eliminating inspection requirements. ASTs would be handled in accordance with the Pennsylvania Storage Tank and Spill Prevention Act, 25 PA Code Chapter 245. Periodic monitoring of the ACM, LBP, radon, and pesticides would continue.

Under the No Action Alternative, the Navy will continue environmental remediation as required under CERCLA; therefore, there would be no impact on the environment concerning the environmental restoration program under the No Action Alternative.

4.6 Air Quality

As discussed in Section 3.6, the former NAS JRB Willow Grove property is located in Montgomery County, Pennsylvania, in the Philadelphia-Wilmington Air Control Region, which is in moderate nonattainment for the 8-hour ozone standard, and basic nonattainment for both 1997 and 2006 $PM_{2.5}$ standards. In addition, Pennsylvania as a whole is included in the North East Ozone Transport Region (EPA 2013c). Upon disposal and transfer of NAS JRB Willow Grove, the Navy would not retain control of the property; therefore, the implementation of the proposed action would not be considered a federal action, and the General Conformity Rule does not apply. A Record of Non-Applicability (RONA) is provided in Appendix D.

The annual emissions of criteria pollutants from direct and indirect sources associated with the redevelopment alternatives have been estimated to assess the air quality impacts after final build-out and during the worst-case year of construction. Temporary emission increases would be expected from construction and the increased use of motor vehicles during construction. Permanent, new emissions would be associated with new homes and businesses under Alternative 1 and Alternative 2, and with new aircraft operations and businesses under Alternative 3. Total estimated final annual emissions were compared to baseline emission estimates from NAS JRB Willow Grove operations in 2010 (see Section 3.6) to provide a net change in projected direct and indirect emissions from disposal and reuse of NAS JRB Willow Grove. Methods for estimating emissions are described below, and more detailed information on the energy estimates and emission factors are provided in Appendix D.

The PADEP is responsible for maintaining air quality in the Commonwealth of Pennsylvania. The Bureau of Air Quality is responsible for issuing air emission source permits. For some proposed reuses of NAS JRB Willow Grove (e.g., airport operations, aviation-related business, and business and technology industries), it may be necessary to analyze projected air emissions, apply for an air quality permit, and undergo permit review. Some reuses may be subject to permit conditions, including emission controls.

4.6.1 Alternative 1 (HLRA Plan - Preferred Alternative)

Alternative 1 is the preferred alternative, the disposal and reuse of NAS JRB Willow Grove in a manner consistent with the Redevelopment Plan (RKG 2012). The Redevelopment Plan, as described in Section 2, includes the demolition of most of the existing NAS JRB Willow Grove buildings and the construction

of 1,416 residential units, 70 BCHG housing units, and 2.3 million square feet of new non-residential (commercial, educational, and public) floor space.

4.6.1.1 Construction Emissions

Emissions would result from demolition, construction equipment, construction materials delivery, demolition material removal, construction employee commute, and dust from ground disturbance. It was assumed that construction would occur over 20 years, construction emissions would be temporary, and construction emissions would not likely occur at the same time as the final build-out operational emissions. Annual construction emissions were evaluated based on the assumed worst-case year of construction.

Construction-related emission levels would depend on the type and number of pieces of construction equipment being operated, the size of the development, the duration of the project, and the number of projects occurring simultaneously. Impacts would vary widely, depending on the phase of construction (e.g., demolition, land clearing and excavations, foundation and capping, construction of new building walls, etc.). Due to a lack of specific details regarding future development of the site (i.e., building size and type, location, use, and construction time line), it is not possible to accurately predict levels of future construction emissions. Based on a projected construction schedule, the year with the most construction

would be Year 8 (RKG 2012). The construction projected for this year has been analyzed to estimate a worst-case scenario that applies to all three redevelopment alternatives (See Table 4.6-1). Detailed information on the assumptions and emission factors are provided in Appendix D.

It is anticipated that the air quality impacts from construction would be moderate, but construction emissions could be mitigated using best management practices (BMPs). Exhaust emissions from construction vehicles can be reduced by using fuel-efficient vehicles with emission controls and ensuring that all equipment is properly maintained. Dust emissions from ground disturbance and road traffic should be controlled by spraying water on soil piles and graded areas and keeping roadways clean.

Table 4.6-1 Estimated Construction Emissions (Worst Case – "Year 8")

Source	Emissions (tons)[1]					
	CO	NOx	VOC	SO_2	PM_{10}	$PM_{2.5}$
Construction Equipment	6.78	17.47	1.54	0.026	1.27	1.27
Worker Commute	21.82	1.69	2.31	0.020	4.86	0.54
Delivery Truck Traffic	0.08	0.55	0.019	0.011	0.23	0.04
VOC and PM from Paving and Grading	-	-	8.350	-	46.71	7.01
Total Emissions (tons)	**28.67**	**19.71**	**12.22**	**0.06**	**53.07**	**8.85**

Note:
[1] Totals may be different than sum of numbers in column due to rounding.

Other possible mitigation measures could include:

- Minimizing idling of construction vehicles;
- Utilizing existing power sources (e.g., power poles) or clean fuel generators rather than diesel-powered generators;
- Ensuring that all construction equipment is properly tuned and maintained prior to and during on-site operation;
- Developing a project-specific dust control plan, which could include the following BMPs:

- Using traffic control to restrict traffic to predetermined routes.
- Maintaining as much natural vegetation as is practicable.
- Phasing of construction to reduce the area of land disturbed at any one time.
- Using temporary mulching, permanent mulching, temporary vegetative cover, permanent vegetative cover, or sodding to reduce the need for dust control.
- Using mechanical sweepers on paved surfaces where necessary to prevent dirt buildup, which can create dust.
- Periodically moistening exposed soil surfaces with adequate water to control dust.
- Applying treatments, as needed, to control dust when temporary dust control measures are used.

4.6.1.2 Building Use Emissions

As discussed in Section 3.6, stationary source emissions at NAS JRB Willow Grove are reported under the sitewide Air Quality Permit as required by PADEP. Many stationary sources, such as paint booths and aircraft engine test cells, are no longer in use. Upon disposal of the installation property, most baseline sources of stationary emissions would be shut down in accordance with permit requirements. New industrial operations would be subject to PADEP permitting and air quality control requirements, which would be evaluated by the PADEP prior to construction.

New stationary sources would be associated with the heating and operation of residential and commercial buildings. Most heating operations in commercial and residential buildings are small and would not require an air emissions permit, although, a central or large heating plant may require an air permit under PADEP regulations.

U.S. averages for energy use per square foot were obtained from the EIA for specific types of building use (EIA 2003, 2009). These averages were used to estimate total energy use by the proposed new building spaces, based on the type and size of buildings indicated in the Redevelopment Plan. Published emission factors for fuel use (Haneke 2003) were used to estimate direct emissions from on-site fuel use, and EIA's Pennsylvania average emissions per kilowatt-hour (kWh) of electricity were used to estimate total indirect emissions associated with electricity use (EIA 2013). It was assumed that business emission factors would remain the same and that new residential buildings would be 30 percent more efficient, based on the Redevelopment Plan, which recommends energy efficient housing. The U.S. Department of Energy's Energy Star program suggests that homes can be 30 percent more efficient if minimum guidelines are followed (Energy Star 2013a). Detailed information on the energy estimates and emission factors are provided in Appendix D.

Full build-out conditions were used to estimate the final direct and indirect air emissions from proposed buildings under Alternative 1. Total annual building energy emission estimates are presented in Table 4.6-2, where they are compared to baseline building emissions (Refer to Section 3.6 for a description of baseline emission calculations).

Table 4.6-2 Building Emissions under Alternative 1 (Full Build-out)

Emission Source	Emissions per Year (tons)[1]					
	CO	NOx	VOC	SO_2	PM_{10}	$PM_{2.5}$
Baseline Conditions, 2010: 1.02 million sq. ft.						
Electricity	N/A	9.56	N/A	27.21	N/A	N/A
Total Reported Operational Emissions	4.63	3.55	3.90	0.18	0.60	0.60
Total Annual Baseline Building Emissions	**4.63**	**13.12**	**3.90**	**27.39**	**0.60**	**0.60**
Alternative 1						
Residential Buildings (1,486 including BCHG Housing)						
Fuel Oil	0.00	0.00	0.00	0.00	0.00	0.00
Natural Gas	1.46	3.42	0.20	0.02	0.07	0.07
Electricity	N/A	4.53	N/A	12.88	N/A	N/A
Total Annual Residential Emissions	**1.46**	**7.95**	**0.20**	**12.90**	**0.07**	**0.07**
Non-Residential Buildings (2.3 million sq. ft.)						
Fuel Oil	0.40	1.43	0.06	3.38	0.09	0.07
Natural Gas	2.12	4.99	0.29	0.03	0.10	0.10
Electricity	N/A	27.13	N/A	77.20	N/A	N/A
Total Annual Non-Residential Emissions	**2.52**	**33.55**	**0.35**	**80.62**	**0.19**	**0.17**
Total Annual Building Emissions	**3.98**	**41.50**	**0.55**	**93.52**	**0.26**	**0.24**
Total Change in Annual Building Emissions	**–0.65**	**28.38**	**–3.35**	**66.13**	**–0.34**	**–0.36**

Note:
[1] Totals may be different than sum of numbers in column due to rounding.

It is anticipated that the air quality impacts from operating building emissions would be moderate, but mitigation would reduce adverse impacts. To mitigate emissions from buildings, modern building construction and renovation methods can be used to provide energy efficiencies that result in lower criteria pollutant emissions from new and existing buildings. Energy Star (www.energystar.org) and LEED (Leadership in Energy and Environmental Design) programs (www.USGBC.org) are examples of programmatic systems that can be employed to ensure that buildings are using the best reasonable energy efficiency techniques. While Energy Star predicts that built commercial space can be 25 percent more efficient if minimum guidelines are followed, 50 percent efficiency is attainable. Some of these techniques include:

- **Effective Insulation:** Properly installed and inspected insulation in floors, walls, and roofs ensures even temperatures throughout buildings, reduced energy use, and increased comfort.
- **High-Performance Windows:** Energy-efficient windows employ advanced technologies (e.g., protective coatings and improved frames) to help keep heat in during winter and out during summer. These windows also block damaging ultraviolet sunlight, which can discolor carpets and furnishings.
- **Tight Construction and Ducts:** Sealing holes and cracks in the home's "envelope" and in heating and cooling duct systems helps reduce drafts, moisture, dust, pollen, and noise. A tightly sealed building/home improves comfort and indoor air quality while reducing utility and maintenance costs.
- **Efficient Heating and Cooling Equipment:** In addition to using less energy to operate, energy-efficient heating and cooling systems can be quieter, reduce indoor humidity, and improve overall comfort. The use of natural gas rather than heating oil for heating reduces SO_2 emissions.

- **Efficient Products:** Energy Star-qualified electronic products save energy compared to other electronics. Such products include computers, lighting fixtures, compact fluorescent bulbs, ventilation fans, and appliances such as refrigerators, dishwashers, and washing machines (Energy Star 2013b).

4.6.1.3 Mobile Sources

Alternative 1 does not include an airfield; therefore, there would be no aircraft operations under this alternative. Mobile emissions associated with the planned redevelopment of NAS JRB Willow Grove would be from motor vehicle use by new residents. For the purposes of this analysis, the vehicle miles travelled (VMT) were estimated assuming 1.5 cars per new household and an average of 25 miles driven per day. It is assumed that employees working at the commercial/retail spaces proposed in the redevelopment would be from the existing area, so there would be no additional VMT assigned to workers. EPA emission factors were used to estimate mobile emissions (EPA 2008), and Appendix D contains additional information on assumptions and detailed calculations. Mobile source emission estimates are presented in Table 4.6-3, and are compared to baseline mobile emissions (see Section 3.6 for a description of baseline emission calculations).

The increase in commercial and residential space would result in more car and truck use replacing NAS JRB Willow Grove's worker commute and aircraft emissions. Because aircraft use different fuels that generate different emissions, some emission types would increase, and some would decrease as a result of this change.

Table 4.6-3 Emissions from Mobile Sources under Alternative 1 (Full Build-out)

Emission Source	Emissions per Year (tons) [1]					
	CO	NOx	VOC	SO_2	PM_{10}	$PM_{2.5}$
Baseline Conditions, 2010						
Worker Commute	158.44	12.26	16.84	0.19	46.70	5.16
Truck Deliveries	0.15	1.11	0.04	0.02	0.45	0.07
Baseline Aircraft Emissions	98.94	6.45	14.45	1.21	4.02	0.78
Total Baseline Mobile Emissions	**257.53**	**19.81**	**31.33**	**1.42**	**51.18**	**6.01**
Alternative 1						
Residential vehicles	226.41	17.51	24.07	0.27	66.74	7.37
Worker Commute	0.00	0.00	0.00	0.00	0.00	0.00
Truck Deliveries	0.44	3.24	0.11	0.06	1.32	0.21
Total Alternative 1 Mobile Emissions	**226.86**	**20.75**	**24.18**	**0.33**	**68.06**	**7.57**
Change in Mobile Emissions	**–30.68**	**0.94**	**–7.15**	**–1.09**	**16.89**	**1.57**

Note:
[1] Totals may be different than sum of numbers in column due to rounding.

It is anticipated that the air quality impacts from mobile emissions would be moderate, but mitigation would reduce adverse impacts. The impacts of mobile emissions can be reduced by increasing vehicle fuel efficiency and reducing VMT. Recent improvements to the federal Corporate Average Fuel Economy Standards (CAFE) will improve the efficiency of all cars, including sport utility vehicles (SUVs) and light trucks, which should lower vehicle emissions by 2034. This increase in vehicle fuel efficiency would result in lower emissions from vehicles. VMT can be reduced with "smart" community planning that reduces commuting trips and the establishment of public transportation and car-pooling programs. The Redevelopment Plan incorporated smart planning with goals to incorporate pedestrian-oriented features (e.g., a town center, walkable neighborhoods, and bike lanes), and green and sustainable design principles, where appropriate.

Intersections that are congested because of more traffic could generate increased levels of CO emissions. Sufficient details are not available to accurately assess the impact at new and existing intersections around or within the former NAS JRB Willow Grove. If intersections were improved to minimize congestion and prevent transportation impacts as recommended in the *Traffic Assessment Study: Naval Air Station Joint Reserve Base (NAS JRB) Willow Grove* (TechniQuest 2013), these mitigation measures would also reduce air quality impacts at these intersections. Further analysis should be conducted by the developer once final roadway design is complete and prior to road construction to assess air quality impacts at specific intersections.

4.6.1.4 Estimated Total Air Emissions under Alternative 1

Table 4.6-4 provides a summary of direct and indirect stationary and mobile emissions associated with projected operations under Alternative 1 at final build-out. The projected change in these emissions from baseline conditions at NAS JRB Willow Grove is also presented. Under Alternative 1, VOCs and CO emissions would decrease as a result of the discontinuation of Navy aircraft operations and maintenance. However, NO_X, SO_2, and $PM_{10}/PM_{2.5}$ emissions would increase, primarily the result of an increase in the use of energy in new building space and increased vehicle use.

Table 4.6-4 Estimated Total Annual Air Emissions under Alternative 1 (Full Build-out)

Emission Source	Emissions per Year (tons) [1]					
	CO	NOx	VOC	SO_2	PM_{10}	$PM_{2.5}$
Baseline Conditions, 2010						
Building Emissions	4.63	13.12	3.90	27.39	0.60	0.60
Mobile Emissions	257.53	19.81	31.33	1.42	51.18	6.01
Total Baseline Emissions	**262.16**	**32.93**	**35.22**	**28.81**	**51.78**	**6.61**
Alternative 1						
Building Emissions	3.98	41.50	0.55	93.52	0.26	0.24
Mobile Emissions	226.86	20.75	24.18	0.33	68.06	7.57
Total Alternative 1 Emissions	**230.83**	**62.25**	**24.73**	**93.85**	**68.32**	**7.81**
Change in Total Emissions	**–31.32**	**29.32**	**–10.49**	**65.04**	**16.54**	**1.20**

Note:
[1] Totals may be different than sum of numbers in column due to rounding.

Mitigation measures would reduce emissions and, therefore, reduce impacts due to an increase of emissions of NOx, SO_2, and $PM_{10}/PM_{2.5}$. Specific analysis of the development projects and mitigation strategies would be necessary during build-out to accurately assess and effectively mitigate impacts during construction and operation of the new facilities. If applicable, emission sources would be required to meet PADEP permitting requirements prior to construction and during operation.

4.6.2 Alternative 2 (HLRA Plan with Increased Residential Development)

Alternative 2 includes a higher density of residential development and less commercial development compared to Alternative 1. It includes the demolition of most NAS JRB Willow Grove buildings and the construction of 1,929 residential units, 70 BCHG housing units, and 2.1 million square feet of new non-residential floor space.

4.6.2.1 Construction Emissions

For Alternative 2, emissions would result from demolition, construction equipment, construction materials delivery, demolition material removal, construction employee commute, and dust from ground disturbance. It was assumed that construction would occur over 20 years, construction emissions would be temporary, and construction emissions would not likely occur at the same time as the final build-out

operational emissions. A worst-case year of construction was considered for all alternatives (see Section 4.6.1).

4.6.2.2 Building Use Emissions

Building energy use emissions would be similar under Alternative 2 compared to Alternative 1, except that more residential energy use would result in more residential building use air emissions, and less commercial energy use would result in less commercial air emissions. Energy use and emissions were calculated using the same methods described in Section 4.6.1.2. Detailed information on the energy estimates and emission factors are provided in Appendix D. Full build-out conditions were used to estimate the final annual air emissions from proposed buildings under Alternative 2, and are compared to baseline emissions in Table 4.6-5.

Table 4.6-5 Building Emissions under Alternative 2 (Full Build-out)

Emission Source	Emissions per Year (tons) [1]					
	CO	NOx	VOC	SO_2	PM_{10}	$PM_{2.5}$
Baseline Conditions, 2010: 1.02 million sq. ft.						
Electricity	0.00	9.56	0.00	27.21	0.00	0.00
Total Reported Operational Emissions	**4.63**	**3.55**	**3.90**	**0.18**	**0.60**	**0.60**
Total Annual Baseline Building Emissions	**4.63**	**13.12**	**3.90**	**27.39**	**0.60**	**0.60**
Alternative 2						
Residential Buildings (1999, including BCHG Housing)						
Fuel Oil	0.00	0.00	0.00	0.00	0.00	0.00
Natural Gas	1.94	4.55	0.27	0.03	0.09	0.09
Electricity	N/A	5.86	N/A	16.68	N/A	N/A
Total Annual Residential Emissions	**1.94**	**10.42**	**0.27**	**16.71**	**0.09**	**0.09**
Non-Residential Buildings (2.1 million sq. ft.)						
Fuel Oil	0.31	1.12	0.04	2.65	0.07	0.05
Natural Gas	1.99	4.68	0.27	0.03	0.09	0.09
Electricity	N/A	25.39	N/A	72.25	N/A	N/A
Total Annual Non-Residential Emissions	**2.30**	**31.19**	**0.32**	**74.92**	**0.16**	**0.15**
Total Annual Building Emissions	**4.24**	**41.60**	**0.58**	**91.64**	**0.25**	**0.24**
Total Change in Annual Building Emissions	**–0.39**	**28.49**	**–3.31**	**64.25**	**–0.35**	**–0.36**

Note:
[1] Totals may be different than sum of numbers in column due to rounding.

It is anticipated that the air quality impacts from operating building emissions would be moderate, but mitigation would reduce adverse impacts. As described in Section 4.6.1.2, emissions from buildings can be mitigated using modern building construction and renovation method to provide energy efficiencies that result in lower energy use, and therefore fewer emissions.

4.6.2.3 Mobile Sources

Alternative 2 does not include an airfield; therefore, there would be no aircraft operations under this alternative. Mobile emissions associated with the planned redevelopment of NAS JRB Willow Grove would be from motor vehicles use by new residents. Similar to Alternative 1, it was assumed that workers would be from the existing area, so there would be no new worker commute emissions. Emissions have been estimated using the same method described for Alternative 1 in Section 4.6.1.3. Mobile source emission estimates are presented in Table 4.6-6, where they are compared to baseline mobile emissions. It is anticipated that the air quality impacts from mobile emissions would be moderate, but mitigation would reduce adverse impacts.

Table 4.6-6 Emissions from Mobile Sources under Alternative 2 (Full Build-out)

Emission Source	Emissions per Year (tons)[1]					
	CO	NOx	VOC	SO_2	PM_{10}	$PM_{2.5}$
Baseline Conditions, 2010						
Worker Commute	158.44	12.26	16.84	0.19	46.70	5.16
Truck Deliveries	0.15	1.11	0.04	0.02	0.45	0.07
Baseline Aircraft Emissions	98.94	6.45	14.45	1.21	4.02	0.78
Total Baseline Mobile Emissions	**257.53**	**19.81**	**31.33**	**1.42**	**51.18**	**6.01**
Alternative 2						
Residential vehicles	308.44	23.86	32.79	0.37	90.92	10.04
Worker Commute	0.00	0.00	0.00	0.00	0.00	0.00
Truck Deliveries	0.44	3.24	0.11	0.06	1.32	0.21
Total Alternative 2 Mobile Emissions	**308.88**	**27.10**	**32.90**	**0.43**	**92.24**	**10.24**
Change in Mobile Emissions	**51.35**	**7.28**	**1.57**	**–0.99**	**41.06**	**4.23**

Note:
[1] Totals may be different than sum of numbers in column due to rounding.

4.6.2.4 Estimated Total Air Emissions under Alternative 2

Table 4.6-7 provides a summary of direct and indirect stationary and mobile emissions associated with projected operations under Alternative 2 at final build-out. The projected change in these emissions from baseline conditions at NAS JRB Willow Grove is also presented. Under Alternative 2, VOCs emissions would decrease as a result of the discontinuation of Navy aircraft operations and maintenance. However, CO, NO_X, SO_2, and $PM_{10}/PM_{2.5}$ emissions would increase, primarily the result of an increase in the use of energy in new building space and increased vehicle use.

Table 4.6-7 Estimated Total Annual Air Emissions under Alternative 2 (Full Build-out)

Emission Source	Emissions per Year (tons)[1]					
	CO	NOx	VOC	SO_2	PM_{10}	$PM_{2.5}$
Baseline Conditions, 2010						
Building Emissions	4.63	13.12	3.90	27.39	0.60	0.60
Mobile Emissions	257.53	19.81	31.33	1.42	51.18	6.01
Total Baseline Emissions	**262.16**	**32.93**	**35.22**	**28.81**	**51.78**	**6.61**
Alternative 2						
Building Emissions	4.24	41.60	0.58	91.64	0.25	0.24
Mobile Emissions	308.88	27.10	32.90	0.43	92.24	10.24
Total Alternative 2 Emissions	**313.12**	**68.70**	**33.49**	**92.07**	**92.50**	**10.48**
Change in Total Emissions	**50.97**	**35.77**	**–1.74**	**63.26**	**40.72**	**3.87**

Note:
[1] Totals may be different than sum of numbers in column due to rounding.

Mitigation measures would reduce emissions and, therefore, reduce impacts due to an increase of emissions of CO, NOx, SO_2, and $PM_{10}/PM_{2.5}$. Specific analysis of the development projects and mitigation strategies would be necessary during build-out to accurately assess and effectively mitigate impacts during construction and operation of the new facilities. If applicable, emission sources would be required to meet PADEP permitting requirements prior to construction and during operation.

4.6.3 Alternative 3 (Airfield Reuse)

Alternative 3 includes 1.5 million sq. ft. of commercial space and a general aviation airfield. The only residential space would be the construction of 70 BCHG housing units. There would be no additional residential development.

4.6.3.1 Construction Emissions

For Alternative 3, emissions would result from demolition, construction equipment, construction materials delivery, demolition material removal, construction employee commute, and dust from ground disturbance. It was assumed that construction would occur over 20 years, construction emissions would be temporary, and construction emissions would not likely occur at the same time as the final build-out operational emissions. A worst-case year of construction was considered for all alternatives (see Section 4.6.1). While any year of construction could have the potential annual emissions discussed in Section 4.6.1, Alternative 3 would require fewer demolition and construction operations and, therefore, result in less total construction-related emissions over the course of the 20 year build-out period when compared to Alternatives 1 and 2.

4.6.3.2 Building Use Emissions

Building energy use emissions would occur under Alternative 3 from operation of new commercial space and BCHG housing units. Building energy use and emissions were calculated using the same methods described in Section 4.6.1.2. Detailed information on the energy estimates and emission factors are provided in Appendix D. Full build-out conditions were used to estimate the final annual air emissions from proposed buildings under Alternative 3, and are compared to baseline emissions in Table 4.6-8.

Table 4.6-8 Building Emissions under Alternative 3 (Full Build-out)

Emission Source	Emissions per Year (tons) [1]					
	CO	NO_X	VOC	SO_2	PM_{10}	$PM_{2.5}$
Baseline Conditions, 2010: 1.02 million sq. ft.						
Electricity	0.00	9.56	0.00	27.21	0.00	0.00
Total Reported Operational Emissions	4.63	3.55	3.90	0.18	0.60	0.00
Total Annual Baseline Building Emissions	**4.63**	**13.12**	**3.90**	**27.39**	**0.60**	**0.60**
Alternative 3						
Residential Buildings (70 BCHG housing only)						
Fuel Oil	0.00	0.00	0.00	0.00	0.00	0.00
Natural Gas	0.07	0.17	0.01	0.00	0.00	0.00
Electricity	N/A	0.18	N/A	0.52	N/A	N/A
Total Annual Residential Emissions	**0.07**	**0.35**	**0.01**	**0.52**	**0.00**	**0.00**
Non-Residential Buildings (1.5 million sq. ft.)						
Fuel Oil	0.25	0.90	0.04	2.14	0.05	0.04
Natural Gas	1.05	2.46	0.14	0.02	0.05	0.05
Electricity	N/A	15.02	N/A	42.75	N/A	N/A
Total Annual Non-Residential Emissions	**1.30**	**18.39**	**0.18**	**44.91**	**0.10**	**0.09**
Total Annual Building Emissions	**1.37**	**18.74**	**0.19**	**45.43**	**0.11**	**0.09**
Total Change in Annual Building Emissions	**–3.26**	**5.63**	**–3.71**	**18.04**	**–0.49**	**–0.50**

Note:
[1] Totals may be different than sum of numbers in column due to rounding.

It is anticipated that the air quality impacts from operating building emissions would be moderate, but mitigation would reduce adverse impacts. As described in Section 4.6.1.2, emissions from buildings can be mitigated using modern building construction and renovation method to provide energy efficiencies that result in lower energy use and therefore fewer emissions.

4.6.3.3 Mobile Sources

Alternative 3 includes the reuse of the existing military airfield and associated Navy aircraft operations with a general aviation airport, airport-related buildings and general aviation aircraft operations. It was assumed that new residents of the BCHG housing units and workers at the developed commercial space and airport would be from the existing area, so there would be no new vehicle emissions. Under Alternative 3, the type of aircraft operating at the airfield would change from military to general aviation. Aircraft emissions were estimated using EDMS version 5.1.3 (FAA 2010) and the total projected operations for the various types of general aviation aircraft. Total emissions consider departures, arrivals, and touch-and-go operations, as well as ground taxi times and the use of ground-support equipment (see Appendix D for operations data and EDMS output information). Truck delivery emissions were estimated using the same method described for Alternative 1 in Section 4.6.1.3. Mobile source emission estimates are presented in Table 4.6-9, where they are compared to baseline mobile emissions. It is anticipated that the air quality impacts from mobile emissions would be moderate, but mitigation would reduce adverse impacts.

Table 4.6-9 Emissions from Mobile Sources under Alternative 3 (Full Build-out)

Emission Source	Emissions per Year (tons) [1]					
	CO	NOx	VOC	SO_2	PM_{10}	$PM_{2.5}$
Baseline Conditions, 2010						
Worker Commute	158.44	12.26	16.84	0.19	46.70	5.16
Truck Deliveries	0.15	1.11	0.04	0.02	0.45	0.07
Baseline Aircraft Emissions	98.94	6.45	14.45	1.21	4.02	0.78
Total Baseline Mobile Emissions	**257.53**	**19.81**	**31.33**	**1.42**	**51.18**	**6.01**
Alternative 3						
Residential vehicles	0.00	0.00	0.00	0.00	0.00	0.00
Worker Commute	0.00	0.00	0.00	0.00	0.00	0.00
Truck Deliveries	0.44	3.24	0.11	0.06	1.32	0.21
Commercial Aircraft	295.37	3.15	6.06	0.74	0.03	0.03
Total Alternative 3 Mobile Emissions	**295.81**	**6.39**	**6.17**	**0.80**	**1.35**	**0.23**
Change in Mobile Emissions	**38.28**	**–13.42**	**–25.16**	**–0.62**	**–49.83**	**–5.78**

Note:
[1] Totals may be different than sum of numbers in column due to rounding.

While there were more aircraft operations analyzed at the proposed general aviation airport compared to NAS JRB Willow Grove in 2010, most of these aircraft would be smaller and use less fuel. Emission factors are also different. These differences result in more CO emissions but less of all other criteria pollutants from the proposed, new aircraft operations.

4.6.3.4 Estimated Total Air Emissions under Alternative 3

Table 4.6-10 provides a summary of direct and indirect stationary and mobile emissions associated with projected operations under Alternative 3 at final build-out. The projected change in these air emissions from baseline conditions at NAS JRB Willow Grove is also presented. Under Alternative 3, NO_X, VOCs, and PM_{10}/$PM_{2.5}$ emissions would decrease as a result of the discontinuation of Navy operations. However, CO and SO_2 emissions would increase, primarily the result of an increase in the use of energy in new building space and the increase in aircraft operations compared to baseline operations.

Table 4.6-10 Estimated Total Annual Air Emissions under Alternative 3 (Full Build-out)

Emission Source	Emissions per Year (tons) [1]					
	CO	NOx	VOC	SO_2	PM_{10}	$PM_{2.5}$
Baseline Conditions, 2010						
Building Emissions	4.63	13.12	3.90	27.39	0.60	0.60
Mobile Emissions	257.53	19.81	31.33	1.42	51.18	6.01
Total Baseline Emissions	**262.16**	**32.93**	**35.22**	**28.81**	**51.78**	**6.61**
Alternative 3						
Building Emissions	1.37	18.74	0.19	45.43	0.11	0.09
Mobile Emissions	295.81	6.39	6.17	0.80	1.35	0.23
Total Alternative 3 Emissions	**297.18**	**25.13**	**6.36**	**46.23**	**1.46**	**0.33**
Change in Total Emissions	**35.02**	**–7.80**	**–28.87**	**17.42**	**–50.32**	**–6.28**

Note:
[1] Totals may be different than sum of numbers in column due to rounding.

Mitigation measures would reduce emissions and, therefore, reduce impacts due to an increase of emissions of CO and SO_2. Specific analysis of the development projects and mitigation strategies would be necessary during build-out to accurately assess and effectively mitigate impacts during construction and operation of the new facilities. If applicable, emission sources would be required to meet PADEP permitting requirements prior to construction and during operation.

4.6.4 No Action Alternative

Under the No Action Alternative, NAS JRB Willow Grove would be retained in caretaker status. Existing structures would not be reused or redeveloped and no new construction would occur. Navy activities would cease, except minor maintenance activities. This would result in elimination of the baseline emissions described in Section 3.6 and listed in Table 4.6-10, with no new emissions. This change would result in an overall reduction in total air emissions in the region, which could provide a beneficial impact on air quality.

4.7 Noise

This section summarizes the potential noise impacts resulting from construction and implementation of the Redevelopment Plan at the former NAS JRB Willow Grove property under Alternative 1, Alternative 2, Alternative 3 and the No Action Alternative.

4.7.1 Alternative 1 (HLRA Plan - Preferred Alternative)

Implementation of Alternative 1 would result in short- and long-term impacts on the baseline noise environment. Short-term noise impacts would occur during the construction period, as discussed in Section 4.7.1.1. Long-term noise impacts would occur following full build-out of the Redevelopment Plan and would be primarily associated with the projected increase in motor vehicle traffic along existing roadways near the former installation property, as discussed in Section 4.7.1.2. In addition, with the cessation of airfield operations at the former installation's airfield due to its closure, the baseline noise environment would no longer be dominated by aircraft noise.

4.7.1.1 Construction Noise

Construction, demolition, and renovation activities associated with Alternative 1 would involve operating construction equipment and commercial vehicles traveling to and from the former installation property. Residential and other noise-sensitive receptors near the former installation property may be temporarily disturbed during the construction activities. However, the impacts would be minor as they would be

temporary and would occur only during the construction period. In addition, construction would occur during regular, working daylight hours, when the noise would be less disturbing to area residents.

Construction-related noise levels at any given location would depend on the type and number of pieces of construction equipment being operated and the receptor's distance from the construction site. Noise impacts would vary widely, depending on the phase of construction (e.g., demolition, land clearing and excavations, foundation and capping, construction of new building walls, etc.) and the specific task being performed.

Typical noise levels for construction equipment are shown in Table 4.7-1. The listed noise levels represent the A-weighted maximum sound level (L_{max}), measured at a distance of 50 feet from the construction equipment. The L_{max} noise metric is the highest A-weighted integrated sound level measured during a single event in which the sound level changes value with time (Wyle 2012). Noise from construction equipment is typically intermittent in nature. For example, an air compressor will normally be quiet for a period of time (perhaps half an hour or so, depending on intensity of use) and then will make noise for a few minutes as it compresses more air. At a distance of 50 feet from a construction or demolition site, noise from the various types of equipment will, at times, range from 80 to 95 dBA.

Table 4.7-1 Typical Construction Noise Levels

Equipment Description	Maximum Sound Level (L_{max}) at 50 feet
Backhoe	80
Chainsaw	85
Compressor (air)	80
Concrete mixer truck	85
Concrete saw	90
Crane	85
Dozer	85
Dump Truck	84
Excavator	85
Flatbed truck	84
Front-end loader	80
Generator	82
Grader	85
Jackhammer	85
Pickup truck	55
Pneumatic tools	85
Sand blasting (single nozzle)	85
Vacuum street sweeper	80
Warning horn	85
Welder/torch	73

Source: Modified from FHWA 2006.

Montgomery County and the Town of Horsham have regulations that govern sound levels in the community. The maximum allowable noise levels under the Montgomery County Code, Chapter 31B-5 - Noise Level and Noise Disturbance Violations, are presented in Table 4.7-2.

Table 4.7-2 Maximum Allowable Noise Levels (dBA) for Receiving Noise Areas in Montgomery County

Land Use	Daytime	Nighttime
Non-residential noise area	67	62
Residential noise area	65	55

Source: Montgomery County n.d.

Construction noise may exceed the noise levels shown in Table 4.7-2 if the activity is temporary and occurs between 7:00 a.m. and 5:00 p.m. on weekdays. However, noise associated with construction should not exceed a sound level of 75 dBA between the hours of 7:00 a.m. and 5:00 p.m. if the Montgomery County Department of Environmental Protection has not approved a noise-suppression plan for the activity, or 85 dBA if the Department has approved a noise-suppression plan for the activity.

The Township of Horsham Code, Article IV, General Provisions, Chapter 230 – Zoning, includes maximum permitted sound levels that may not be exceeded at any point on the boundary of a residential, industrial, or commercial district. Table 4.7-3 presents the maximum permitted SPLs in the designated octave bands for residential districts. Developers may need to implement noise-suppression measures to achieve these SPLs at the nearest residential location.

Table 4.7-3 Maximum Permitted SPLs for Residential Districts in the Town of Horsham

Octave Band (cycles per second)	Along Residential District Boundaries: Maximum Permitted SPL (dB)	Any Other Non-Residential Point on the Lot Boundary: Maximum Permitted SPL (dB)
0 to 75	72	79
75 to 150	67	74
150 to 300	59	66
300 to 600	52	59
600 to 1,200	46	53
1,200 to 2,400	40	47
2,400 to 4,800	34	41
Above 4,800	32	39

The developer would be required to implement, as appropriate, BMPs to minimize adverse construction noise impacts on the community (see Section 6). Appropriate BMPs may include:

- **Truck Traffic.** Designate routes for construction-related truck traffic to avoid noise-sensitive areas.
- **Portable Noise Barriers.** Use portable barriers to enclose noisier stationary equipment.
- **Limit Heavy Equipment Activity near Residences**. Limit the use of heavy equipment activity adjacent to residences or other noise-sensitive receptors to the shortest possible period required to complete the work activity.
- **Mufflers and Intake Silencers**. Use proper mufflers and other noise-reduction equipment that are in good working condition.
- **Establish Telephone Hotline.** Establish and notify the public of a phone number for members of the public to call if they have a noise complaint.

- **Modify Backup Alarms**. Lay out construction sites to minimize the need for backup alarms; use broadband noise backup alarms; and use flagmen to keep the area behind maneuvering vehicles clear.
- **Stationary Equipment**. Place stationary equipment such as compressors, generators, and welding machines away from noise-sensitive receptors or behind barriers.
- **Construction Management Strategies.** Sequence operations so as to perform noisy operations during the same time period. Implement alternative construction methods to reduce the transmission of high noise levels to noise-sensitive areas (e.g., use special low noise emission level equipment, select and specify quieter demolition or deconstruction methods).

4.7.1.2 Operational Noise (Traffic)

Noise associated with the full build-out of Alternative 1 would be dominated by increased motor vehicle traffic on roadways near the former installation property. Traffic noise was modeled at representative residential receptor locations selected along the main roadways around the property using TNM version 2.5. The afternoon peak traffic volume, vehicle speed, and vehicle mix data under the full build out of Alternative 1 from the traffic study *Traffic Assessment Study: Naval Air Station Joint Reserve Base (NAS JRB) Willow Grove* (TechniQuest 2013) were used as inputs to the model.

Traffic-related noise impacts within the study area resulting from the implementation of Alternative 1 would be expected to be minor. The noise would occur in areas already experiencing vehicular noise and would not be expected to cause additional impacts. The predicted traffic noise levels associated with the redevelopment proposed under Alternative 1 are summarized in Table 4.7-4. The largest estimated increase in traffic noise would be 3.5 dBA. An increase in noise of 3 dBA is considered to be barely noticeable. As shown in Table 4.7-4, with the exception of receptor locations 5 and 7, the projected traffic noise levels would exceed FHWA guidance noise abatement criteria thresholds for residential locations (i.e., 67 dBA [Category B]) under Alternative 1, but would not substantially exceed (i.e., by more than 15 dBA) baseline conditions. The FHWA uses the criteria of 15 dBA Leq to define a "substantial" increase over baseline noise levels (FHWA 1995).

Table 4.7-4 Peak Hour (p.m.) Traffic Noise Levels under Alternative 1 (Full Build-out)

Receptor	Location	Hourly L_{eq} Sound Level (dBA)		Sound Level Change
		Modeled Baseline	Full Build Out	
1	Horsham Road between Evergreen Road and Babylon Road (north side of road)	71.1	73.7	2.6
2	Horsham Road between Hatters Way and Progress Drive (south side of road)	71.8	74.3	2.5
3	Easton Road and Johnson Avenue (west corner)	73.7	75.1	1.4
4	Girard Avenue between Easton Road and Washington Avenue (north side of road)	66.0	68.2	2.2
5	Easton Road across from existing Main Gate	64.1	66.2	2.1
6	Kansas Road between County Line Road and Tulip Drive (north side of road)	63.7	69.1	5.4
7	Keith Valley Road between Horsham Road and Davis Grove Road (north side of road)	63.2	66.1	2.9

4.7.2 Alternative 2 (HLRA Plan with Increased Residential Development)

Implementation of Alternative 2 would result in short- and long-term impacts on the baseline noise environment. Short-term noise impacts would occur during the construction period, as discussed in Section 4.7.2.1. Long-term noise impacts would occur following full build-out of Alternative 2 and would be primarily associated with the projected increase in motor vehicle traffic along existing roadways near the former installation property, as discussed in Section 4.7.2.2. In addition, with the cessation of airfield operations at the former installation's airfield due to its closure, the baseline noise environment would no longer be dominated by aircraft noise under Alternative 2.

4.7.2.1 Construction Noise

Although redevelopment of the former installation property under Alternative 2 would have a higher density of residential development than under Alternative 1, the estimated construction noise levels would be similar to those under Alternative 1 during the period of construction. However, the duration of construction may be slightly longer due to the increased square footage of new construction under Alternative 2.

Temporary increases in construction-related vehicle noise also would be expected. Truck and construction vehicle (e.g., dump trucks, material deliveries, debris removal, etc.) traffic within and near the former installation property would produce localized noise for brief periods, but this would not be expected to create any long-term, adverse noise impacts on the neighboring community.

To minimize or eliminate adverse construction noise impacts on the community, the developer would be required to meet local noise standards and to implement, as appropriate, the same BMPs as identified under Alternative 1.

4.7.2.2 Operational Noise (Traffic)

Noise associated with the full build-out of Alternative 2 would be dominated by increased motor vehicle traffic on roadways near the former installation property. Traffic noise was modeled at representative residential receptor locations selected along the main roadways around the property using TNM version 2.5. The afternoon peak traffic volume, vehicle speed, and vehicle mix data under the full build out of Alternative 2 from the traffic study *Traffic Assessment Study: Naval Air Station Joint Reserve Base (NAS JRB) Willow Grove* (TechniQuest 2013) were used as inputs to the model.

Traffic-related noise impacts within the study area resulting from the implementation of Alternative 2 would be expected to be minor. The noise would occur in areas already experiencing vehicular noise and would not be expected to cause additional impacts. The predicted traffic noise levels associated with the redevelopment proposed under Alternative 2 are summarized in Table 4.7-5. Noise levels would increase by 2.2 to 5.4 dBA at designated residential receptor locations. An increase in noise of 3 dBA or less is considered to be barely noticeable, and an increase in noise of 5 dBA is considered to be typically noticeable. As shown in Table 4.7-5, projected traffic noise levels would exceed FHWA guidance noise abatement criteria thresholds for residential locations (i.e., 67 dBA [Category B]) but would not substantially exceed (i.e., by more than 15 dBA) baseline conditions. The FHWA uses the criteria of 15 dBA Leq to define a "substantial" increase over baseline noise levels (FHWA 1995).

Table 4.7-5 Peak Hour (p.m.) Traffic Noise Levels under Alternative 2 (Full Build-out)

Receptor	Location	Hourly L_{eq} Sound Level (dBA)		Sound Level Change
		Modeled Baseline	Full Build Out	
1	Horsham Road between Evergreen Road and Babylon Road (north side of road)	71.1	73.8	2.7
2	Horsham Road between Hatters Way and Progress Drive (south side of road)	71.8	74.4	2.6
3	Easton Road and Johnson Avenue (west corner)	73.7	76.9	3.2
4	Girard Avenue between Easton Road and Washington Avenue (north side of road)	66.0	68.2	2.2
5	Easton Road across from existing Main Gate	64.1	67.4	3.3
6	Kansas Road between County Line Road and Tulip Drive (north side of road)	63.7	69.1	5.4
7	Keith Valley Road between Horsham Road and Davis Grove Road (north side of road)	63.2	67.6	4.4

4.7.3 Alternative 3 (Airfield Reuse)

Implementation of Alternative 3 would result in short- and long-term impacts on the baseline noise environment. Short-term noise impacts would occur during the construction period, as discussed in Section 4.7.3.1. Long-term noise impacts would occur following full build-out of Alternative 3 and would be primarily associated with the projected increase in motor vehicle traffic along existing roadways near the former installation property, as discussed in Section 4.7.3.2, and aircraft operations at the proposed general aviation airport, as discussed in Section 4.7.3.3.

4.7.3.1 Construction Noise

Although redevelopment of the former installation property under Alternative 3 would include less residential development, more open space, and reuse of the airfield, the estimated construction noise levels would be similar to Alternatives 1 and 2 during the period of construction. However, the duration of construction may be shorter under Alternative 3.

Temporary increases in construction-related vehicle noise also would be expected. Truck and construction vehicle (e.g., dump trucks, material deliveries, debris removal, etc.) traffic within and near the former installation property would produce localized noise for brief periods, but this would not be expected to create any long-term, adverse noise impacts on the neighboring community.

To minimize or eliminate adverse construction noise impacts on the community, the developer would be required to meet local noise standards and to implement, as appropriate, the same BMPs as identified under Alternative 1.

4.7.3.2 Operational Noise (Traffic)

Noise associated with the full build-out of Alternative 3 would be dominated in part by increased motor vehicle traffic on roadways near the former installation property. Traffic noise was modeled at representative residential receptor locations selected along the main roadways around the property using TNM version 2.5. The afternoon peak traffic volume, vehicle speed, and vehicle mix data under the full build out of Alternative 3 from the traffic study *Traffic Assessment Study: Naval Air Station Joint Reserve Base (NAS JRB) Willow Grove* (TechniQuest 2013) were used as inputs to the model.

Traffic-related noise impacts within the study area resulting from the implementation of Alternative 3 would be expected to be minor. The noise would occur in areas already experiencing vehicular noise and would not be expected to cause additional impacts. The predicted traffic noise levels associated with the redevelopment proposed under Alternative 3 are summarized below in Table 4.7-6. The largest estimated increase in traffic noise would be 2.9 dBA. An increase in noise of 3 dBA is considered to be barely noticeable. As shown in Table 4.7-6, projected traffic noise levels would exceed FHWA guidance noise abatement criteria thresholds for some residential locations (i.e., 67 dBA [Category B]) but would not substantially exceed (i.e., by more than 15 dBA) baseline conditions. The FHWA uses the criteria of 15 dBA Leq to define a "substantial" increase over baseline noise levels (FHWA 1995).

Table 4.7-6 Peak Hour (p.m.) Traffic Noise Levels under Alternative 3 (Full Build-out)

Receptor	Location	Hourly L_{eq} Sound Level (dBA)		Sound Level Change
		Modeled Baseline	Full Build Out	
1	Horsham Road between Evergreen Road and Babylon Road (north side of road)	71.1	72.9	1.8
2	Horsham Road between Hatters Way and Progress Drive (south side of road)	71.8	73.4	1.6
3	Easton Road and Johnson Avenue (west corner)	73.7	74.3	0.6
4	Girard Avenue between Easton Road and Washington Avenue (north side of road)	66.0	67.3	1.3
5	Easton Road across from existing Main Gate	64.1	66.3	2.2
6	Kansas Road between County Line Road and Tulip Drive (north side of road)	63.7	68.6	4.9
7	Keith Valley Road between Horsham Road and Davis Grove Road (north side of road)	63.2	66.1	2.9

4.7.3.3 Operational Noise (Aircraft)

Implementation of Alternative 3 would generate noise impacts associated with aircraft operations at the proposed general aviation airport. Noise levels would be expected to increase as the number of aircraft operations increase through the full build-out period.

The FAA's Integrated Noise Model (INM) version 7.0d, was used to model the DNL based on estimated 2034 operations. Assumptions about the type of aircraft, number and type of aircraft flight operations, and the flight tracks of the aircraft were used as inputs to the model. The following provides a brief discussion of these assumptions, and the results of the noise impact analysis. Further discussion of the modeling assumptions used to develop the noise contours is provided in Appendix E.

A general aviation airport is a civilian airport that generally serves private aircraft and small aircraft charter operations, but does not serve scheduled passenger service on commercial airlines. General aviation aircraft are used for cargo transport, medical transport, charter service
flight training, and personal flying.

Initially, operations at the proposed general aviation airport are assumed to be a proportion of the transient operations currently conducted at general aviation airports in the region (e.g., Philadelphia

Northeast Airport [PNE], Trenton/Mercer Airport [TTN], and Lehigh Valley International Airport [ABE]). Users of these existing general aviation airports are assumed to move a proportion of their operations to the new airport. For purposes of analysis in this EIS, approximately 20 percent of the current transient operations at Philadelphia Northeast Airport, Trenton/Mercer Airport, and Lehigh Valley International Airport are assumed to form the basis of the operations at the proposed new general aviation airport. As shown in Table 4.7-7, in the initial year of operation (2014), the proposed new general aviation airport would serve 31,392 operations.

To estimate the annual aircraft operations at full build-out (2034), the number of operations was projected to increase at a rate of 2.2 percent annually, similar to the rate of growth at general aviation airports nationally (FAA n.d.). Therefore, the number of annual aircraft operations is projected to increase to 48,511 by full build-out.

Table 4.7-7 Estimated Annual Flight Operations at the Proposed General Aviation Airport (2014 and 2034)

Airport	Total Operations[1]	Transient Operations	Convenience Factor[2]	Estimated Annual Operations
PNE	105,000	71,400	0.20	14,280
TTN	85,000	51,000	0.20	10,200
ABE	108,000	34,560	0.20	6,912
			2014 Total	**31,392**
			2034 Total	**48,511**

Note:
1 RKG 2012
2 Convenience factor estimated from the percentage of transient aircraft that are assumed to move to a new general aviation airport based on proximity to the former NAS JRB Willow Grove airfield than PNE, TTN, or ABE airports.

Key:
PNE = Philadelphia Northeast Airport
TTN = Trenton/Mercer Airport
ABE = Lehigh Valley International Airport

Table 4.7-8 presents the annual aircraft operations at full build-out by aircraft type. As shown in Table 4.7-8, approximately 95 percent of aircraft operations are assumed to be conducted by fixed-wing aircraft (small propeller-driven aircraft, small business or regional jets). The remaining aircraft would be rotary-wing aircraft (helicopters).

Table 4.7-8 Estimated Annual Flight Operations in 2034 by Aircraft Type

Group	Aircraft Category (representative aircraft type)	Total Operations	Percent Day Operations (7 a.m. to 10 p.m.)	Percent Night Operations (10 p.m. to 7 a.m.)
General Aviation	Single Prop (General)	38,810	95	5
	Twin Prop (Beech Baron)	4,850	95	5
	Business Jet (Lear 60)	1,940	95	5
	Regional Jet (Embraer 145)	485	95	5
	Rotary Wing (Aerospatiale AS-350)	2,426	95	5
Total		**48,511**	**N/A**	**N/A**

Flight tracks for both fixed- and rotary-wing aircraft are expected to be similar to flight tracks used by aircraft at NAS JRB Willow Grove during its last year of operations. These are shown on Figures 4.7-1 and 4.7-2.

The majority of future operations are assumed to take place during daytime hours (7:00 a.m. to 10:00 p.m.), and the distribution of the types of operations and flight track usage were assumed to be similar to the 2010 baseline flight operations.

Figure 4.7-3 presents the modeled noise contours based on estimated 2034 annual flight operations. The area covered by the 2034 modeled DNL noise zones encompasses approximately 279 acres, approximately 1 acre of which extends outside of the former NAS JRB Willow Grove and Horsham Air Guard Station property (see Table 4.7-9). As shown in Table 4.7-9, the total land area within the noise zones decreases by approximately 242 acres between 2010 and 2034. Although the number of annual operations is higher in 2034 compared to the baseline, flight operations would be conducted by smaller, quieter aircraft than the large military aircraft (e.g., CH-53E, Super Stallion) that previously operated at the former installation.

Table 4.7-9 Comparison of Baseline and Projected Land Area (acres[1]) within Noise Zones

DNL Noise Zone	On-Installation[2]	Off-Installation	Total
2010 (Baseline Conditions)			
65 to 70 dB DNL	211	17	228
70 to 75 dB DNL	152	1	153
Greater than 75 dB DNL	140	0	140
Total	**503**	**18**	**521**
2034 (Projected under Alternative 3)			
65 to 70 dB DNL	183	1	184
70 to 75 dB DNL	58	0	58
Greater than 75 dB DNL	37	0	37
Total	**278**	**1**	**279**

Notes:
[1] Acreage calculations are approximate and are rounded to the nearest acre.
[2] Includes both the former NAS JRB Willow Grove property as well as the Horsham Air Guard Station, which had aircraft operations that were a component of the 2010 baseline noise zones.

The greater-than-65 dB DNL contours are located primarily along Runway 33/15 and over the existing airfield and airfield operations land use districts. The 2034 greater-than-65 dB DNL noise zone extends outside the former installation (and Horsham Air Guard Station) boundary to the southeast, near the commercial intersection of Easton Road (SR 611) and Maple Avenue, impacting less than 1 acre of commercial land uses. These areas are the same areas impacted by the 2010 greater-than-65 dB DNL noise zones. The modeled 2034 greater-than-65 dB DNL noise zones associated with future aircraft operations are not projected to impact any additional noise-sensitive land use areas, including residential, educational, health, and religious structures and sites, and parks, recreational areas (including areas with wilderness characteristics), wildlife refuges, and cultural and historical sites.

Under Alternative 3, there would be noise present from aircraft operations that would not be present under Alternatives 1 or 2. However, the noise from future flight operations would include a smaller overall land area than the 2010 baseline DNL noise zones and be primarily isolated to the airfield and airfield operations land use districts. Therefore, noise associated with the aviation component of Alternative 3 would have a minor impact on land use as well as the potential for a minor impact on individuals due to single-event noise from aircraft overflights.

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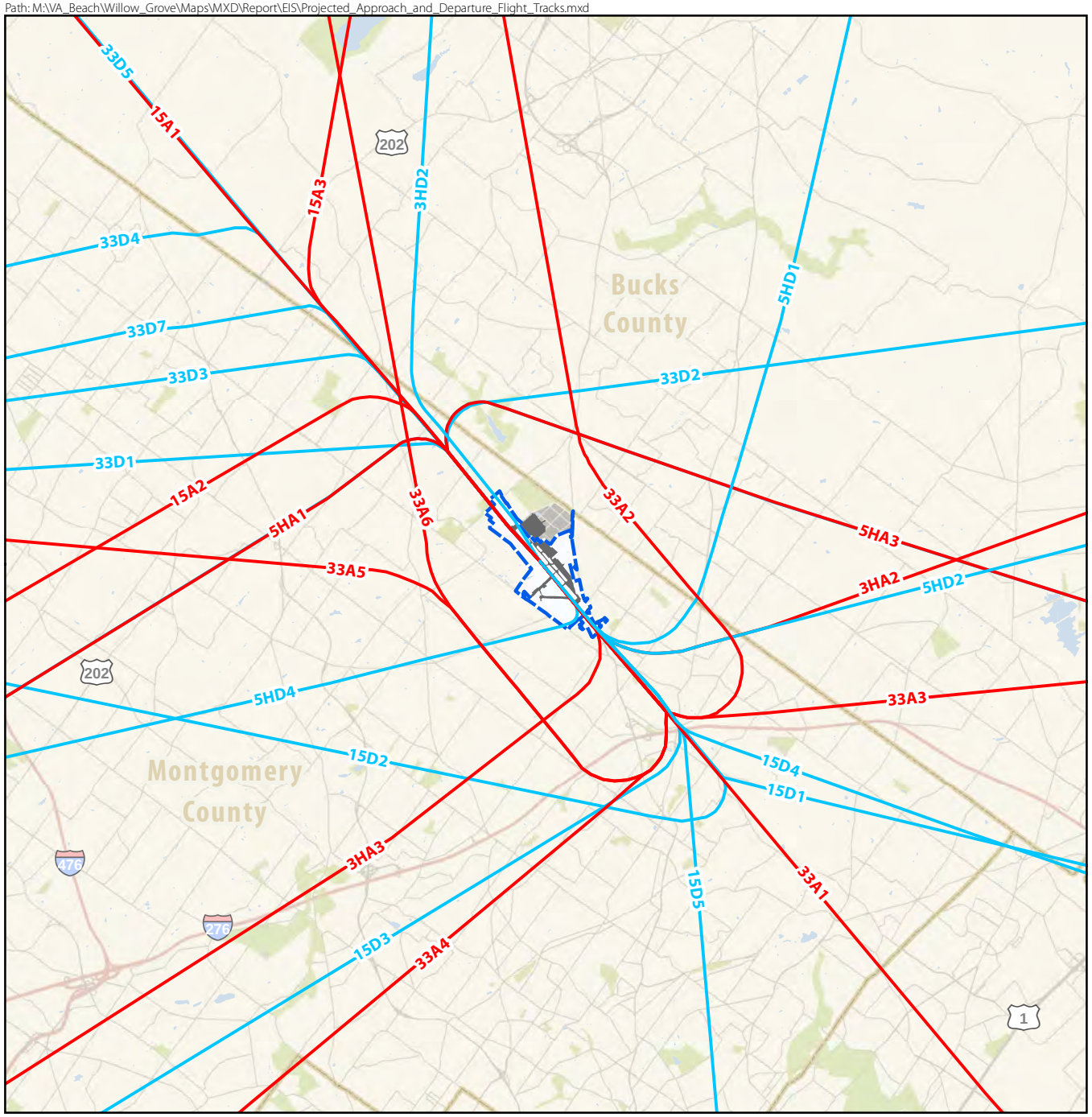

Figure 4.7-1
Projected Approach and Departure Flight Tracks Under Alternative 3
(Airfield Reuse)
Horsham, PA

Legend

- Freeway
- Major Road

Flight Tracks

- Arrival
- Departure
- NAS JRB Willow Grove
- FAA Tower and Horsham Air Guard Station (not included in redevelopment)
- Runways, Taxiways, Parking Aprons
- County Boundary
- Park
- Waterbody

N

SCALE

0 1 2 Miles

SOURCE: Ecology and Environment Inc 2013; ESRI 2010; Northern Division Naval Facilities Engineering Command and The Onyx Group 1999; Tetra Tech 2012.

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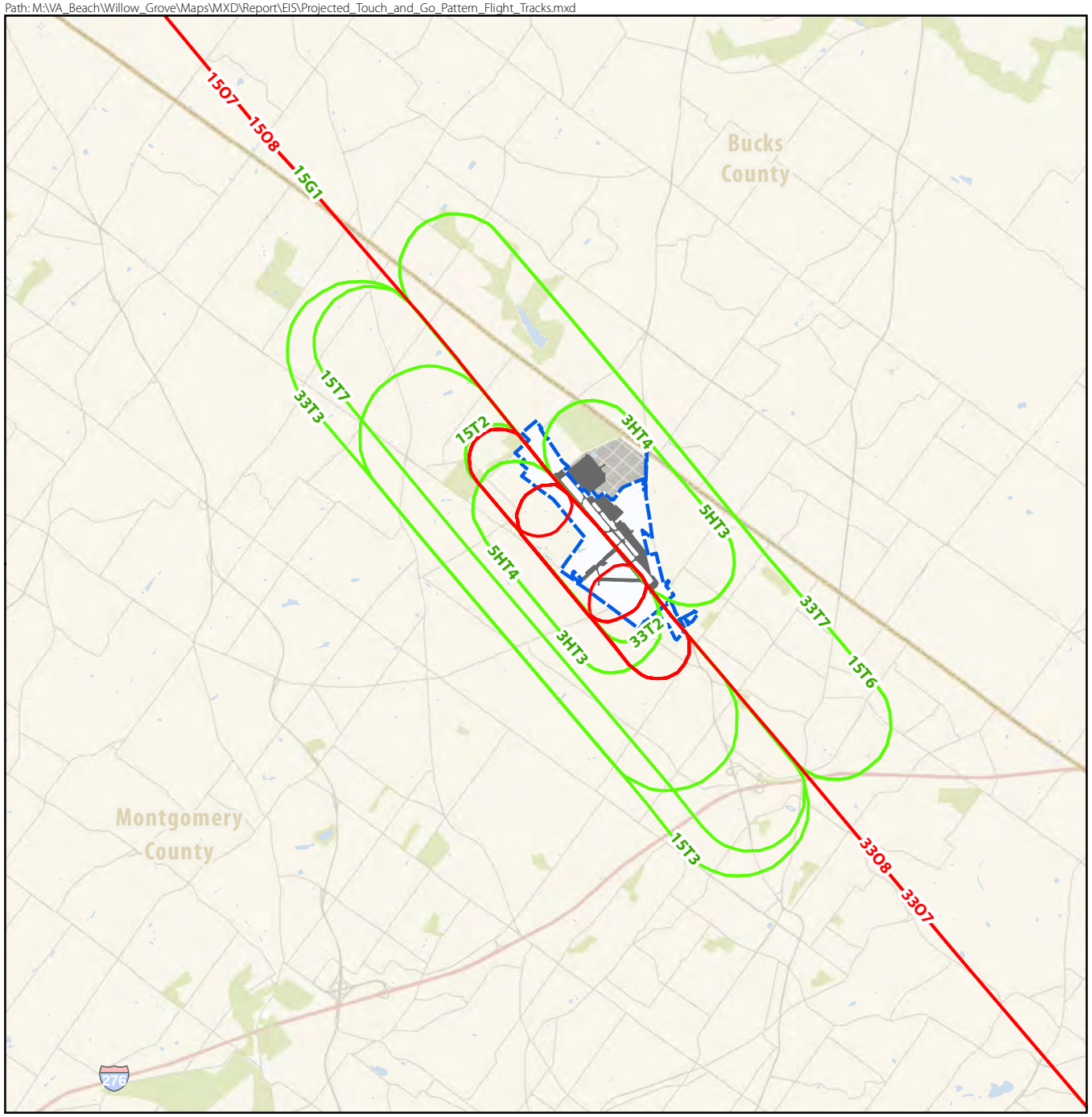

Figure 4.7-2
Projected Touch-and-Go Pattern Flight Tracks Under Alternative 3
(Airfield Reuse)
Horsham, PA

Legend

- Freeway
- Major Road

Flight Tracks

- Arrival
- Pattern
- NAS JRB Willow Grove
- FAA Tower and Horsham Air Guard Station (Not included in redevelopment)
- Runways, Taxiways, Parking Aprons
- County Boundary
- Park
- Waterbody

N

SCALE

0 1 2 Miles

SOURCE: Ecology and Environment Inc 2013; ESRI 2010; Northern Division Naval Facilities Engineering Command and The Onyx Group 1999; Tetra Tech 2012.

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Path: M:\VA_Beach\Willow_Grove\Maps\MXD\Report\EIS\Projected_Noise_Contours_Alt3.mxd

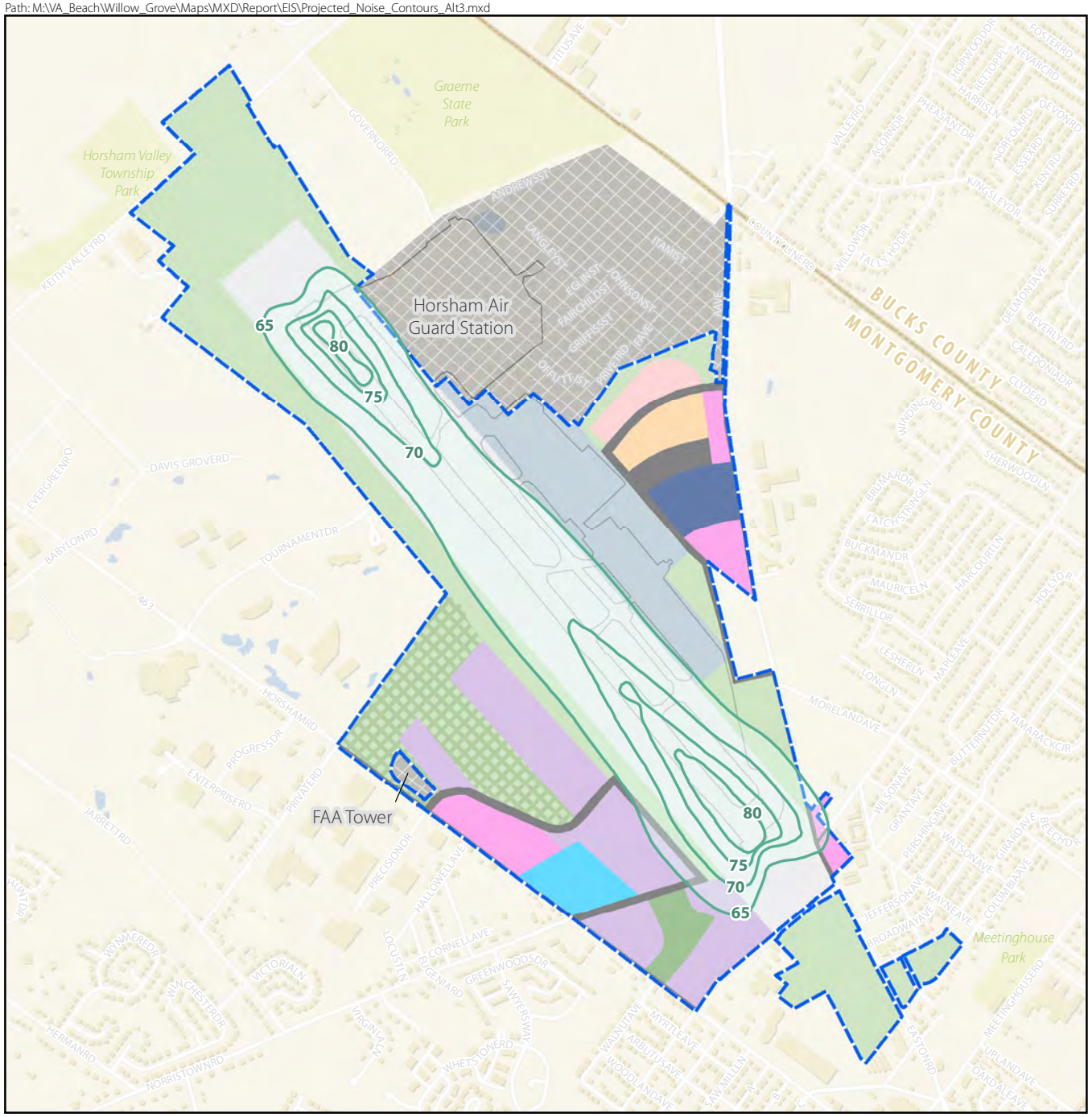

Figure 4.7-3

Projected Noise Contours for Aircraft Operations Under Alternative 3

(Airfield Reuse)

Horsham, PA

Legend

- County Boundary
- NAS JRB Willow Grove

Projected Noise Contours (dB)

- Projected Noise Contours (dB)
- Runways, Taxiways, Parking Aprons
- FAA Tower and Horsham Air Guard Station (not included in redevelopment)
- Waterbody
- Park

Alternative 3 Land Uses

- Airfield
- Airfield Operations
- Aviation Museum
- Bucks County Housing Group (BCHG)
- Park
- Open Space
- Hotel/Conference Center
- Office Park
- Par-3 Golf Course
- Recreation Center
- Retail
- Roads/Parking

SCALE

0 1,000 2,000 Feet

SOURCE: Blue Ridge Research and Consulting 2013; Ecology and Environment 2013; ESRI 2010; RKG 2012; Tetra Tech 2012.

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4.7.4 No Action Alternative

The No Action Alternative is retention of the former NAS JRB Willow Grove property by the federal government in caretaker status. No reuse or redevelopment would occur at the facility; therefore, no additional noise would be generated.

4.8 Infrastructure and Utilities

This section presents an analysis of the potential impacts on infrastructure and utility systems (water, wastewater, stormwater, electricity, and natural gas) resulting from the implementation of Alternative 1, Alternative 2, Alternative 3, or the No Action Alternative. Implementation of any of these alternatives could directly impact infrastructure and utility systems on the former installation property, and because utility services are offered regionally, there could also be indirect impacts on the distribution area in which the service is provided (e.g., Horsham Township water system). A description of the methodology used in calculating these projections, along with the assumptions and definitions of multipliers and calculations, is provided in Appendix B.

The installation's drinking water wells and wastewater treatment facility are not being disposed of or transferred for redevelopment. The drinking water wells are located on the Horsham Air Guard Station, and the installation's wastewater treatment facility has been closed and dismantled. Therefore, there would need to be early public investment in new infrastructure to provide these services to the property.

4.8.1 Alternative 1 (HLRA Plan - Preferred Alternative)

4.8.1.1 Water Supply

Alternative 1 would be expected to have a significant, adverse impact on the municipal water system, but with mitigation measures, impacts could be reduced to not significant. As discussed above, the current sources of installation's water supply (wells 31 and 32) are part of the Horsham Air Guard Station and will not be transferred to the HLRA. Upon disposal of the former installation property, the HWSA would assume responsibility for providing the water supply to the future redeveloped properties. The HWSA's existing water source well currently supports between 80 and 85 percent of the existing daily demand for the township. The remaining 15 to 20 percent of demand is met through the purchase of water via interconnections with water utilities located in two neighboring communities (O'Rourke 2013). A source for future water demand resulting from redevelopment of the former installation would need to be identified.

Water Demand

Full build-out of Alternative 1 would include a maximum of 1,486 residential units (includes 70 BCHG units) and 2.3 million square feet of non-residential floor space. Based on the density of development at full build-out, Alternative 1 would require water demand of 668,650 gallons per day (gpd), exceeding the baseline (2009) condition of 170,095 gpd. Additional water demand would be expected under Alternative 1 for fire protection and irrigation for general landscaping, recreational fields and the proposed 9-hole, par-3 golf course.

Projections of water demand were estimated using established planning multipliers for each land use district and number of residential units and non-residential square footages within those land use districts. For more information on the methodology, assumptions, and multipliers used to project water demand, see Appendix B. Table 4.8-1 identifies the projected water demand resulting from Alternative 1.

Table 4.8-1 Projected Water Demand under Alternative 1 (gpd)

	Baseline Condition	Full Build-out	Net Change
Water Demand	170,095	668,650[1]	+498,555

Note:
[1] The HLRA's projected estimate for drinking water demand at full build-out for Alternative 1 was 634,000 gpd. The difference between the demand calculated for the purposes of this analysis and the HLRA's calculation was within 10 percent (actual difference = 5.4 percent) and considered comparable.

Implementation of Alternative 1 would be expected to have a significant impact on the future capacity of Horsham Township's water system. The HWSA estimates that the existing average daily demand in Horsham Township is approximately 2.2 million gpd, 15 to 20 percent of which is purchased via interconnections with neighboring water suppliers (O'Rourke 2013). Therefore, the township's existing water supply system is already operating at full capacity. At full build-out of Alternative 1, demand would increase to nearly 2.9 million gpd, an approximately 30 percent increase. The HWSA would need to acquire additional water supply in order to meet the expected demand.

The potential water supply demand impacts that would result from Alternative 1 could be mitigated through the action of the Horsham Township Planning Board, which may require the developer to estimate potential impacts on the water system, including changes in flow rate, capacity, and water pressure. As one of the goals of the Redevelopment Plan, water demand may be further reduced through the incorporation of the latest green and sustainable design principles (e.g., LEED buildings, LID, complete streets, energy efficiency/renewable energy, etc.) (RKG 2012). Energy Star (www.energystar.org) and LEED programs (www.USGBC.org) are examples of programmatic systems that can be employed to ensure that buildings are using the best reasonable energy efficiency techniques.

Furthermore, full build-out of the former installation property would occur incrementally over a 20-year period. Therefore, any increase in the demand for water would not occur at once, and the HWSA would have the ability to upgrade and/or expand to meet increases in service demand.

Distribution System

Redevelopment of the former installation would require upgrading and expansion of the existing water supply infrastructure to meet Horsham Township standards, particularly reliability (at the utility level), water quality, and the quantity and pressure needed for fire protection. Furthermore, to fully assess the limitations, potential liabilities, and risks associated with reuse of the existing distribution system, the HLRA recommended conducting a detailed review of maintenance records and/or recent engineering reports to more completely evaluate the need for and cost of any required rehabilitation (RKG 2012).

The HLRA's Redevelopment Plan does not include detailed plans for any infrastructure improvements, and what improvements are needed are currently unknown. Given the proposed locations and types of development and the areas of the property where development would occur, it would be expected that the existing water distribution system would require upgrades, expansion, and/or construction of new water lines to supply areas of the installation not currently serviced. The entity responsible for implementing any water distribution system improvements has not been determined and funding for these improvements has not been secured. The HLRA anticipates that the major trunk lines and storage tanks for the drinking water infrastructure would be provided by the developer. In 2011 dollars, the estimated cost for the public water infrastructure to support the redevelopment would be approximately $9,099,500 (RKG 2012).

Operation and Management

Under Alternative 1, any property not transferred to other federal agencies would no longer be owned or managed by the federal government. Upon completion of the BRAC process, the developer in combination with HWSA would determine who will provide service and maintenance.

4.8.1.2 Wastewater

In September 2011, the Navy shut down and demolished the former installation's wastewater treatment plant and capped a majority of the sewer pipes throughout the property, with the exception of those on the Horsham Air Guard Station. Sewage flows from the Horsham Air Guard Station are currently sent to the HWSA system via a new connector that was constructed in the fall of 2011. Currently, no system is in place to handle wastewater distribution outside the Horsham Air Guard Station. However, upon disposal of the former installation property, ownership and the responsibility of developing and operating the property's wastewater infrastructure would be transferred to the HWSA. The property would be serviced by an extension of the sewer line that currently serves the Horsham Air Guard Station and delivers wastewater to the Park Creek Sewage Treatment Plant (STP) (O'Rourke 2013).

Wastewater Volume

Full build-out of Alternative 1 would result in a denser built environment (i.e., a higher intensity of residential and non-residential development) than currently exists on the former installation. Based on the increased density of development, implementation of Alternative 1 would result in a significant increase in wastewater generated (approximately 590,000 gpd), which exceeds the 160,000 gpd generated by the facility in 2009.

Projections of wastewater volumes were estimated using established planning multipliers for each land use district and number of residential units and non-residential square footages within those land use districts. For more information on the methodology, assumptions, and multipliers used to estimate wastewater volumes, see Appendix B. Table 4.8-2 identifies the projected wastewater volume resulting from the implementation of Alternative 1.

Table 4.8-2 Projected Wastewater Volume under Alternative 1 (gpd)

	Baseline Condition	Full Build-Out	Net Change
Wastewater	160,000	586,457	+426,457

Notes:

[1] The HLRA's projected estimate for wastewater generation at full build-out for Alternative 1 was 538,986 gpd. The difference between the value calculated for the purposes of this analysis and the HLRA's was within 10 percent (actual difference = 8.8 percent) and therefore considered comparable.

The current capacity of the Park Creek STP is 1.0 million gpd, and the 2012 average daily volume was 770,000 gpd; therefore, full build-out of Alternative 1 would exceed the current treatment capacity of the Park Creek STP. The HWSA is currently seeking to increase the capacity of its STP to 2.25 million gpd. Approximately 500,000 to 600,000 gpd have been allocated to support the redevelopment of the former installation property (RKG 2012) and mitigate the potential impacts. This capacity change should be adequate to address the increase wastewater volume anticipated.

Full build-out of the installation would occur incrementally over a 20-year period. Therefore, increases in wastewater volumes would not occur at once, and the HWSA, as the local utility provider, would have a longer period to plan for and implement the system expansion.

Wastewater System

As with the water distribution system, redevelopment of the property would require an upgrade of the former installation's existing wastewater collection system and the construction of new wastewater

infrastructure and treatment systems. The HLRA's Redevelopment Plan does not include detailed plans for any infrastructure improvements, and it is unknown what improvements are needed. However, it is estimated that the improvements necessary to bring the existing system up to local standards and to expand major trunk lines through the property could cost as much as $9,939,300 (RKG 2012).

The HLRA anticipates that the major trunk lines and sewer infrastructure would be provided by the developer. Upon disposal of the former installation property, the future developer and property owner would be responsible for wastewater system improvements. Given the proposed locations and types of development and the areas of the property where development would occur, it would be expected that the sewer infrastructure would require upgrades, expansion, or new systems to support redevelopment. In addition, the design and installation of any new infrastructure would require, if applicable, municipal review and approval and would need to comply with applicable local codes, ordinances, and regulations.

Operation and Management

Under Alternative 1, any property not transferred to other federal agencies would no longer be owned or managed by the federal government. Upon completion of the BRAC process, the developer, and the HWSA would determine responsibility for service and maintenance of wastewater infrastructure.

4.8.1.3 Stormwater

Full build-out of Alternative 1 would be expected to result in an increase in the total impervious surface area on the former installation property, resulting in higher volumes of stormwater runoff. New impervious surface area would be created as a result of new construction (e.g., buildings, parking lots, and roadways). Some of the existing impervious surface would be removed with the demolition of the runway, taxiways and parking apron space that would not be utilized under Alternative 1.

Specific project plans and details have not yet been developed. However, for planning purposes, the total impervious surface area was estimated based on the HLRA Redevelopment Plan, including roadways, building roofs, and parking areas. Under Alternative 1, impervious surface areas would cover approximately 352 acres or 41 percent of the total 861 acres of the property. The remaining 59 percent of the property, which includes areas designated as parks and open spaces, would have mostly non-impervious surfaces (e.g., lawns, woodlands, etc.). The projected 352 acres of impervious surface area would be an increase of 103 acres (or 12 percent) over the existing impervious surface. For more information on the methodology, assumptions, and calculations used to project the impervious surface area resulting from implementation of Alternative 1, see Appendix B.

Full build-out of Alternative 1 would potentially have an impact on stormwater runoff. However, redevelopment of the property would provide an opportunity to address the projected increase in stormwater runoff as well as existing stormwater management, such as the periodic flooding at the northern end of the property. Stormwater impacts resulting from Alternative 1 would be reduced through the implementation of stormwater management practices required by local and state regulations. Horsham Township would require the developer to prepare a stormwater management plan, preferably using a watershed approach rather than a site-by-site approach. The plan would likely be prepared as part of the master plan design. The stormwater management plan would describe measures to control the volume and quality of stormwater runoff in a manner consistent with PADEP stormwater management policies. The plan also may include measures to mitigate other impacts identified by the Township (e.g., restrictions on passage for fish due to construction and operation of stormwater infrastructure).

Disturbance of more than 1 acre of land would require adherence to the standards set forth in Pennsylvania's Clean Streams Law (Chapter 102) and the submittal of a Notice of Intent, an erosion and sediment control plan, and a post-construction stormwater management plan to the PADEP. Since demolition and construction activities under Alternative 1 would disturb more than 1 acre, the activities

would be subject to these requirements. Under Chapter 102 of the Clean Stream Law, the developer would be required to implement BMPs during construction to control the release of stormwater runoff from exposed construction sites (see Section 6). Post-construction BMPs also would be required to control the average annual load of total suspended solids in stormwater runoff. If spillage of fuels or lubricating oils occurs, it would be cleaned up immediately by the removal and proper disposal of any contaminated soils pursuant to applicable regulatory requirements. The developer would also be required to prepare a PPC plan that contains BMPs.

In addition, all future development plans would be required to undergo Horsham Township development review. As required by the Horsham Township Ordinance, development plans would be accompanied by a stormwater management plan developed in accordance with the BMPs for stormwater management in Pennsylvania. Development plans would also be accompanied by a soil erosion and sedimentation control plan with BMPs. The Township requires development applications to reduce both stormwater runoff rates and stormwater volumes to pre-development drainage conditions (Horsham Township 2011).

The potential also exists for soil contamination to occur as a result of spills or leaks of lubricants and fuels used in the construction process and during facility operation. Procedures to prevent spills and to respond to spills that occur would be included in the storm water pollution prevention plan (SWPPP), which would be developed in compliance with a National Pollutant Discharge Elimination System (NPDES) permit for stormwater discharges. The CWA, Section 402, established the NPDES to limit pollutant discharges into waterbodies, including streams and rivers. The NPDES program regulates stormwater discharges from municipal separate storm sewer systems, construction activities, and industrial activities.

The existing NPDES Multi-sector General Permit for stormwater discharges associated with industrial activates at NAS JRB Willow Grove would have been terminated when the former installation closed. NPDES permits are non-transferrable and, due to the early termination of the existing permit, the developer will need to file for a new permit.

Section 438 of the Energy Independence and Security Act (EISA) of 2007

As indicated in Section 3.8, Infrastructure and Utilities, Section 438 of the EISA of 2007 requires that any development or redevelopment project involving a federal facility with a footprint exceeding 5,000 square feet shall use site planning, design, construction, and maintenance strategies in order to maintain or restore the predevelopment hydrology of the property with regard to temperature, rate, volume, and duration of flow. Compliance with this requirement can be met through the implementation of LID technologies.

Section 438 applies to the "sponsor of any development or redevelopment project involving a Federal facility." The act of transferring the installation per the BRAC Law would result in the property being no longer federally owned; consequently, Section 438 would not apply to the redevelopment of the former Navy Lodge property. However, the provisions of Section 438 form the basis for practices that could be implemented by the developer to mitigate potential stormwater impacts. Therefore, although not required through federal ownership of the property, it would be expected that redevelopment of the installation would be consistent with the terms contained in Section 438 of the EISA.

Stormwater Collection System

The existing stormwater collection system may require modifications, depending on the amount of redevelopment and project phases. Although a portion of the existing structures and built areas would be reused, new stormwater infrastructure may be necessary to offset new impervious surfaces associated with redevelopment under this alternative.

The future developer would be responsible for implementing any stormwater collection system improvements. Upon disposal of the federally owned and maintained property, the developer would be required to identify and incorporate appropriate stormwater controls and BMPs into the redevelopment design, which would upgrade the existing infrastructure. In order to address stormwater runoff management in the northern end of the former installation property, it was estimated that approximately $2.4 million in improvements would be needed (RKG 2012). A retention basin could be constructed as part of these improvements, not only to capture stormwater run-off, but to add a major open space amenity to the property (RKG 2012).

Management

Under Alternative 1, any property not transferred to other federal agencies would no longer be owned or managed by the federal government. Upon completion of the BRAC process, the future property owner would be responsible for coordinating with Horsham Township regarding the stormwater infrastructure located on the property and for its service and maintenance.

4.8.1.4 Other Utility Systems

Electric

Ownership of the electric power distribution system on the former installation property would transfer to the Philadelphia Electric Company (PECO) following disposal of the property. Prior to transfer, PECO would identify any improvements required to bring the distribution system up to local standards. PECO would also identify any additional regulatory and operational considerations that would need to be addressed prior to transfer (RKG 2012). The *Electric Power Outlook for Pennsylvania, 2012-2017* (Washko 2013) found that sufficient generation, transmission, and distribution capacity exists to reasonably meet the needs of Pennsylvania's electricity consumers for the foreseeable future. As a result, there would be no anticipated capacity constraints for electric power.

Upon redevelopment under Alternative 1, the electric power distribution system on the installation may need to be either upgraded, expanded, or new distribution lines constructed to accommodate the final design at full build-out. Estimates of future electricity usage were calculated for the 20-year (2034) full build-out scenario as proposed under Alternative 1 using U.S. averages for energy use per square foot for specific building types, obtained from the U.S. Department of Energy's Energy Information Agency s (EIA 2003, 2009). These averages were used to estimate total energy use by the proposed new building spaces

Under Alternative 1, full build-out in 2034 would require 48.5 million kWh of electricity per year, which would be an increase of 33.8 million kWh over the estimated electricity use at the former installation of 14.7 million kWh in 2010. Therefore, full build-out of Alternative 1 would result in an increase in electricity usage, which would require expansion of the existing infrastructure to accommodate the increased capacity. Without knowing the final design, it is not possible to determine the degree or location of these improvements or the cost of any such expansion and/or relocation. The 20-year build-out duration would allow the electricity infrastructure to be expanded as needed.

Natural Gas

Redevelopment under Alternative 1 may require the upgrade, expansion or new natural gas lines on the former installation to accommodate the final design at full build-out. Similar to electricity usage, estimates of future natural gas usage were calculated for the 20-year (2034) full build-out scenario as proposed under Alternative 1 using U.S averages for natural gas use per square foot, which were obtained from the U.S. Department of Energy's Energy Information Agency for all specific building types. These averages were used to estimate total natural gas use by the proposed new building spaces (EIA 2003,

2009). The *Gas Long Term Infrastructure Improvement Plan, 2013-2022* (PECO Energy Co. 2013), does not indicate any anticipated capacity constraints due to planned improvements of existing infrastructure throughout PECO's service territory.

Under Alternative 1, at full build-out in 2034, the development would require 179 million cubic feet (cf) of natural gas which would be an increase of 87 million cf over the baseline (2010) natural gas usage at the former installation of 92 million cf. Therefore, full build-out of Alternative 1 would require expansion of the existing infrastructure to accommodate the increased capacity. Without knowing the final design, it is not possible to determine the degree or location of these improvements or the cost of any such expansion and/or relocation. The 20-year build-out duration would allow the natural gas infrastructure to be expanded as needed.

Natural gas meters may need to be assigned to each new building so that individual customers can be tracked and billed. However, without knowing the final design, it is not possible to determine the extent and cost of such expansion and relocation.

4.8.2 Alternative 2 (HLRA Plan with Increased Residential Development)

4.8.2.1 Water Supply

Potential impacts on water supply resources under Alternative 2 would be similar to those described under Alternative 1. Therefore, implementation of Alternative 2 would be expected to have a significant, adverse impact on the municipal water system, but with mitigation measures, impacts could be reduced to not significant. The capacity of the existing system is already being exceeded, as described in Sections 3.8.1 and 4.8.1.1; therefore, a source for future water demand created by the redevelopment of the former installation would need to be identified.

Water Demand

Full build-out of Alternative 2 would have a maximum of 1,999 residential units and 2.1 million square feet of non-residential floor space. Based on the density of development at full build-out, Alternative 2 would require water at a rate of approximately 765,298 gallons per day, which exceeds the baseline condition (2009) rate of 170,095 gallons per day. In addition, Alternative 2 would generate water demands for fire protection and irrigation for general landscaping, recreational fields, and the proposed 9-hole, par-3 golf course.

As with Alternative 1, projections of water demand were estimated using established planning multipliers. For more information on the methodology, assumptions, and multipliers used to project water demand, see Appendix B. Table 4.8-3 identifies the projected water demand resulting from the implementation of Alternative 2.

Table 4.8-3 Projected Water Demand under Alternative 2 (gpd) [1]

	Baseline Condition	Full Build-Out	Net Change
Water Demand	170,095	765,298	+595,203

Note:
[1] This table presents a summary of the projected water demand. For descriptions of the methodology and assumptions and the detailed tables used to project water demand, see Appendix B.

Implementation of Alternative 2 would be expected to have a significant impact on the future capacity of the Horsham Township's water system. The HWSA estimates that the existing average daily demand in Horsham Township is approximately 2.2 million gpd, 15 to 20 percent of which is purchased via interconnections with neighboring water suppliers (O'Rourke 2013). Therefore, the township's existing water supply system is already operating at full capacity. At full build-out of Alternative 2, demand

would increase to nearly 3.0 million gpd, an approximately 35 percent increase. The HWSA would need to acquire additional water supply in order to meet the expected demand.

The potential water supply demand impacts that would result from implementation of Alternative 2 could be mitigated through the action of the Horsham Township Planning Board, which may require the developer to estimate potential impacts on the water system, including changes in flow rate, capacity, and water pressure. As one of the goals of the Redevelopment Plan, water demand may be further reduced through the incorporation of the latest green and sustainable design principles (e.g., LEED buildings, LID, complete streets, energy efficiency/renewable energy, etc.) (RKG 2012). Energy Star (www.energystar.org) and LEED programs (www.USGBC.org) are examples of programmatic systems that can be employed to ensure that buildings are using the best reasonable energy efficiency techniques.

Furthermore, full build-out of the former installation property would occur incrementally over a 20-year period. Therefore, the HWSA would have the ability to upgrade or expand as needed to meet increases in service demand.

Distribution System

As identified under Alternative 1, redevelopment of the installation would require upgrading, expansion, and new construction to meet Horsham Township standards, particularly reliability (at the utility level), water quality, and the quantity and pressure needed for fire protection.

Upon disposal of the federally owned and maintained property, the developer in coordination with HWSA would be responsible for water supply infrastructure improvements. In addition, the design and installation of any new infrastructure may require municipal review and approval and would need to comply with applicable local codes, ordinances, and regulations.

Operation and Management

Under Alternative 2, any property not transferred to other federal agencies would no longer be owned or managed by the federal government. Upon completion of the BRAC process, the developer in coordination with HWSA would determine service and maintenance requirements.

4.8.2.2 Wastewater

Implementation of Alternative 2 would be expected to create more stress on the municipal wastewater system compared to Alternative 1 due to a greater volume of wastewater that would be generated. Currently, no system is in place to handle wastewater distribution outside the Horsham Air Guard Station. Similar to Alternative 1, under Alternative 2, ownership and the responsibility for developing and operating the property's wastewater infrastructure would be transferred to the HWSA upon disposal of the property. The property would be serviced by an extension of the sewer line that currently serves the Horsham Air Guard Station and delivers wastewater to the Park Creek STP.

Wastewater Volume

Full build-out of Alternative 2 would result in a higher intensity of residential and non-residential development than under Alternative 1 or that currently exists on the former installation. Based on the increased density of development, implementation of Alternative 2 would result in a significant increase in wastewater generated (approximately 660,000 gpd), which exceeds the 160,000 gpd previously generated by the facility in 2009.

As with Alternative 1, wastewater volume projections were estimated using established planning multipliers for each land use district and the associated square footages or units within those districts. Table 4.8-4 identifies the projected wastewater flows that would result from the implementation of Alternative 2.

Table 4.8-4 Projected Wastewater Volume under Alternative 2 (gpd)[1]

	Baseline Condition	Full Build-Out	Net Change
Wastewater	160,000	663,970	+503,970

Note:
[1] This table presents a summary of the projected water demand. For descriptions of the methodology and assumptions and the detailed tables used to project water demand, see Appendix B.

The current capacity of the Park Creek STP is 1.0 million gpd, and the 2012 average daily volume was 770,000 gpd; therefore, full build-out of Alternative 2 would exceed the treatment capacity for the Park Creek STP. The HWSA is currently seeking to increase the capacity of its STP to 2.25 million gpd. Approximately 500,000 to 600,000 gpd have been allocated to support the redevelopment of the former installation property (RKG 2012) and potentially mitigate the impacts. Alternative 2, however, would exceed the HWSA's allocated volume by 63,970 gpd, thereby potentially impacting the municipal wastewater treatment system.

Full build-out of the installation is projected to occur incrementally over a 20-year period. Therefore, increases in wastewater volumes would not occur at once, and the HWSA would be able to plan for and implement system expansion.

Wastewater System

As identified in Alternative 1, redevelopment of the property under Alternative 2 would require an upgrade of the existing wastewater collection system and the construction of new wastewater infrastructure. Upon disposal of the former installation property, the future developer and property owner would be responsible for making the wastewater system improvements. Given the proposed locations and types of development that would occur, the existing sewer infrastructure would require improvement and/or relocation/expansion to service areas of the former installation not currently served by the existing system. In addition, the design and installation of any new infrastructure would require, if applicable, municipal review and approval and would need to comply with applicable local codes, ordinances, and regulations.

Operation and Management

Under Alternative 2, any property not transferred to other federal agencies would no longer be owned or managed by the federal government. Upon completion of the BRAC process, the developer and the HWSA would be responsible for determining responsibility for service and maintenance.

4.8.2.3 Stormwater

The potential stormwater impacts under Alternative 2 would be similar to those described under Alternative 1. Full build-out of Alternative 2 would be expected to result in an increase in the total impervious surface area on the former installation property compared to exiting conditions, resulting in higher volumes of stormwater runoff. However, Alternative 2 would result in slightly less impervious surface area than Alternative 1. In addition to the impervious surface area that already exists, new impervious surface area would be created as a result of new construction (e.g., buildings, structures, parking lots, and roadways). Some of the existing impervious surface would be removed with the demolition of the runway, taxiways, and parking apron space that would not be utilized under Alternative 2.

Specific project plans and details have not yet been developed. However, for planning purposes, the total impervious surface area was projected based on the HLRA's proposed redevelopment under Option D. Full build-out of Alternative 2 is projected to result in a total of 351 acres of impervious surface (approximately 41 percent of total land area), which would be comprised predominantly of roadways and

building roofs. This would be an addition of approximately 102 acres (or 12 percent) over the baseline conditions of 249 acres of impervious surface. For more information on the methodology, assumptions, and calculations used to project the impervious surface area resulting from implementation of Alternative 2, see Appendix B.

Full build-out of Alternative 2 would potentially have an impact on stormwater runoff. However, redevelopment of the property would provide an opportunity to address the projected increase in stormwater runoff as well as existing stormwater management, such as the periodic flooding at the northern end of the property. As described in Section 4.8.1.3, almost all of the proposed redevelopment and resulting impervious surface area would be concentrated in the same land use districts described in Alternative 1. The impervious and non-impervious area coverage would remain similar to Alternative 1, both at approximately 41 percent. Methods to reduce stormwater impacts, applicable stormwater state and federal mandates and regulations, associated stormwater management plans, and recommended BMPs are the same as those described in Section 4.8.1.3.

Section 438 of the Energy Independence and Security Act (EISA) of 2007

Similar to Alternative 1, the developer would not be subject to the requirements of Section 438, because transferring the installation per BRAC Law would result in the property no longer being federally owned; consequently, Section 438 would not apply to the redevelopment of the former installation property. However, as outlined by the HLRA's redevelopment planning principles, redevelopment would incorporate the latest green and sustainable design principles where appropriate (e.g., LEED buildings, LID, complete streets, etc.) (RKG 2012). Therefore, although not required through federal ownership of the property the redevelopment of the installation would be consistent with the terms contained within Section 438 of the EISA.

Stormwater Collection System

The existing stormwater collection system may require modifications, depending on the amount of redevelopment and project phases. Although a portion of the existing structures and built areas would be reused, new stormwater infrastructure may be necessary to offset new impervious surfaces associated with redevelopment under this alternative.

The future developer would be responsible for implementing any stormwater collection system improvements. Upon disposal of the federally owned and maintained property, the developer would be required to identify and incorporate appropriate stormwater controls and BMPs into the redevelopment, which would upgrade the existing infrastructure.

Management

Under Alternative 2, any property not transferred to other federal agencies would no longer be owned or managed by the federal government. Upon completion of the BRAC process, the future property owner would be responsible for coordinating with Horsham Township for service and maintenance of stormwater infrastructure.

4.8.2.4 Other Utility Systems

Electric

Ownership of the electric power distribution system on the former installation property would transfer to the Philadelphia Electric Company (PECO) following disposal of the property. Prior to transfer, PECO would identify any improvements required to bring the distribution system up to local standards. PECO would also identify any additional regulatory and operational considerations that would need to be addressed prior to transfer (RKG 2012). The *Electric Power Outlook for Pennsylvania, 2012-2017* (Washko 2013) found that sufficient generation, transmission, and distribution capacity exists to

reasonably meet the needs of Pennsylvania's electricity consumers for the foreseeable future. As a result, there would be no anticipated capacity constraints for electric power.

Upon redevelopment under Alternative 2, the electric power distribution system on the installation may need to be either expanded or relocated to accommodate the final design at full build-out. Estimates of future electricity usage were calculated for the 20-year (2034) full build-out scenario as proposed under Alternative 2 using U.S averages for energy use per square foot for specific building types, obtained from the U.S. Department of Energy's Energy Information Agency (EIA 2003, 2009). These averages were used to estimate total energy use by the proposed new building spaces.

Under Alternative 2, at full build-out in 2034, the development would require 47.9 million kWh of electricity, which is an increase of 33.2 million kWh over the estimated electricity use of 14.7 million kWh in 2010 at the former installation. Therefore, full build-out of Alternative 2 would result in an increase in electricity usage, which would require expansion of the existing infrastructure to accommodate the increased capacity. Without knowing the final design, it is not possible to determine the degree or location of these improvements or the cost of any such expansion and/or relocation. The 20-year build-out duration would allow the electricity infrastructure to be expanded as needed.

Natural Gas

As with Alternative 1, redevelopment under Alternative 2 may require the expansion or relocation of natural gas lines on the former installation to accommodate the final design at full build-out. Similar to electricity usage, estimates of future natural gas usage were calculated for the 20-year (2034) full build-out scenario as proposed under Alternative 2 using U.S averages for natural gas use per square foot by specific building type (EIA 2003, 2009). The *Gas Long Term Infrastructure Improvement Plan, 2013-2022* (PECO Energy Co. 2013), does not indicate any anticipated capacity constraints due to planned improvements of existing infrastructure throughout PECO's service territory.

Under Alternative 2, at full build-out in 2034, the development would require 196 million cf of natural gas, which would be an increase of 104 million cf over the baseline (2010) natural gas usage at the former installation of 92 million cf. Therefore, full build-out of Alternative 2 would require expansion of the existing infrastructure to accommodate the increased capacity. Without knowing the final design, it is not possible to determine the degree or location of these improvements or the cost of any such expansion and/or relocation. The 20-year build-out duration would allow the natural gas infrastructure to be expanded as needed.

Natural gas meters may need to be assigned to each new building so that individual customers can be tracked and billed. However, without knowing the final design, it is not possible to determine the extent and cost of such expansion and relocation.

4.8.3 Alternative 3 (Airfield Reuse)

4.8.3.1 Water Supply

Potential impacts on water supply resources under Alternative 3 would be less than those described under Alternatives 1 and 2, primarily due to the reduced residential development. Alternative 3 would not have a significant impact on the municipal water system. The capacity of the HWSA's water system is already exceeded, as described in Sections 3.8.1 and 4.8.1.1; however, the impact would be less than Alternatives 1 and 2. A source for future water demand created by redevelopment of the former installation property would still need to be identified.

Water Demand

Full build-out of Alternative 3 would include a maximum of 70 residential units and 1.5 million square feet of non-residential floor space. Based on the density of development at full build-out, Alternative 3 would require water at a rate of approximately 201,937 gallons per day, exceeding the baseline conditions (2009) of 170,095 gallons per day. In addition, Alternative 3 would generate water demands for fire protection and irrigation for general landscaping, recreational fields, and the proposed 9-hole, par-3 golf course.

As with Alternatives 1 and 2, projections of water demand were estimated using established planning multipliers. For more information on the methodology, assumptions, and multipliers used to project water demand, see Appendix B. Table 4.8-5 identifies the projected water demand resulting from the implementation of Alternative 3.

Table 4.8-5 Projected Water Demand under Alternative 3 (gpd)[1]

	Baseline Condition	Full Build-Out	Net Change
Water Demand	170,095	201,937	+31,842

Note:
[1] This table presents a summary of the projected water demand. For descriptions of the methodology and assumptions and the detailed tables used to project water demand, see Appendix B.

Alternative 3 would be expected to have a minor impact on the future capacity of the Horsham Township's water system. The HWSA estimates that the existing average daily demand in Horsham Township is approximately 2.2 million gpd, 15 to 20 percent of which is purchased via interconnections with neighboring water suppliers (O'Rourke 2013). Therefore, the township's existing water supply system is already operating at full capacity. At full build-out of Alternative 3, demand would increase demand to nearly 2.4 million gpd, an approximately 9 percent increase. The HWSA would need to provide additional water supply in order to meet the expected demand, though this would be less than the demand created from Alternatives 1 and 2 due to the addition of only 70 new residential units and less non-residential, commercial space to the property.

The potential water supply demand impacts that would result from implementation of Alternative 3 could be mitigated through the action of the Horsham Township Planning Board, which may require the developer to estimate potential impacts on the water system, including changes in flow rate, capacity, and water pressure. Furthermore, full build-out of the former installation property would occur over a 20-year period. Therefore, the HWSA would have the ability to upgrade and/or expand its distribution system as needed to meet increases in service demand.

Distribution System

Redevelopment of the former installation would require some upgrading and expansion of the existing water supply infrastructure to meet Horsham Township standards for reliability (at the utility level), water quality, and the quantity and pressure needed for fire protection. However, because Alternative 3 would include reuse of the existing airfield and less residential housing and non-residential commercial space, fewer areas would require modifications and/or expansion to accommodate the redevelopment.

Upon disposal of the federally owned and maintained property, the developer would be responsible for making the water supply infrastructure improvements. In addition, the design and installation of any new infrastructure may require municipal review and approval and would need to comply with applicable local codes, ordinances, and regulations.

Operation and Management

Under Alternative 3, any property not transferred to other federal agencies would no longer be owned or managed by the federal government. Upon completion of the BRAC process, the developer in combination with the HWSA would be responsible for the infrastructure located on the property and for its service and maintenance.

4.8.3.2 Wastewater

Implementation of Alternative 3 would generate lower volumes of wastewater compared to Alternative 1 or 2. Currently, no system is in place to handle wastewater distribution outside the Horsham Air Guard Station. Similar to Alternative 1 and 2, under Alternative 3 the ownership of and responsibility for developing and operating the property's wastewater infrastructure would be transferred to the HWSA. The property would be serviced by an extension of the sewer line that currently serves the Horsham Air Guard Station and delivers wastewater to the Park Creek STP (O'Rourke 2013).

Wastewater Volume

Full build-out of Alternative 3 would result in a higher density of development than currently exists on the installation but less dense than proposed under Alternative 1 or 2. Based on the increased density of development over baseline conditions, Alternative 3 would generate wastewater volumes of approximately 190,000 gpd, which would be greater than the 160,000 gpd generated by the facility in 2009.

As with Alternative 1 and 2, wastewater volume projections were estimated using established planning multipliers for each land use district and the associated square footages or units within those districts. Table 4.8-6 identifies the projected wastewater volumes resulting from the implementation of Alternative 3.

Table 4.8-6 Projected Wastewater Volume under Alternative 3 (gpd)[1]

	Baseline Condition	Full Build-Out	Net Change
Wastewater	160,000	191,588	+31,588

Note:
[1] This table presents a summary of the projected water demand. For descriptions of the methodology and assumptions and the detailed tables used to project water demand, see Appendix B.

The current capacity of the Park Creek STP is 1.0 million gpd, and the 2012 average daily flow was 770,000 gpd; therefore, full build-out of Alternative 3 would exceed the treatment capacity for the Park Creek STP. The HWSA is currently seeking to increase the capacity of its STP to 2.25 million gpd. Approximately 500,000 to 600,000 gpd have been allocated to support the redevelopment of the former installation property (RKG 2012) and mitigate the potential impacts. The wastewater volume under Alternative 3 would be less than the HWSA's allocated volume.

Full build-out of the installation would occur over a 20-year period. Therefore, the HWSA would be able to plan for and implement system expansion.

Wastewater System

Similar to Alternative 1 and 2, redevelopment of the former installation property under Alternative 3 would require an upgrade of the existing wastewater system and the construction of new wastewater infrastructure. However, this upgrade and expansion would be less than under Alternatives 1 and 2 because by reusing the airfield, only limited areas of the former property would be available for new development. The design and installation of any new infrastructure may require municipal review and approval and would need to comply with applicable local codes, ordinances, and regulations.

Operation and Management

Under Alternative 3, any property not transferred to other federal agencies would no longer be owned or managed by the federal government. Upon completion of the BRAC process, the developer, the Horsham Township, or the HWSA, would be responsible for service and maintenance of the wastewater infrastructure.

4.8.3.3 Stormwater

The potential stormwater impacts under Alternative 3 would differ from those described under both Alternatives 1 and 2 due to the reuse of the existing runway. Full build-out of Alternative 3 would result in an increase in the total impervious surface area on the installation compared to exiting conditions, resulting in higher volumes of stormwater runoff. However, Alternative 3 would result in less impervious surface area than Alternatives 1 and 2. In addition to the impervious surface area that already exists, new impervious surface area would be created as a result of new construction (i.e., buildings, structures, parking lots, and roadways).

Full build-out of Alternative 3 would result in a total of 301 acres of impervious surface (approximately 35 percent of total land area), which would be predominantly comprised of roadways and building roofs, and include the existing runway remaining in place. This would be an addition of approximately 52 acres (or 6 percent) over the baseline conditions of 249 acres of impervious surface. For more information on the methodology, assumptions, and calculations used to project the impervious surface area resulting from implementation of Alternative 3, see Appendix B.

Full build-out would have an impact on stormwater resources. The redevelopment of the property could provide an opportunity to address existing stormwater management, especially flooding at the northern end of the property. However, improved stormwater retention and control measures would need to be designed in the context of the existing runway layout. Otherwise, methods to reduce stormwater impacts, applicable stormwater state and federal mandates and regulations, associated stormwater management plans, and recommended BMPs for the potential redevelopment would be the same as those described in Section 4.8.1.3. Under Alternative 3, the developer would be required to apply for and obtain an NPDES General Permit for discharges of stormwater associated with industrial activities.

Section 438 of the Energy Independence and Security Act (EISA) of 2007

Similar to Alternative 1 and 2, under Alternative 3, the developer would not be subject to the requirements of Section 438, because the act of transferring the installation per BRAC Law would result in the property no longer being federally owned; consequently, Section 438 would not apply to the redevelopment of the installation. However, as outlined by the HLRA's redevelopment planning principles, redevelopment will incorporate the latest green and sustainable design principles where appropriate (e.g., LEED buildings, LID, complete streets, etc.) (RKG 2012). Therefore, although not required through federal ownership of the property, the redevelopment of the installation would be consistent with the terms contained within Section 438 of the EISA.

Stormwater Collection System

Although a portion of the existing structures and built areas, including the runway, would be reused, new stormwater infrastructure may be necessary to offset new impervious surfaces associated with redevelopment under this alternative. The future developer would be responsible for implementing any stormwater collection system improvements. Upon disposal of the federally owned and maintained property, the developer would be required to identify and incorporate appropriate stormwater controls and BMPs into the redevelopment, which would upgrade the existing infrastructure.

Management

Under Alternative 3, any property not transferred to other federal agencies would no longer be owned or managed by the federal government. Upon completion of the BRAC process, the future property owner and Horsham Township would determine the responsibility for service and maintenance of stormwater infrastructure.

4.8.3.4 Other Utility Systems

Electric

Ownership of the electric power distribution system on the former installation property would transfer to the Philadelphia Electric Company (PECO) following disposal of the property. Prior to transfer, PECO would identify any improvements required to bring the distribution system up to local standards. PECO would also identify any additional regulatory and operational considerations that would need to be addressed prior to transfer (RKG 2012). The *Electric Power Outlook for Pennsylvania, 2012-2017* (Washko 2013) found that sufficient generation, transmission, and distribution capacity exists to reasonably meet the needs of Pennsylvania's electricity consumers for the foreseeable future. As a result, there would be no anticipated capacity constraints for electric power.

Upon redevelopment under Alternative 3, the electric power distribution system on the former installation may need to be either expanded or relocated to accommodate the final design at full build-out. Estimates of future electricity usage were calculated for the 20-year (2034) full build-out scenario proposed under Alternative 3 using U.S averages for energy use per square foot for specific building types (EIA 2003, 2009).

Under Alternative 3, at full build-out in 2034 the development would require 23.3 million kWh of electricity, which would be an increase of 8.6 million kWh over the estimated electricity demand of 14.7 million kWh in 2010 at the former installation Therefore, full build-out of Alternative 3 would require expansion of the existing infrastructure to accommodate the increased capacity. Without knowing the final design, it is not possible to determine the degree or location of these improvements or the cost of any such expansion and/or relocation. The 20-year build-out duration would allow the electricity infrastructure to be expanded as needed.

Natural Gas

As with Alternative 1 and 2, redevelopment under Alternative 3 may require the expansion or relocation of natural gas lines on the former installation to accommodate the final design at full build-out. Similar to electricity usage, estimates of future natural gas usage were calculated for the full build-out scenario proposed under Alternative 3 using U.S averages for natural gas use per square foot based on specific building type (EIA 2003, 2009). These averages were used to estimate total natural gas use by the proposed new building spaces. The *Gas Long Term Infrastructure Improvement Plan, 2013-2022* (PECO Energy Co. 2013), does not indicate any anticipated capacity constraints due to planned improvements of existing infrastructure throughout PECO's service territory.

Under Alternative 3, at full build-out in 2034, the development would require 56 million cf of natural gas, which is less than the total natural gas usage of 92 million cf in 2010 at the former installation. Full build-out of Alternative 3 may require re-distribution of the existing infrastructure to accommodate the reconfiguration of the property's footprint. Without knowing the final design, it is not possible to determine the degree or location of these improvements or the cost of any such expansion and/or relocation. The 20-year build-out duration would allow the natural gas infrastructure to be expanded as needed.

Natural gas meters may need to be assigned to each new building so that individual customers can be tracked and billed. However, without knowing the final design, it is not possible to determine the extent and cost of such expansion and relocation.

4.8.4 No Action Alternative

Under the No Action Alternative, no reuse or redevelopment would occur at the former installation. The installation would remain closed and in caretaker status.

4.8.4.1 Water Supply

Implementation of the No Action Alternative would not result in an increase in water demand and would not impact the municipal water supply system.

4.8.4.2 Wastewater

Implementation of the No Action Alternative would not result in an increase wastewater generated and would not impact the municipal wastewater system.

4.8.4.3 Stormwater

Under the No Action Alternative, no new impervious surface would be created. Therefore, there would be no impacts on stormwater beyond those that currently exist at the property and as outlined in Section 3.8.

4.8.4.4 Other Utilities

Under the No Action Alternative, there would be minimal demand for utilities since a majority of the installation would be closed and in caretaker status.

4.9 Cultural Resources

NEPA guidance requires an evaluation of the potential impacts of a proposed action on cultural resources, including archaeological resources and architectural or built resources. The Navy has also evaluated the potential impacts of the proposed action in terms of their effects on cultural resources that are historic properties, pursuant to Section 106 of the NHPA and Native American resources.

Section 106 of the NHPA of 1966 (Public Law [Pub.L.] 96-515), as amended (1980 and 1992), and its implementing regulations (36 CFR 60, 63, and 800), requires federal agencies to take into account the effects of their undertakings on significant cultural properties, including archaeological sites, historic structures, landscapes, and districts. To comply with Section 106 of the NHPA and its implementing regulations at 36 CFR Part 800, the Navy is required to identify historic properties within the APE, as discussed above in Section 3.9, and to consider the effects of the proposed action on these properties. The effects of the impacts of the proposed action on historic properties were evaluated pursuant to Section 106 of the NHPA, using the ACHP's guidance on determining effects, including findings of no effect on historic properties, no adverse effect on historic properties, and adverse effect on historic properties (36 CFR 800.4[d] and 800.5; ACHP 2004). These criteria are listed in Table 4.9-1.

Table 4.9-1 Findings of Effect on Historic Properties

Finding of No Historic Properties Affected (No Effect on Historic Properties)
"If the agency official finds that either there are no historic properties present or there are historic properties present but the undertaking will have no effect upon them as defined in §800.16(i), the agency shall provide documentation of this finding, as set forth in §800.11(d), to the SHPO/THPO" (36 CFR 800.4[d][1]).
Finding of No Adverse Effect
"If the agency official finds that there are historic properties which may be affected by the undertaking, the agency official shall notify all consulting parties, including Indian tribes and Native Hawaiian organizations, invite their views on the effects and assess adverse effects, if any, in accordance with §800.5" (36 CFR 800.4[d][2]). "The agency official, in consultation with the SHPO/THPO may propose a finding of no adverse effect when the undertakings' effects do not meet the criteria of paragraph (a)(1) [of 36 CFR 800.5] or the undertaking is modified or conditions are imposed, such as the subsequent review of plans for rehabilitation by the SHPO/THPO …to avoid adverse effects" (36 CFR 800.5[b]). The agency official shall maintain a record of the finding of no adverse effect and provide information on the finding to the public on request consistent with the confidentiality provisions of §800.11(c)" (36 CFR 800.5[d]).
Finding of Adverse Effect
"An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or cumulative" (36 CFR 800.5[a][1]).
Examples of Adverse Effect
"Adverse effects on historic properties include but are not limited to: • Physical destruction of or damage to all or part of the property • Alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation and provision of handicapped access that is not consistent with the Secretary's Standards for the Treatment of Historic Properties (36 CFR Part 68) and applicable guidelines • Removal of the property from its historic location • Change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance • Introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features • Neglect of a property which causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to an Indian tribe or Native Hawaiian organization • Transfer, lease, or sale of property out of federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance" (36 CFR 800.5[a][2]).

Source: ACHP 2004.

4.9.1 Alternative 1 (HLRA Plan - Preferred Alternative)

Archaeological Resources

The Navy has evaluated the potential impacts of Alternative 1 under NEPA and determined that the transfer of property under Alternative 1 would have no direct impacts on archaeological resources. However, the transfer of the former installation under Alternative 1 would result in indirect negative impacts on four archaeological sites (36 Mg 0458, 36 Mg 0459, 36 Mg 0460, and 36 Mg 0461) due to proposed redevelopment. Under Alternative 1, once the BRAC process is complete and the former installation property has been transferred out of federal ownership, the HLRA proposes to redevelop the property for new housing, and ground-disturbing construction associated with this redevelopment would result in the destruction of the archaeological sites.

As a result of cultural resources investigations conducted to support the proposed action, the Navy determined that two of the archaeological sites, 36 Mg 0458 and 36 Mg 0461, were previously disturbed and lacked sufficient integrity to convey additional information, such that no additional archaeological investigations were necessary (Drozd 2012a). The Pennsylvania SHPO concurred with these findings (McLearen 2012a). Therefore, the indirect negative impacts of Alternative 1 on these two archaeological sites at the former installation would not be considered significant under NEPA and measures to avoid, minimize, or mitigate these impacts are not required.

The Navy determined that the remaining two archaeological sites, 36 Mg 0459 and 36 Mg 0460, had the potential to provide additional historical or scientific data consistent with Criterion D of the NRHP, and the Pennsylvania SHPO concurred with these findings (Drozd 2012a; McLearen 2012a). Sites 36 Mg 0459 and 36 Mg 0460 are, therefore, considered historic properties because they are NRHP-eligible and are discussed below under NRHP-Listed or Eligible Historic Properties.

Architectural Resources

The Navy has evaluated the potential impacts of Alternative 1 under NEPA and determined that the transfer of property under Alternative 1 would have no direct impact on architectural resources. However, the transfer of the former installation under Alternative 1 would result in indirect negative impacts on the existing architectural resources due to proposed redevelopment. Under Alternative 1, once the BRAC process is complete and the former installation property has been transferred out of federal ownership, the HLRA proposes to redevelop the property for new housing, and construction associated with this redevelopment would result in the demolition of the architectural resources on the property.

As a result of cultural resources investigations conducted to support the proposed action, the Navy determined that that none of the 135 architectural or built resources included in the architectural assessments and NRHP-eligibility evaluations at the former installation are NRHP-eligible (Drozd 2012b). The Pennsylvania SHPO concurred with these findings, indicating that none of the architectural resources are historically or architecturally significant and none are NRHP-eligible (MacDonald 2011). Therefore, the indirect negative impacts of Alternative 1 on the architectural resources at the former installation are not considered significant under NEPA, and measures to avoid, minimize, or mitigate these impacts are not required.

NRHP-Listed or -Eligible Historic Properties

The Navy has evaluated the effects of the impacts of Alternative 1 on historic properties in accordance with Section 106 of the NHPA and is proposing that potential adverse effects on the two archaeological sites (sites 36 Mg 0459 and 36 Mg 0460) that the Navy is treating as NRHP-eligible historic properties would be mitigated by covenants and deed restrictions with the property recipients. These covenants and deed restrictions would require property recipients to conduct evaluative testing of these two sites to

determine their NRHP-eligibility. These covenants and deed restrictions would also require that no disturbance of the ground surface or any other activity shall be undertaken or permitted to be undertaken on the archaeological sites that would affect their physical integrity without first obtaining the prior written permission of the Pennsylvania SHPO (Drozd 2012b). The Pennsylvania SHPO has received the covenants and deed restrictions developed for the archaeological sites (McLearen 2012b). Consultation regarding the proposed finding of effect is ongoing.

As discussed in Section 3.9.1.2, six magazines at the former installation (Facilities 54, 55, 87, 165, 166 and 173), may meet National Register criteria under the 2006 Program Comment for World War II and Cold War Era (1939-1974) Ammunition Storage Facilities. However, the Navy has considered the ammunition storage program comments and determined that the six magazines at the former installation are not significant resources and are, therefore, not NRHP-eligible (Mohlman 2011; Drozd 2012b). The Pennsylvania SHPO concurred with these findings, indicating that none of the architectural resources at the former installation, including the six magazines, are historically or architecturally significant and none are NRHP-eligible (MacDonald 2011).

Native American Resources

The Navy has determined that disposal of the property by the Navy and reuse of the property in accordance with the reuse plan by the HLRA would have no impacts on known Native American resources because none have been identified within the boundaries of the property. The Navy is consulting with the appropriate federally recognized Indian tribes regarding the potential impacts of Alternative 1 on Native American resources, including those that could be considered historic properties.

4.9.2 Alternative 2 (HLRA Plan with Increased Residential Development)

Archaeological Resources

The NEPA impacts of Alternative 2 on archaeological resources are the same as those identified for Alternative 1.

Architectural Resources

The NEPA impacts of Alternative 2 on architectural resources are the same as those identified for Alternative 1.

NRHP-Listed or -Eligible Historic Properties

The Section 106 effects of Alternative 2 on historic properties are the same as those identified for Alternative 1. Covenants and deed restrictions developed for NRHP-eligible sites 36 Mg 0459 and 36 Mg 0460 would be the same as those developed under Alternative 1.

Native American Resources

Under Alternative 2, the impacts and effects on Native American resources would be the same as Alternative 1.

4.9.3 Alternative 3 (Airfield Reuse)

Archaeological Resources

The NEPA impacts of Alternative 3 on archaeological resources are the same as those identified for Alternative 1.

Architectural Resources

The NEPA impacts of Alternative 3 on architectural resources are the same as those identified for Alternative 1.

NRHP-Listed or -Eligible Historic Properties

The Section 106 effects of Alternative 3 on historic properties are the same as those identified for Alternative 1. Covenants and deed restrictions developed for NRHP-eligible sites 36 Mg 0459 and 36 Mg 0460 would be the same as those developed under Alternative 1.

Native American Resources

Under Alternative 3, the impacts and effects on Native American resources would be the same as Alternative 1.

4.9.4 No Action Alternative

Archaeological Resources

The Navy has evaluated the potential impacts of the No Action Alternative under NEPA and determined that the No Action Alternative would have no impacts on archaeological resources because the former installation would remain in caretaker status and the property would not be redeveloped.

Architectural Resources

The Navy has evaluated the potential impacts of the No Action Alternative under NEPA and determined that the No Action Alternative would have no impacts on architectural resources because the former installation would remain in caretaker status and the property would not be redeveloped.

NRHP-Listed or -Eligible Historic Properties

The Navy has evaluated the Section 106 effects of the No Action Alternative and determined that the No Action Alternative would have no effect on archaeological resources because the former installation would remain in caretaker status and the property would not be redeveloped.

Native American Resources

The No Action Alternative is the retention of the property by the federal government in caretaker status. No reuse or redevelopment would occur at the property under this alternative. Since there would be no new reuse or development under the No Action Alternative, there would be no impacts or effects on Native American resources.

4.10 Topography, Geology, and Soils

This section summarizes the potential impacts on topography, geology, and soil resources resulting from the implementation of Alternative 1, Alternative 2, Alternative 3, or the No Action Alternative at the former NAS JRB Willow Grove property. The majority of the proposed development would be located in areas that were previously developed by the Navy. These areas include existing buildings, structures, and roadways, or areas associated with the airfield that have been graded and maintained.

4.10.1 Alternative 1 (HLRA Plan - Preferred Alternative)

4.10.1.1 Topography

Under Alternative 1, some alteration of topography would be expected as a result of grading and associated fill activities to accommodate new building construction. Because of previous development on the former installation, most development sites would require minor grading; therefore, impacts on topography would be minor.

4.10.1.2 Geology

Alternative 1 would not impact geologic resources at the former installation.

4.10.1.3 Soils

A majority of the redevelopment proposed under Alternative 1 would be concentrated on areas that were previously developed by the Navy. Alternative 1 would include approximately 220 acres of residential land use, 260 acres of commercial land use, and 310 acres of other land uses including open space and recreation. The former Navy Lodge and fire station currently exist on the installation property and are proposed for reuse, and it is assumed that the existing urban/man-made soils located in these areas have been modified from their original condition. The existing runway, which would be removed under Alternative 1, is located in an area of the former installation where soils have already been extensively modified. Therefore, implementation of Alternative 1 would be expected to result in a minor impact on soils. However, it would be expected that temporary and permanent minor impacts, based on the size of the redevelopment footprint, could occur as new structures and supporting infrastructure would be constructed.

Erosion Potential

All soil types located at the former installation have the potential to be impacted by development, including erosion from wind, water, and construction. To varying degrees, all such soils may require specific measures to control soil erosion and limit runoff of sediment during clearing and construction. In addition, construction (clearing, grading, landscaping, and movement of equipment, material, and vehicles) would expose soils to wind and stormwater erosion, compaction, and rutting. Soils that are heavily modified may suffer losses in fertility and productivity.

Soils would be impacted under Alternative 1, but the impacts would be mitigated by the implementation of temporary erosion and sediment control measures during construction, permanent stormwater management measures, and appropriate building siting and design. Although the existing vegetation is limited primarily to maintained grass and there are gentle to moderate slopes on the property (with steeper slopes southeast of Dawes Road and in the northwestern portion of the installation), slope stabilization may be necessary in some areas following vegetation removal. Additionally, to mitigate these impacts, the developer would implement appropriate erosion and sediment control measures at construction and demolition sites in accordance with the PA Code, Title 25, Erosion and Sediment Control and Post-Construction Stormwater Management Best Management Practices (PA Code 2013) and other applicable state laws. Erosion and sediment control is discussed in Section 6.

Farmland

The former installation includes approximately 233 acres of prime farmland soils or farmland of statewide importance. No unique farmland soils occur on the property. None of the installation is currently used or has recently been used for farming. For the purposes of farmland protection, the prime farmland and statewide important farmland soils have essentially been converted to urban uses as part of the former installation. Furthermore, the prime and statewide important farmlands within the installation development are surrounded by buildings, the runway, and other urban uses, both within and around the installation. There is also very little agriculture in the vicinity of the installation and little in the way of farm support services. There are no agricultural investments (barns, drainage or irrigation systems, etc.) on the installation. The impact of Alternative 1 on prime farmland and farmland of statewide importance would, therefore, be negligible.

Hydric Soils

Approximately 14 acres of the former installation are occupied by soil map units in which all or some of the soils are hydric; non-hydric soil map units also can contain hydric inclusions. Therefore, new

construction under Alternative 1 could impact mapped hydric soils and hydric inclusions in non-hydric soils. Hydric soils may require special measures during construction or other uses to overcome limitations caused by wetness. Limitations may include a high water table or low strength for supporting construction equipment and structures. Hydric soils may also present limitations to development activities (e.g., excavation and movement of heavy equipment) due to wet conditions.

Constructability

The primary constructability limitations on the former installation include hydric soils, shallow depth to saturation or bedrock, flooding or ponding, and potential for frost action. Shallow depth to saturation may require dewatering during excavation and construction and other measures to facilitate construction in a saturated environment. Shallow depth to bedrock may require blasting to excavate for foundations. Ponding may require surface or subsurface drainage. Areas that flood should generally be avoided as building sites. The frost action limitations can be overcome or minimized by special planning or design. Prior to construction, engineering evaluations will be completed by the developer, and appropriate engineering techniques will be identified to mitigate any soil limitations.

Organic Soils

None of the soils located at the former installation are identified by USDA as organic soils.

4.10.2 Alternative 2 (HLRA Plan with Increased Residential Development)

Similar to Alternative 1, a majority of the redevelopment proposed under Alternative 2 would be located in areas that were previously developed by the Navy. Therefore, implementation of Alternative 2 would not result in long-term impacts on topography, geology, and soil resources. However, minor temporary impacts on these resources would be expected during the construction phase of the redevelopment (e.g., temporary disturbance due to construction of new buildings, parking lots, and utilities).

4.10.2.1 Topography

Impacts on topography under Alternative 2 would be similar to those discussed above for Alternative 1.

4.10.2.2 Geology

Alternative 2 would not impact the geologic resources at the former installation.

4.10.2.3 Soils

A majority of the redevelopment proposed under Alternative 2 would be concentrated on areas that were previously developed by the Navy. Alternative 2 would include approximately 160 acres of residential land use, 240 acres of commercial land use, and 320 acres of other land uses including open space and recreation. In addition, as with Alternative 1, the existing runway would be removed under Alternative 2; however, it is located in an area of the former installation where soils have already been extensively modified. Implementation of Alternative 2 would be expected to have similar impacts on soils as described for Alternative 1, including impacts on prime farmland and farmland of statewide importance, and impacts associated with erosion potential, hydric soils, and constructability.

4.10.3 Alternative 3 (Airfield Reuse)

Similar to Alternatives 1 and 2, a majority of the redevelopment proposed under Alternative 3 would be located in areas that were previously developed by the Navy. A majority of the redevelopment proposed under Alternative 3 would be concentrated on areas that were previously developed by the Navy. Alternative 3 would include approximately 10 acres of residential land use, 140 acres of commercial land use, 300 acres of other land uses including open space and recreational uses, and 350 acres would remain as airfield and airfield operations. Therefore, implementation of Alternative 3 would not be expected to result in long-term impacts on topography, geology, and soil resources. However, minor temporary

impacts on these resources would be expected during the construction phase of the redevelopment (e.g., temporary disturbance due to construction of new buildings, parking lots, and utilities). Alternative 3 is the only redevelopment alternative that includes leaving the existing runway, taxiways, and parking apron space in place, which may result in less disturbance than other alternatives.

4.10.3.1 Topography

Impacts on topography under Alternative 3 would be similar to those discussed above for Alternatives 1 and 2.

4.10.3.2 Geology

Alternative 3 would not impact the geologic resources at the former installation.

4.10.3.3 Soils

A majority of redevelopment proposed under Alternative 3 would be concentrated on areas that were previously developed by the Navy. Alternative 3 would include approximately 140 acres of commercial land use and 720 acres of other land uses; there would be limited residential land use (BCHG). Implementation of Alternative 3 would be expected to have similar impacts on soils as described for Alternatives 1 and 2, including impacts on prime farmland and farmland of statewide importance, and impacts associated with erosion potential, hydric soils, and constructability.

4.10.4 No Action Alternative

The No Action Alternative is retention of the surplus property at the former installation by the federal government in caretaker status, and no reuse or redevelopment of the property would occur. As a result, the No Action Alternative would have no direct or indirect impacts on topography, geology, or soils.

4.11 Water Resources

This section summarizes the potential environmental impacts on water resources resulting from the implementation of Alternative 1, Alternative 2, Alternative 3, or the No Action Alternative at the former installation. It includes a discussion of potential impacts on surface water, water quality, groundwater, floodplains, and wetlands and the proposed mitigation measures associated with the disposal and future reuse of the former installation property.

When evaluating the potential impacts of alternatives on water resources, including the No Action Alternative, the following assumptions were made:

- The developer would avoid or minimize impacts on waterbodies, wetlands, and floodplains to the maximum extent practicable when considering the locations of individual construction projects;
- The developer would apply for and receive all applicable water quality and wetland permits; and
- The developer would use BMPs to minimize water quality impacts during construction.

Upon completion of the disposal process under Alternatives 1, 2 or 3, the properties not transferred to other federal agencies would fall under the jurisdiction of Horsham Township. Any future reuse of these properties would be required to comply with applicable local, state, and federal laws and regulations pertaining to water resources.

4.11.1 Alternative 1 (HLRA Plan - Preferred Alternative)

4.11.1.1 Surface Water

Redevelopment under Alternative 1 would result in both direct and indirect impacts on surface waters. Direct impacts are associated with installation of roads, sidewalks, and paths, as well as office park and town center land uses. These direct impacts would result where streams intersect proposed redevelopment features; in these cases, streams would be culverted, rerouted, or filled in. Indirect impacts are generally water quality impacts resulting from site grading and clearing activities, as well as generation of runoff from new impervious surfaces. Indirect impacts are discussed in detail in Section 4.11.1.2.

A conservative assessment of direct impacts on surface waters has been completed to account for the greatest potential impact; however, many of these impacts are likely to be minimized through adherence to federal, state, and local permits and regulations. Under Alternative 1, development of office park, roads/sidewalks/paths, and town center land uses could potentially result in direct, significant and permanent impacts on three streams in the southeastern portion of the former installation property (see Figure 4.11-1). These impacts would affect approximately 1,909 linear feet of stream (see Table 4.11-1). No direct impacts would occur on Park Creek or its tributary in the northwestern portion of the former installation.

Table 4.11-1 Estimated Direct Waterbody Impacts under Alternative 1

Waterbody	Flow Regime	Linear Feet of Impact	Total Stream Length (feet)	Type of Impact
S03	Ditch/Canal	519	607	Fill
S04	Perennial	1,231	1,438	Reroute/Culvert
S05	Perennial	159	781	Reroute
Total		**1,909**	**2,826**	**N/A**

For the purpose of this analysis, perennial streams that bisect redevelopment features other than roads/sidewalks/paths would be rerouted, and perennial streams crossed by roads/sidewalks/paths would be culverted. The ditch/canal is assumed to be filled to accommodate the construction of redevelopment features and road infrastructure.

While siting and constructing roads, pedestrian paths, or other facilities, the developer would be required to comply with applicable laws and regulations. As stipulated in the Horsham Township Code, Chapter 230-49(E), Environmental Resource Protection – Riparian Corridor Preservation, a Riparian Corridor Conservation District (RCCD) has been established in Horsham Township. The RCCD boundary is a minimum of 75 feet from each defined stream edge, and there are specific permitted, conditional, and prohibited uses within the RCCD. The developer would be required to adhere to the requirements set forth in Chapter 230-49(E) if applicable to the waterbodies on the former installation.

Once surface water impacts have been avoided and minimized to the maximum extent practicable, compensation must be provided to mitigate for unavoidable direct impacts. Mitigation requirements for direct stream impacts would be determined through coordination with USACE and PADEP, and a site-specific mitigation plan would be developed. This would be completed following the final design phase for redevelopment, and as part of the Section 401/404 permit process (see Section 6).

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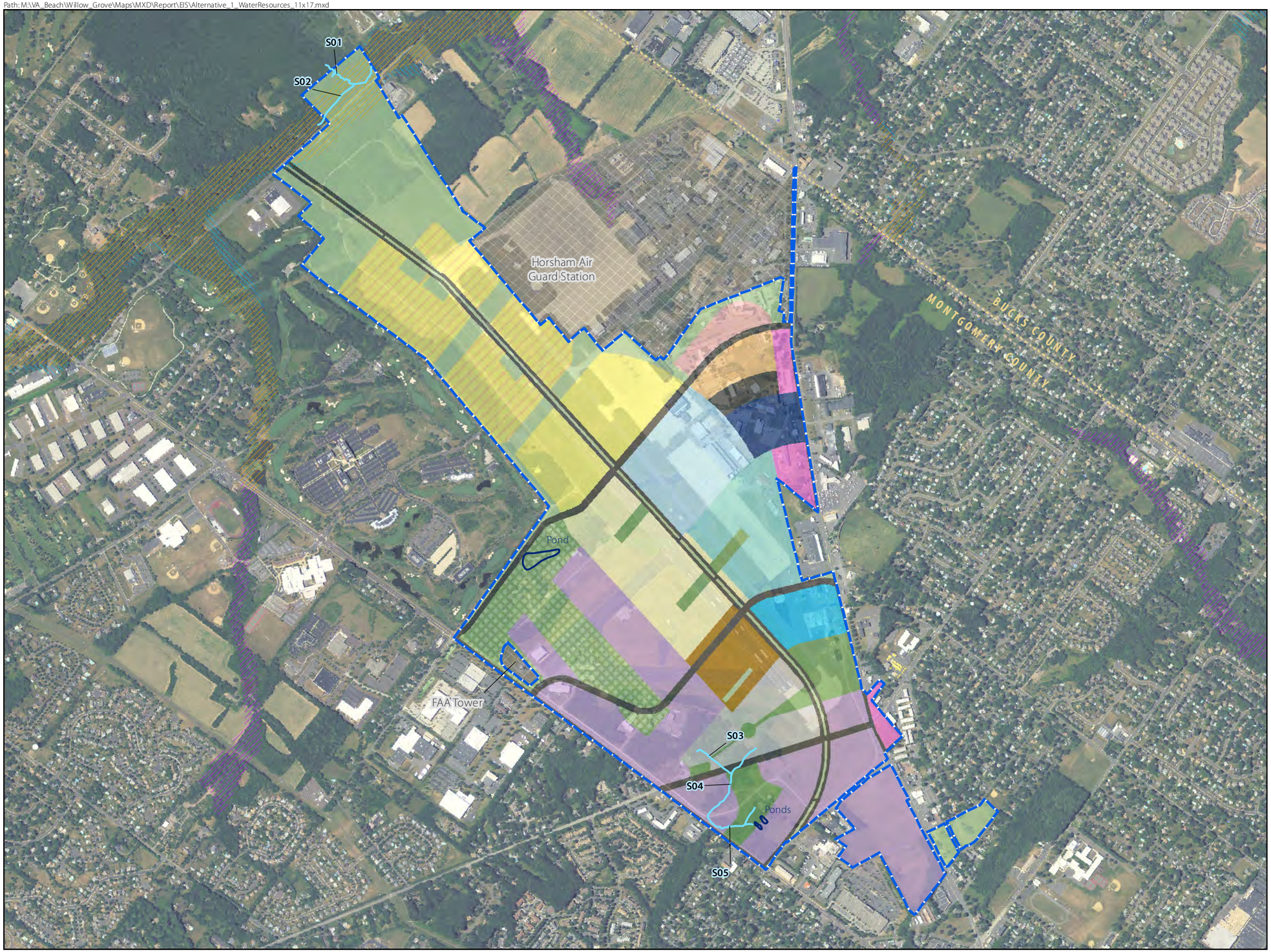

Figure 4.11-1

Water Resources Impacts Under Alternative 1

(HLRA Plan - Preferred Alternative)

Horsham, PA

Note: *Flood Zone AE = Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. In most instances, base flood elevations derived from detailed analyses are shown at selected intervals within these zones. Flood Zone A = Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones.*

Legend

- County Boundary
- NAS JRB Willow Grove
- FAA Tower and Horsham Air Guard Station (not included in redevelopment)
- Field-Delineated Streams
- Pond

FEMA Flood Zone

- AE
- A
- 0.2 % Annual Chance Flood Hazard

Alternative 1 Land Uses

- Townhomes
- Small-Lot Single-Family
- Large-Lot Single-Family
- Apartments/Condominiums
- Aviation Museum
- Bucks County Housing Group
- Continuing Care Retirement Community
- Hotel/Conference/ Office Center
- Office Park
- Open Space
- Par-3 Golf Course
- Park
- Recreation Center
- Retail
- Roads/Paths/Parking
- School
- Town Center

SCALE

0 — 0.25 — 0.5 Miles

SOURCE: Ecology and Envrionment 2013; ESRI 2010; National Aerial Imagery Program 2010; RKG 2012; Tetra Tech 2012.

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4.11.1.2 Water Quality

Redevelopment of the former installation could result in indirect impacts on surface waters in the form of erosion and sedimentation, which could temporarily result from construction activities, as well as from an increase in impervious surface area.

Short-term, minor impacts on water quality could result from the discharge of sediments during construction, demolition, and renovation activities (e.g., clearing, grading, and landscaping and movement of equipment, materials, and vehicles) adjacent to or in proximity to surface waters. All redevelopment would require compliance with applicable local and state laws and regulations pertaining to erosion and sedimentation control and stormwater management.

The nature and extent of impacts on adjacent surface waters would depend on specific development within each of the major land use districts. The open space district located in the northwestern portion of the former installation would surround Park Creek and its tributary; therefore, no construction would occur. Similarly, the conservation park and festival park to be located in the southern portion of the former installation would result in no impacts on surface waters due to the lack of construction associated with these land use districts.

The office park and town center land use districts and roads/paths/parking would have the greatest potential for impacting surface waters due to their location adjacent to and over streams S03, S04, and S05 in the southeastern portion of the former installation. As indicated in Table 4.11-1, portions of these land use districts would be constructed over one of these streams and would require culverting, rerouting, or filling. Certain water features could be incorporated into the overall design of the districts, thereby creating appealing aesthetic feature while minimizing or avoiding impacts on these surface waters. The portions of the proposed reuse located adjacent to the streams could impact water resources as a result of erosion and sedimentation and the development of new impervious surfaces.

Due to the drainage characteristics of the site, the development of large-lot, single-family residences in the northwestern portion of the former installation could result in erosion and sedimentation of Park Creek and its tributary if proper precautions are not taken during construction.

The Horsham Township Code (Chapter 190 Stormwater Management) contains specific provisions regarding stormwater management requirements, including the use of BMPs and erosion and sedimentation standards and criteria. This chapter of the code requires the developer to prepare a stormwater management plan, preferably using a watershed approach rather than a site-by site approach. The developer would also be required to comply with the PA Code, Chapter 102, Erosion and Sediment Control, which requires that a Notice of Intent (NOI) for construction be submitted for any disturbance of more than 1 acre. Chapter 102 would also require the developer to submit an Erosion and Sediment Control Plan and a Post-Construction Stormwater Management Plan to both the PADEP and the local permitting authority. The submission of a Post-Construction Stormwater Management Plan would also fulfill the requirements of the Neshaminy Creek Watershed Stormwater Management Plan and the Pennypack Creek Watershed Stormwater Management Plan. Stormwater requirements are discussed further in Section 4.8.3.

Additionally, under the National Pollution Discharge Elimination System (NPDES) requirements, a General Permit PAG-02 for Storm Water Discharges Associated with Construction Activities must be obtained from the PADEP. This permit requires the filing of an NOI prior to commencing construction activity.

Full build-out of Alternative 1 is projected to result in a total of 352 acres of impervious surface area (approximately 41 percent of total land area within the former installation), which would predominantly comprise building roofs, parking areas, roadways, and pedestrian pathways. This would result in a net increase of approximately 103 acres above baseline conditions (249 acres). (Refer to Section 4.8.1.3 for a more detailed summary of the proposed impervious surface distribution on the former installation.) The additional impervious surface area would generate a long-term increase in precipitation runoff into the Little Neshaminy Creek and Pennypack Creek watersheds, as well as the watercourses within the former installation boundary and those identified adjacent to the site, including Pennypack Creek and Little Nashaminy Creek. Full build-out as proposed under Alternative 1 would have the potential to result in significant impacts on water quality; however, because a majority of the proposed redevelopment would occur on lands that have been previously developed by the Navy and future development would require mitigation and BMPs, the potentially adverse impacts would be reduced. As proposed, 28 percent of the redeveloped property would be designated for parks and open space and would have mostly non-impervious surfaces. For more information on the methodology, assumptions, and calculations used to project the impervious surface area resulting from the implementation of Alternative 1, see Appendix B.

In summary, compliance with local and state laws and regulations regarding stormwater management and erosion and sedimentation control, coupled with the implementation of BMPs, would reduce the magnitude of impacts on water quality from stormwater runoff.

4.11.1.3 Groundwater

As indicated in Section 3.11.2, the water table at a monitoring station in Horsham Township has been observed to be, on average, approximately 11 feet below ground surface (bgs) but can extend to 75 to 100 feet bgs (Montgomery County Health Department 2013; Sloto 2002). Construction activities could potentially extend below ground surface to a depth that would directly impact the underlying water table, but would be considered minor. The developer would be required to use standard dewatering techniques and follow erosion sediment control plans and BMPs that would involve erosion prevention, selection of an appropriate discharge/treatment process, removal of sediment from collected water, and preservation of downgradient natural resources.

Spills of fuels or other chemicals and hazardous materials could occur during construction activities. The impacts of such spills on groundwater resources would be minimized through compliance with the stormwater permits and management plans and the implementation of BMPs as set forth in the Pennsylvania Erosion and Sediment Pollution Control Program Manual (PADEP 2012b).

4.11.1.4 Floodplains

A majority of the former installation property is located within the FEMA Zone X, meaning it falls outside the 100-year floodplain (FEMA 1996). As indicated in Section 4.11.3, the only portion of the former installation that is located within the 100-year floodplain is along the northwestern boundary of the installation, along Keith Valley Road. The proposed land use district for this area includes only open space, which would not impact the 100-year floodplain. Therefore, implementation of Alternative 1 would not impact any floodplain.

4.11.1.5 Wetlands

Potential wetland impacts are based on the wetland assessment conducted in accordance with the methods and guidance provided in the *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region Version 2.0* (USACE 2012b), as described in Section 3.11.4.1. A total of 25.96 acres of wetlands were delineated at the former installation. The Navy did not request that the USACE make a jurisdictional determination to confirm the wetland boundaries, as these were

used for planning-level analysis in this report. Prior to redevelopment, the USACE should be contacted to obtain a jurisdictional determination. Based on the results of the wetland assessment, direct impacts would be greatest on PSS1/PFO1 wetlands, with approximately 2.0 acres impacted, followed by PSS1/PEM1/PFO1/OW, and PSS1 wetland community types.

Table 4.11-2 summarizes estimated wetland impacts at the former installation under Alternative 1; wetland impacts are depicted on Figure 4.11-2.

Redevelopment under Alternative 1 would have the potential to directly impact 13 wetlands encompassing approximately 7.0 acres. Direct wetland impacts (i.e., wetland fill) would result from the development of various land use districts, including office park, recreation center, retail, roads/sidewalks/paths, town center, townhomes, and small-lot, single-family residential (see Figure 4.11-2).

Table 4.11-2 Estimated Wetland Impacts under Alternative 1

Wetland Community	Direct Impact Acres
PEM1	0.8
PSS1	1.2
PFO1	0.5
PSS1/PEM1/PFO1/OW	1.3
PSS1/PFO1/PEM1	0.5
PFO1/PEM1	0.7
PSS1/PFO1	2.0
Total	**7.0**

Key:
OW = Open Water
PEM1 = Palustrine Emergent - Persistent
PSS1 = Palustrine Scrub-Shrub – Broad-Leaved Deciduous
PFO1 = Palustrine Forested – Broad-Leaved Deciduous

There would be no impacts on the wetland complexes in the northwestern portion of the former installation, surrounding Park Creek and its tributary, as this area is proposed for open space under Alternative 1. Additionally, it is expected that the wetlands located within the proposed golf course would be incorporated into the design of the golf course. Impacts on the wetland complex could result from construction of crossings to provide access for equipment during construction and golf carts during the operation of the golf course. The use of pesticides and fertilizers on the golf course could also result in indirect impacts on the wetland complex. However, it is expected the developer would implement an integrated pest management plan and/or a nutrient management plan to mitigate potential impacts from pesticides and fertilizer used on the golf course. In addition, the developer should consider a LID golf course, which would emphasize the conservation of natural landscape features, including wetlands, and thereby mitigate potential environmental impacts.

Wetland impacts will be avoided or minimized to the maximum extent practicable during final design. In accordance with the Horsham Township Code, Chapter 230-49(D)(5), Environmental Resource Protection – Wetland Protection Standards, a wetland transition area must be established as a buffer extending from the outer limit of the wetland to a distance of 25 feet, or the extent of hydric soils extending beyond the wetland boundary, whichever is greater. Where sensitive site features warrant additional protection, this wetland transition area must be extended in accordance with the conditions set forth in the code. The construction of structures and paving are prohibited within the transition area.

Additionally, the code requires that any property containing wetlands must have them included on the deed and that a deed restriction be filed with the Montgomery County Recorder of Deeds. Following the property transfer by the Navy out of federal ownership, the future developer would be required to comply with this deed restriction requirement Horsham Township Code, Chapter 230-49(D)(8).

Once wetland impacts have been avoided and minimized to the maximum extent practicable, compensation will be provided to mitigate for the remaining, unavoidable permanent impacts. Filling of a freshwater wetland requires a permit from the PADEP and a permit from the USACE under Section 404 of the CWA. This process is often accomplished under a Joint Permit Application (JPA). In accordance with the CWA and state regulations, wetland alterations must be avoided where practicable. If it can be demonstrated that no practicable alternative exists, the developer would be required to show that the amount of wetland affected has been minimized. As part of the permitting process, the developer will be required to coordinate wetland mitigation plans with the PADEP and USACE.

Section 404 of the CWA authorizes the USACE to issue permits regulating the discharge of dredged or fill materials into waters of the U.S., including wetlands. In 2008, the USACE and the EPA issued regulations governing compensatory mitigation for authorized impacts on wetlands; these are codified in 40 CFR Part 230 as the *Final Rule for Compensatory Mitigation for Losses of Aquatic Resources*. This guidance outlines policies that support the use of private mitigation banks and authorized use of state-run in-lieu fee programs only if on-site restoration or private mitigation bank-derived credits are unavailable.

Compensation requirements typically vary based on the impacted wetland communities. A mitigation ratio of 2:1 (a USACE requirement) is typically required for permanent impacts on forested wetlands. Wetland mitigation criteria for Pennsylvania are stipulated in Chapter 105.20(a), Wetland Replacement Criteria. These general criteria include the following:

- **Area ratio** – Wetland shall be replaced at a minimum ratio of 1:1 (area of replacement acres/affected areas); however, this ratio may be increased pending a determination of the area and functions and values to be destroyed or adversely affected.
- **Function and value replacement** – Functions and values that are physically and biologically the same as those lost shall be replaced at a minimum ratio of 1:1; however, this ratio may be increased based on the area affected and the functions and values that will be destroyed or adversely affected.
- **Siting criteria** – Replacement shall be located adjacent to the impacted wetland unless an alternative replacement site is approved by the PADEP.

Specific mitigation requirements for future development projects at the former installation would be determined in coordination with the USACE and PADEP.

Prior to construction, a SWPPP will be prepared that will include an erosion control plan that addresses appropriate BMPs to minimize impacts on wetlands from erosion and sedimentation in all areas of construction. Based on the requirement to avoid, minimize, and mitigate impacts on wetlands, as required under federal and state permit programs, the potentially significant impacts on wetlands would be expected to be avoided or mitigated under Alternative 1.

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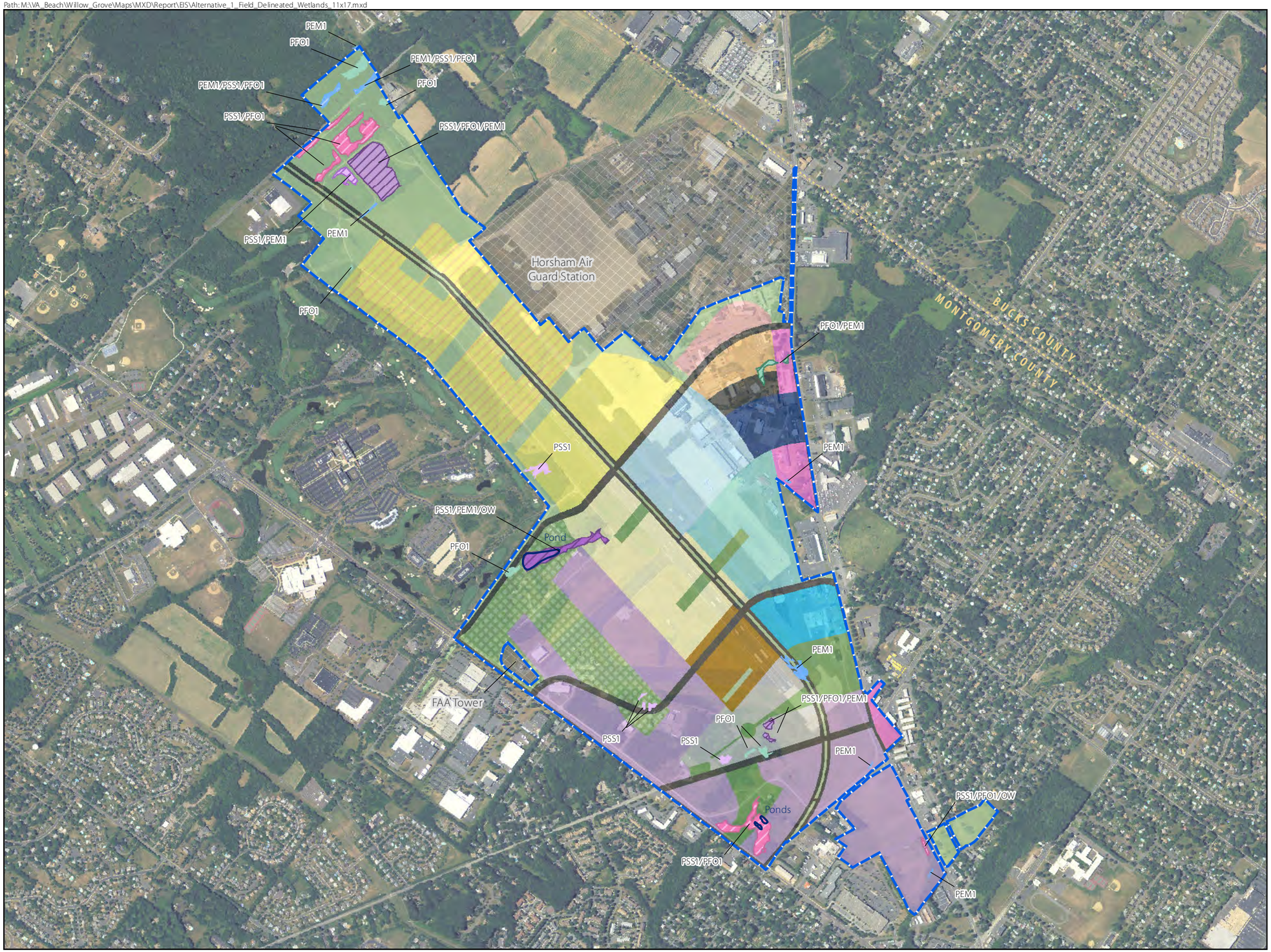

Figure 4.11-2

Field-Delineated Wetland Impacts Under Alternative 1

(HLRA Plan - Preferred Alternative)

Horsham, PA

Legend

- County Boundary
- NAS JRB Willow Grove
- FAA Tower and Horsham Air Guard Station (not included in redevelopment)
- Pond

Field-Delineated Wetland

- PEM1
- PEM1/PSS1/PFO1
- PFO1
- PFO1/PEM1
- PSS1
- PSS1/PEM1
- PSS1/PFO1/PEM1
- PSS1/PEM1/OW
- PSS1/PFO1
- PSS1/PFO1/OW

Key:

PFO = Palustrine Forested
PEM = Palustrine Emergent
PSS = Palustrine Scrub-Shrub
OW = Open Water

* A jurisdictional determination by the U.S. Army Corps of Engineers (USACE) was not obtained for these delineated wetlands.

Alternative 1 Land Uses

- Townhomes
- Small-Lot Single-Family
- Large-Lot Single-Family
- Apartments/Condominiums
- Aviation Museum
- Bucks County Housing Group
- Continuing Care Retirement Community
- Hotel/Conference/ Office Center
- Office Park
- Open Space
- Par-3 Golf Course
- Park
- Recreation Center
- Retail
- Roads/Paths/Parking
- School
- Town Center

N

SCALE

0 0.25 0.5 Miles

SOURCE: Ecology and Envrionment 2013; ESRI 2010; National Aerial Imagery Program 2010; RKG 2012; Tetra Tech 2012.

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4.11.2 Alternative 2 (HLRA Plan with Increased Residential Development)

4.11.2.1 Surface Water

Similar to Alternative 1, redevelopment under Alternative 2 could potentially result in both direct and indirect, significant impacts on surface waters. Direct impacts are associated with the installation of roads, sidewalks, and paths and construction of the office park land use district. These direct impacts would result where streams intersect proposed redevelopment features; in these cases, streams would be culverted, rerouted, or filled. Indirect water quality impacts generally result from site grading and clearing activities and runoff from new impervious surfaces. Indirect impacts are discussed in detail in Section 4.11.2.2.

Redevelopment under Alternative 2 would result in direct permanent impacts on the same three streams in the southeastern portion of the former installation as under Alternative 1. These impacts would total approximately 1,687 linear feet (see Table 4.11-3 and Figure 4.11-3). Park Creek and its tributary in the northwestern portion of the former installation would not be directly impacted.

Table 4.11-3 Estimated Direct Waterbody Impacts under Alternative 2

Waterbody	Flow Regime	Linear Feet of Impact	Total Stream Length (feet)	Type of Impact
S03	Ditch/Canal	607	607	Fill
S04	Perennial	602	1,438	Reroute/Culvert
S05	Perennial	478	781	Reroute/Culvert
Total		**1,687**	**2,826**	**N/A**

Note: Totals may not sum exactly due to rounding.

As indicated in Table 4.11-3, the ditch/canal is assumed to be filled to accommodate the construction of redevelopment features and road infrastructure. The entire length of the ditch would be filled. The perennial streams (S04 and S05) would be rerouted and culverted to facilitate redevelopment.

Prior to siting or construction roads, pedestrian paths, or other facilities, the developer would be required to comply with applicable law regulations, specifically the 75-foot RCCD, as discussed above under Alternative 1.

Once surface water impacts have been avoided and minimized to the maximum extent practicable, compensation must be provided to mitigate for unavoidable direct impacts. Mitigation requirements for direct stream impacts will be determined through coordination with the USACE and PADEP, and a site-specific mitigation plan will be developed. This will be completed following the final design phase for redevelopment, and as part of the Section 401/404 permit process.

4.11.2.2 Water Quality

Similar to Alternative 1, redevelopment of the former installation under Alternative 2 could result in indirect impacts on surface waters in the form of erosion and sedimentation, which could temporarily result from construction activities, as well as from an increase in impervious surface area.

Short-term, minor impacts on water quality could result from the discharge of sediments during construction, demolition, and renovation activities (e.g., clearing, grading, and landscaping and movement of equipment, materials, and vehicles) adjacent to or in proximity to surface waters. All redevelopment would require compliance with applicable local and state laws and regulations pertaining to erosion and sedimentation control and stormwater management, as discussed above under Alternative 1. The developer would be required to follow all applicable state and local laws in order to minimize impacts on

water quality, including Chapter 190 of the Horsham Township Code; Title 25 – Rules and Regulations of PADEP – Chapter 102 (Erosion Control); and the requirements of the NPDES program.

As discussed under Alternative 1, the nature and extent of impacts on adjacent surface waters would depend on the specific development within each of the major land use districts. Similar to Alternative 1, the open space district located in the northwestern portion of the former installation under Alternative 2 would surround Park Creek and its tributary; therefore, no construction would occur. Similarly, the conservation park and festival park located in the southern portion of the former installation would result in no impacts on surface waters due to the lack of construction associated with these land use districts.

The office park, town center, and apartment/condominium land use districts and the roads/paths/parking would have the greatest potential for impacting surface waters due to their location adjacent to and over streams S03, S04, and S05 in the southeastern portion of the former installation. As indicated in Table 4.11-3 above, portions of these land use districts would be constructed over one of these streams and would require filling, rerouting, or culverting. Certain water features could be incorporated into the overall design of the districts, creating an appealing aesthetic feature while minimizing or avoiding impacts on these surface waters. The portions of the proposed reuse located adjacent to the streams could impact water resources as a result of erosion and sedimentation and the development of new impervious surfaces.

Due to the drainage characteristics of the site, the development of quarter-acre, single-family residences in the northwestern portion of the former installation could result in erosion and sedimentation of Park Creek and its tributary if proper precautions are not taken during construction.

Full build-out of Alternative 2 is projected to result in a total of 351 acres of impervious surface area (approximately 41 percent of total land area within the former installation), which would predominantly comprise building roofs, parking areas, roadways and pedestrian pathways. This is nearly the same (within an acre) as the impervious surface projected under Alternative 1. This would be a net increase of approximately 102 acres above baseline conditions (249 acres). (Refer to Section 4.8.1.3 for a more detailed summary of the proposed impervious surface distribution on the former installation.) The additional impervious surface area would generate a long-term increase in precipitation runoff into both the Little Neshaminy Creek and Pennypack Creek watersheds, as well as the watercourses within the former installation boundary and those identified adjacent to the site, including Pennypack Creek and Little Neshaminy Creek. Full build-out as proposed under Alternative 2 would have the potential to result in significant impacts on water quality; however, because a majority of the proposed redevelopment would occur on lands that have been previously developed by the Navy and future development would require mitigation and BMPs, the potentially adverse impacts would be reduced. As proposed, 37 percent of the redeveloped property would be designated for parks and open space and would have mostly non-impervious surfaces. For more information on the methodology, assumptions and calculations used to project the impervious surface area resulting from implementation of Alternative 2, see Appendix B.

In summary, compliance with the local and state laws and regulations regarding stormwater management and erosion and sedimentation control, coupled with the implementation of BMPs, would reduce the magnitude of impacts on water quality from stormwater runoff.

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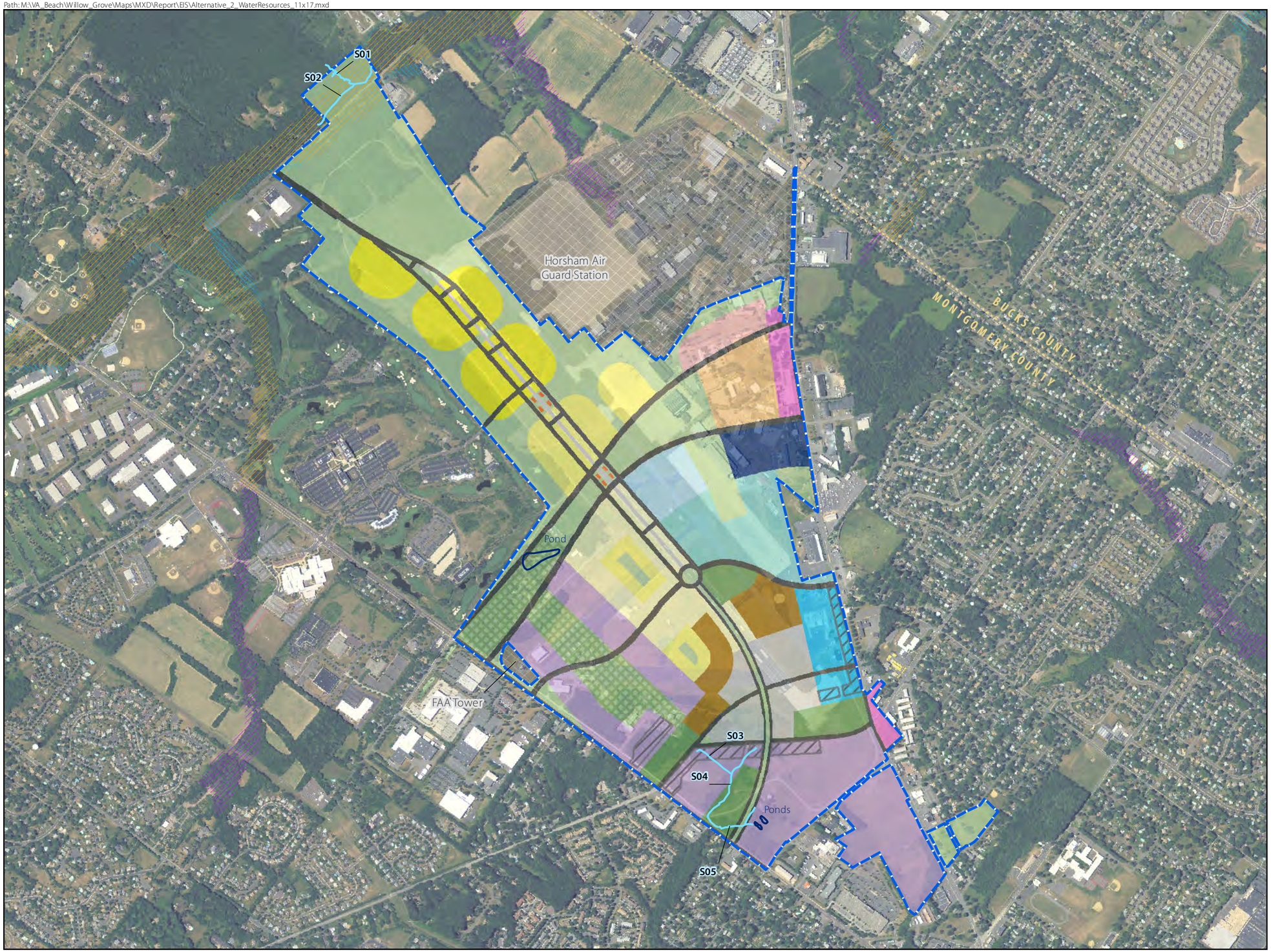

Figure 4.11-3

Water Resources Impacts Under Alternative 2

(HLRA Plan with Increased Residential Development)

NAS JRB Willow Grove

Horsham, PA

Note: *Flood Zone AE = Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. In most instances, base flood elevations derived from detailed analyses are shown at selected intervals within these zones. Flood Zone A = Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones.*

Legend

- County Boundary
- NAS JRB Willow Grove
- FAA Tower and Horsham Air Guard Station (not included in redevelopment)
- Field-Delineated Streams
- Pond

FEMA Flood Zone

- AE
- A
- 0.2 % Annual Chance Flood Hazard

Alternative 2 Land Uses

- Bucks County Housing Group
- Townhomes
- Small-Lot Single-Family
- 1/4 Acre Residential
- Apartments/Condominiums
- Continuing Care Retirement Community
- Aviation Museum
- Hotel Conference Center
- Office Park
- Open Space
- Par-3 Golf Course
- Park
- Courts
- Pedestrian Path/ Plaza
- Recreation Center
- Retail
- Roads/Plazas
- School
- Town Center
- Indicates Ground Floor Retail

SCALE

0 0.25 0.5 Miles

SOURCE: Ecology and Environment 2013; ESRI 2010; National Aerial Imagery Program 2010; RKG 2012; Tetra Tech 2012.

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4.11.2.3 Groundwater

Similar to Alternative 1, implementation of Alternative 2 would result in construction activities that could extend below ground surface to a depth that would directly impact the underlying water table, but would be considered minor. The developer would be required to use standard dewatering techniques, including appropriate discharge and/or treatment methods, and sediment control plans and BMPs that would involve erosion prevention, removal of sediment from collected water, and preservation of downgradient natural resources.

Spills of fuels or other chemicals and hazardous materials could occur during construction activities. The impacts of such spills on groundwater resources would be minimized through compliance with stormwater permits and management plans and implementation of BMPs as set forth in the Pennsylvania Erosion and Sediment Pollution Control Program Manual (PADEP 2012b).

4.11.2.4 Floodplains

Similar to Alternative 1, the proposed land use for the area in the northwestern portion of the former installation, including the 100-year floodplain, is open space, which would not impact the floodplain. Therefore, implementation of Alternative 2 would not impact any floodplain.

4.11.2.5 Wetlands

Potential wetland impacts are based on the wetland assessment conducted in accordance with the methods and guidance provided in the *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region Version 2.0* (USACE 2012b), as described in Section 3.11.4.1. A total of 25.96 acres of wetlands were delineated at the former installation. The Navy did not request that the USACE make a jurisdictional determination to confirm the wetland boundaries, as these were used for planning-level analysis in this report. Prior to redevelopment, the USACE should be contacted to obtain a jurisdictional determination. Based on the results of the wetland assessment, direct impacts would be greatest on PSS1/PFO1 wetlands, with approximately 2.7 acres impacted, followed by PSS1/PEM1/PFO1/OW, and PEM1 wetland community types.

Table 4.11-4 summarizes the estimated wetland impacts at the former installation under Alternative 2. Alternative 2 would have greater direct wetland impacts than Alternatives 1 and 3.

Table 4.11-4 Estimated Wetland Impacts under Alternative 2

Wetland Community	Direct Impact Acres
PEM1	1.1
PSS1	0.6
PFO1	0.4
PSS1/PEM1/PFO1/OW	1.7
PSS1/PFO1/PEM1	0.3
PFO1/PEM1	0.7
PSS1/PFO1	2.7
Total	**7.5**

Key:
OW = Open Water
PEM1 = Palustrine Emergent - Persistent
PSS1 = Palustrine Scrub-Shrub – Broad-Leaved Deciduous
PFO1 = Palustrine Forested – Broad-Leaved Deciduous

Redevelopment under Alternative 2 would have the potential to directly impact 12 wetlands encompassing approximately 7.5 acres. Direct wetland impacts (i.e., wetland fill) would result from the development of various land use districts, including retail; quarter-acre, single-family residential; office park; recreation center; roads/sidewalks/paths; small-lot, single-family residential; town center; and townhome (see Figure 4.11-4).

Similar to Alternative 1, there would be no impacts on the wetland complexes in the northwestern portion of the former installation surrounding Park Creek and its tributary as this area is proposed for use as open space under Alternative 2. Additionally, it is expected that the wetlands located within the proposed golf course would be incorporated into the design of the golf course. Impacts on the wetland complex could result from the construction of crossings to provide access for equipment during construction and golf carts during the operation of the golf course. The use of pesticides and fertilizers on the golf course could also result in indirect impacts on the wetland complex. However, it is expected the developer would implement an integrated pest management plan and/or a nutrient management plan to mitigate potential impacts from pesticides and fertilizer used on the golf course. In addition, the developer should consider a LID golf course, which would emphasize the conservation of natural landscape features, including wetlands, and thereby mitigate potential environmental impacts.

Wetland impacts will be avoided or minimized to the maximum extent practicable during final design, and compensation will be provided to mitigate for the remaining, unavoidable permanent impacts. Similar to Alternative 1, permanent wetland impacts under Alternative 2 will be mitigated in accordance with state and federal permit requirements.

Specific mitigation requirements for future development projects at the former installation would be determined in coordination with the USACE and PADEP.

Prior to construction, a SWPPP will be prepared that will include an erosion control plan to address appropriate BMPs to minimize impacts on wetlands from erosion and sedimentation. Based on the requirement to avoid, minimize, and mitigate impacts on wetlands, as required under federal and state permit programs, the potentially significant impacts on wetlands would be avoided or mitigated under Alternative 2.

4.11.3 Alternative 3 (Airfield Reuse)

4.11.3.1 Surface Water

Similar to Alternatives 1 and 2, redevelopment under Alternative 3 could potentially result in both direct and indirect, significant impacts on surface waters. Direct impacts are associated with installation of roads, sidewalks, and paths and construction of the hotel/conference center and office park land use districts. These direct impacts would result where streams intersect proposed redevelopment features; in these cases, streams would be culverted, rerouted, or filled. Indirect water quality impacts generally result from site grading and clearing activities and runoff from new impervious surfaces. Indirect impacts are discussed in detail in Section 4.11.3.2.

Redevelopment under Alternative 3 would result in direct permanent impacts on the same three streams in the southeastern portion of the former installation as under Alternatives 1 and 2. These impacts would total approximately 1,932 linear feet; however, the impacts under Alternative 3 would be greater than under Alternatives 1 and 2 (see Table 4.11-5 and Figure 4.11-5). No direct impacts on Park Creek and its tributary in the northwestern portion of the former installation would occur.

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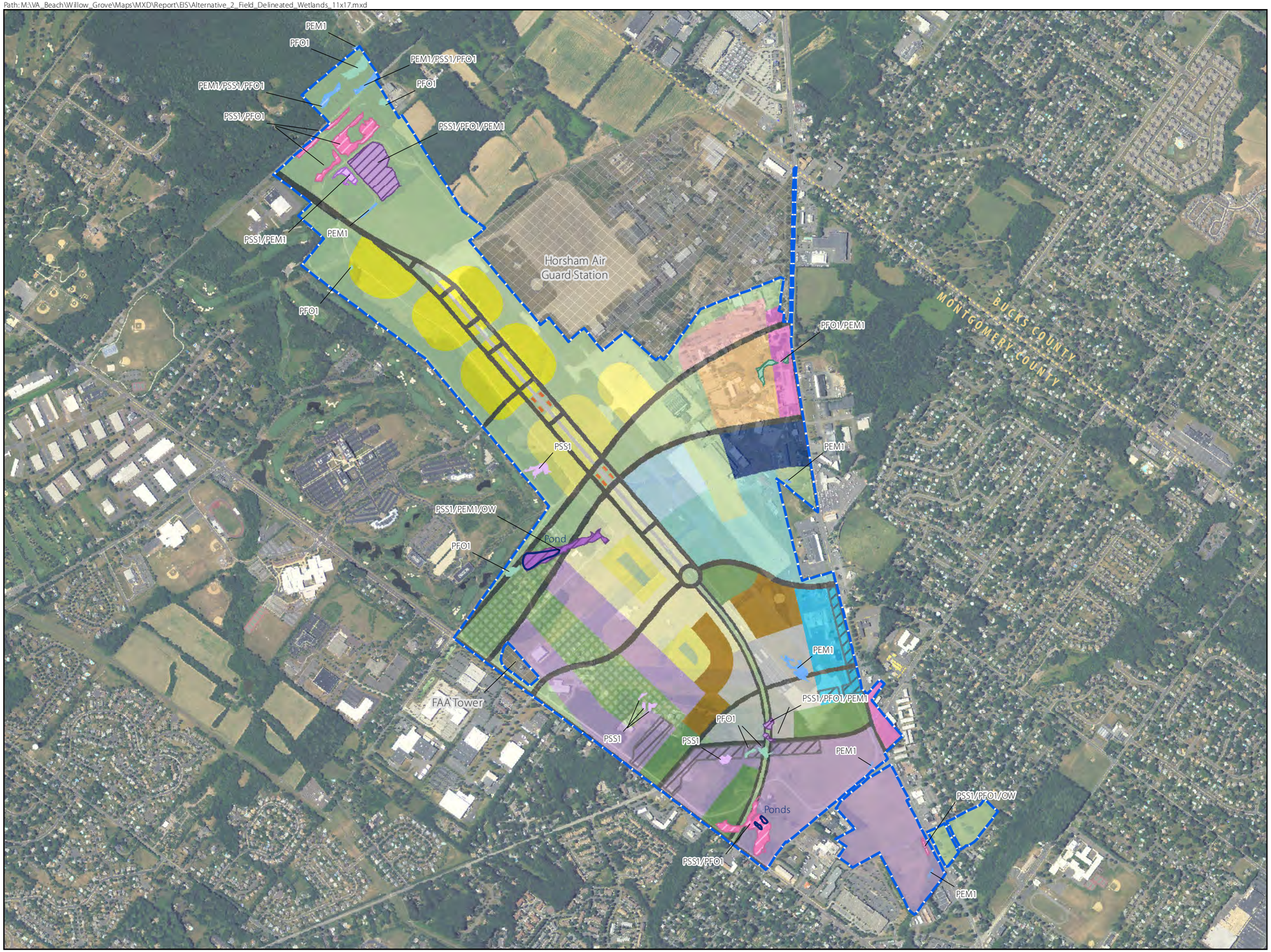

Figure 4.11-4

Field-Delineated Wetland Impacts Under Alternative 2

(HLRA Plan with Increased Residential Development)

Horsham, PA

Legend

- County Boundary
- NAS JRB Willow Grove
- FAA Tower and Horsham Air Guard Station (not included in redevelopment)
- Pond

Field-Delineated Wetland

- PEM1
- PEM1/PSS1/PFO1
- PFO1
- PFO1/PEM1
- PSS1
- PSS1/PEM1
- PSS1/PFO1/PEM1
- PSS1/PEM1/OW
- PSS1/PFO1
- PSS1/PFO1/OW

Key:

PFO = Palustrine Forested
PEM = Palustrine Emergent
PSS = Palustrine Scrub-Shrub
OW = Open Water

* A jurisdictional determination by the U.S. Army Corps of Engineers (USACE) was not obtained for these delineated wetlands.

Alternative 2 Land Uses

- Bucks County Housing Group
- Townhomes
- Small-Lot Single-Family
- 1/4 Acre Residential
- Apartments/Condominiums
- Continuing Care Retirement Community
- Aviation Museum
- Hotel Conference Center
- Office Park
- Open Space
- Par-3 Golf Course
- Park
- Courts
- Pedestrian Path/ Plaza
- Recreation Center
- Retail
- Roads/Plazas
- School
- Town Center
- Indicates Ground Floor Retail

SCALE

0 0.25 0.5 Miles

SOURCE: Ecology and Environment 2013; ESRI 2010; National Aerial Imagery Program 2010; RKG 2012; Tetra Tech 2012.

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Path: M:\VA_Beach\Willow_Grove\Maps\MXD\Report\EIS\Alternative_3_WaterResources_11x17.mxd

Figure 4.11-5

Water Resources Impacts Under Alternative 3

(Airfield Reuse)

Horsham, PA

Note: *Flood Zone AE = Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. In most instances, base flood elevations derived from detailed analyses are shown at selected intervals within these zones. Flood Zone A = Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones.*

Legend

- County Boundary
- NAS JRB Willow Grove
- FAA Tower and Horsham Air Guard Station (not included in redevelopment)
- Field-Delineated Streams
- Pond
- FEMA Flood Zone
  - AE
  - A
  - 0.2 % Annual Chance Flood Hazard

Alternative 3 Land Uses

- Airfield
- Airfield Operations
- Aviation Museum
- Bucks County Housing Group
- Park
- Open Space
- Hotel/Conference Center
- Office Park
- Par-3 Golf Course
- Recreation Center
- Retail
- Roads/Parking

SCALE

0 — 0.25 — 0.5 Miles

SOURCE: Ecology and Environment 2013; ESRI 2010; National Aerial Imagery Program 2010; RKG 2012; Tetra Tech 2012.

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Table 4.11-5 Estimated Direct Waterbody Impacts under Alternative 3

Waterbody	Flow Regime	Linear Feet of Impact	Total Stream Length (feet)	Type of Impact
S03	Ditch/Canal	550	607	Fill
S04	Perennial	1,228	1,438	Reroute/Culvert
S05	Perennial	154	781	Reroute
Total		**1,932**	**2,826**	**N/A**

As indicated in Table 4.11-5, the ditch/canal is assumed to be filled to accommodate the construction of redevelopment features and road infrastructure, and the perennial streams (S04 and S05) would be rerouted and culverted to facilitate redevelopment. Alternative 3 would be associated with greater direct stream impacts than Alternatives 1 and 2.

Prior to siting or construction roads, pedestrian paths, or other facilities, the developer will be required to comply with applicable laws and regulations, specifically the 75-foot RCCD, as discussed above under Alternatives 1 and 2.

Once surface water impacts have been avoided and minimized to the maximum extent practicable, compensation must be provided to mitigate for unavoidable direct impacts. Mitigation requirements for direct stream impacts will be determined through coordination with the USACE and PADEP, and a site-specific mitigation plan will be developed. This will be completed following the final design phase for redevelopment and as part of the Section 401/404 permit process.

4.11.3.2 Water Quality

Similar to Alternatives 1 and 2, redevelopment of the former installation under Alternative 3 could be associated with indirect impacts on surface waters in the form of erosion and sedimentation, which could temporarily result from construction activities, and from a permanent increase runoff from the additional impervious surface areas.

Short-term, minor impacts on water quality could result from the discharge of sediments that may result from construction, demolition, and renovation activities (e.g., clearing, grading, and landscaping, and movement of equipment, materials, and vehicles) adjacent or in proximity to surface waters. All redevelopment would require compliance with applicable local and state laws and regulations pertaining to erosion and sedimentation control and stormwater management, as discussed above under Alternatives 1 and 2. The developer would be required to follow all applicable state and local laws in order to reduce impacts on water quality, including Chapter 190 of the Horsham Township Code; Title 25 – Rules and Regulations of PADEP – Chapter 102 (Erosion Control); and the requirements of the NPDES program.

As discussed under Alternatives 1 and 2, the nature and extent of impacts on adjacent surface waters would depend on the specific development within each of the major land use districts. Similar to Alternatives 1 and 2, the open space district located in the northwestern portion of the former installation under Alternative 3 would surround Park Creek and its tributary; therefore, no construction would occur. Similarly, the conservation park and open space located in the southern portion of the former installation would result in no impacts on surface waters due to the lack of construction associated with these land use districts.

The office park, hotel/conference center land use districts and roads/paths/parking would have the greatest potential for impacting surface waters due to their location adjacent to and over streams S03, S04, and S05 in the southeastern portion of the former installation. As indicated in Table 4.11-5 above, portions of these land use districts would be constructed over one of these streams and would require filling,

rerouting, or culverting. Certain water features could be incorporated into the overall design of the districts, creating an appealing aesthetic feature while minimizing or avoiding impacts on these surface waters. For portions of the proposed reuse districts located adjacent or in proximity to the streams, erosion and sedimentation associated with construction and runoff from new impervious surfaces could impact water resources.

Additionally, maintaining the existing runway and a portion of the taxiways, parking aprons, and hangar space for airfield operations would result in water quality impacts. Impervious surfaces would accumulate various pollutants during facility operations, primarily particulates, hydrocarbons, and oil. If appropriate stormwater management and control measures are not implemented, these pollutants, in the form of non-point-source pollution, could impact the water quality of nearby waterbodies, including Park Creek and Pennypack Creek. Alternative 3 would result in the greatest amount of impervious surface area, primarily due to the airfield and associated airfield operations land use districts. Proper stormwater management would be a key consideration to ensure that there is no further degradation of the currently impaired Park Creek, Little Neshaminy Creek, and particularly Pennypack Creek, which is listed as impaired for aquatic life from urban runoff and storm sewers. Siltation from urban runoff and other, unknown, causes have contributed to the impairment in Pennypack Creek, further highlighting the importance of implementing proper erosion and sedimentation control measures and stormwater BMPs during and after construction.

Full build-out of Alternative 3 is projected to result in a total of 301 acres of impervious surface area (35 percent of total land area within the former installation), consisting predominantly of the airfield, building roofs, parking areas, roadways, and pedestrian pathways. This would be a net increase of approximately 52 acres above baseline conditions (249 acres). The additional impervious surface area would generate a long-term increase in precipitation runoff into both the Little Neshaminy Creek and Pennypack Creek watersheds and ultimately the adjacent surface waterbodies that receive stormwater discharge from the site. Full build-out as proposed under Alternative 3 would have the potential to result in significant impacts on water quality; however, if proper stormwater management controls are implemented, the potentially adverse impacts would be reduced. As proposed, 34 percent of the redeveloped property would be designated for parks and open space and would have mostly non-impervious surfaces. For more information on the methodology, assumptions and calculations used to project the impervious surface area resulting from the implementation of Alternative 3, see Appendix B.

4.11.1.3 Groundwater

Similar to Alternatives 1 and 2, implementation of Alternative 3 would result in construction activities that could extend below ground surface to a depth that would directly impact the underlying water table, but would be considered minor. The developer would be required to use standard dewatering techniques, including appropriate discharge and/or treatment methods, and sediment control plans and BMPs that would involve erosion prevention, removal of sediment from collected water, and preservation of downgradient natural resources.

Spills of fuels or other chemicals and hazardous materials could occur during construction activities. The impacts of such spill on groundwater resources would be minimized through compliance with stormwater permits and management plans and the implementation of BMPs as set forth in the Pennsylvania Erosion and Sediment Pollution Control Program Manual (PADEP 2012b).

4.11.3.4 Floodplains

Similar to Alternatives 1 and 2, the proposed land use for the area in the northwest portion of the former installation, including the 100-year floodplain, is open space. Therefore, implementation of Alternative 3 would not impact any floodplain.

4.11.3.5 Wetlands

Potential wetland impacts are based on the wetland assessment conducted in accordance with the methods and guidance provided in the *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region Version 2.0* (USACE 2012b), as described in Section 3.11.4.1. A total of 25.96 acres of wetlands were delineated at the former installation (E & E 2013). The Navy did not request that the USACE make a jurisdictional determination to confirm the wetland boundaries, as these were used for planning-level analysis in this report. Prior to redevelopment the USACE should be contacted to obtain a jurisdictional determination. Based on the results of the wetland assessment, direct impacts would be greatest to PSS1/PFO1 wetlands, with approximately 2.0 acres impacted, followed by PEM1 and PFO1/PEM1 wetland community types.

Table 4.11-6 summarizes the estimated wetland impacts at the former installation under Alternative 3. Redevelopment under Alternative 3 would have the potential to directly impact 10 wetlands, encompassing approximately 5 acres. Direct wetland impacts (i.e., wetland fill) would result from the development of various land use districts, including hotel/conference center, office park, and roads/sidewalks/paths land use districts (see Figure 4.11-6).

Table 4.11-6 Estimated Wetland Impacts under Alternative 3

Wetland Community	Direct Impact Acres
PEM1	1.1
PSS1	0.5
PFO1	0.5
PSS1/PEM1/PFO1/OW	--
PSS1/PFO1/PEM1	0.2
PFO1/PEM1	0.7
PSS1/PFO1	2.0
Total	**5.0**

Key:
OW = Open Water
PEM1 = Palustrine Emergent - Persistent
PSS1 = Palustrine Scrub-Shrub – Broad-Leaved Deciduous
PFO1 = Palustrine Forested – Broad-Leaved Deciduous

Similar to Alternatives 1 and 2, there would be no impacts on the wetland complexes in the northwestern portion of the former installation, surrounding Park Creek and its tributary, as this area is proposed for use as open space under Alternative 3. Additionally, it is expected that the wetlands located within the proposed golf course would be incorporated into the design of the golf course. Impacts on the wetland complex could result from the construction of crossings to provide access for equipment during construction and golf carts during the operation of the golf course. The use of pesticides and fertilizers on the golf course could also result in indirect impacts on the wetland complex. However, it is expected the developer would implement an integrated pest management plan and/or a nutrient management plan to mitigate potential impacts from pesticides and fertilizer used on the golf course. In addition, the developer should consider a LID golf course, which would emphasize the conservation of natural landscape features, including wetlands, and thereby mitigate potential environmental impacts.

Wetland impacts will be avoided or minimized to the maximum extent practicable during final design, and compensation will be provided to mitigate for the remaining, unavoidable permanent impacts. Similar to Alternatives 1 and 2, permanent wetland impacts under Alternative 3 will be mitigated in

accordance with state and federal permit requirements. Specific mitigation requirements for future development projects at the former installation will be determined in coordination with the USACE and PADEP.

Prior to construction, a SWPPP will be prepared that will include an erosion control plan to address appropriate BMPs to minimize impacts on wetlands from erosion and sedimentation. Based on the requirement to avoid, minimize, and mitigate impacts on wetlands, as required under federal and state permit programs, the potentially significant impacts on wetlands would be avoided or mitigated under Alternative 3.

4.11.4 No Action Alternative

Under the No Action Alterative, former NAS JRB Willow Grove property would be retained by the federal government in caretaker status. No reuse or redevelopment would occur at the facility. Under the No Action Alternative, no demolition or construction would occur and there would be no increase in impervious surfaces. Therefore, there would be no additional impacts on surface water, groundwater, floodplains or wetland when compared to baseline conditions.

4.12 Vegetation and Wildlife

This section summarizes the potential impacts on biological resources from the implementation of Alternative 1, Alternative 2, Alternative 3, or the No Action Alternative. It includes an examination of impacts on vegetation, wildlife, and threatened and endangered species from the disposal and future reuse of the former NAS JRB Willow Grove property.

Upon completion of the BRAC process and redevelopment of the former installation property under Alternatives 1, 2, or 3, all future developers would be required to comply with local, state, and federal laws and regulations pertaining to biological resources. Although no federally or state-listed threatened and endangered species are currently known to occur on the property (PNHP 2013), the length of time between consultation for this EIS and the actual redevelopment of the property will necessitate future consultation.

4.12.1 Alternative 1 (HLRA Plan - Preferred Alternative)

4.12.1.1 Vegetation

Under Alternative 1, approximately 675 of the approximately 861 acres (78 percent) of the former installation property would be redeveloped. The remaining approximately 185 acres (22 percent) would remain undeveloped in the form of open space and parks (for the purposes of assessing impacts to vegetation, the proposed golf course is considered “developed” as the natural vegetation would be converted to maintained lawn). In the short-term, currently undeveloped areas of the former installation would be impacted by development. Potential impacts on vegetation from development have been assessed for each proposed land use through spatial GIS analyses, the results of which are presented in Table 4.12-1.

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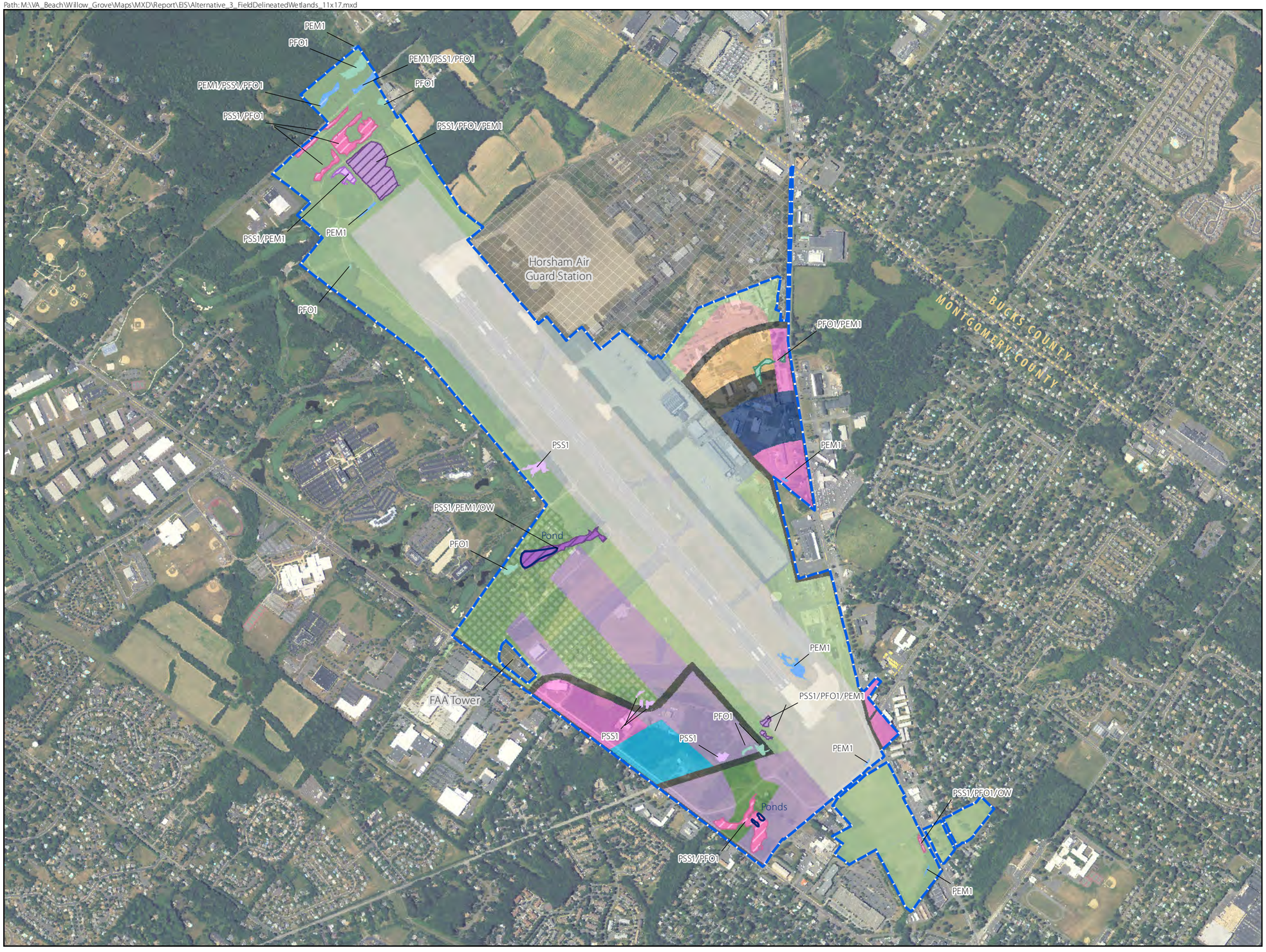

Figure 4.11-6

Field-Delineated Wetland Impacts Under Alternative 3

(Airfield Reuse)

Horsham, PA

Legend

- County Boundary
- NAS JRB Willow Grove
- FAA Tower and Horsham Air Guard Station (not included in redevelopment)
- Pond

Field-Delineated Wetland

- PEM1
- PEM1/PSS1/PFO1
- PFO1
- PFO1/PEM1
- PSS1
- PSS1/PEM1
- PSS1/PFO1/PEM1
- PSS1/PEM1/OW
- PSS1/PFO1
- PSS1/PFO1/OW

Key:

PFO = Palustrine Forested
PEM = Palustrine Emergent
PSS = Palustrine Scrub-Shrub
OW = Open Water

* A jurisdictional determination by the U.S. Army Corps of Engineers (USACE) was not obtained for these delineated wetlands.

Alternative 3 Land Uses

- Airfield
- Airfield Operations
- Aviation Museum
- Bucks County Housing Group
- Park
- Open Space
- Hotel/Conference Center
- Office Park
- Par-3 Golf Course
- Recreation Center
- Retail
- Roads/Parking

SCALE

0 0.25 0.5 Miles

SOURCE: Ecology and Environment 2013; ESRI 2010; National Aerial Imagery Program 2010; RKG 2012; Tetra Tech 2012.

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Under Alternative 1, proposed construction could result in the long-term loss or alteration of approximately 68 acres (54 percent) of currently undeveloped land at the former installation (Table 4.12-1). Vegetative cover types that could be impacted include barren land, deciduous forest, emergent herbaceous wetland, grassland/herbaceous, pasture/hay, and shrub scrub. It is anticipated that the acreages identified in Table 4.12-1 would be the maximum impacts based on the proposed size and dimensions of the development areas. Preparation of a site-specific development plan could reduce impacts on vegetation by maximizing the use of existing cleared areas and minimizing encroachment into vegetated areas. However, in the absence of a site-specific development plan, the maximum impacts are presented.

Table 4.12-1 Vegetative Cover Types Impacted by Development at the Former NAS JRB Willow Grove Under Alternative 1

Cover Type	Existing Acres	Acres Impacted[1]	Percent Impacted
Barren Land	1.33	1.33	100
Cultivated Crop	1.46	0	0
Deciduous Forest	89.27	44.24	50
Emergent Herbaceous Wetland	5.73	5.53	97
Grassland/Herbaceous	4.36	4.36	100
Mixed Forest	0.20	0	0
Pasture/Hay	14.23	10.13	71
Shrub/Scrub	6.45	2.09	32
Woody Wetlands	2.07	0	0
Total	**125.10**	**67.68**	**54**

[1] Wetland acres are estimated from the USGS NLCD. Refer to Section 3.11, Water Resources, for a more detailed discussion of wetland impacts.

Implementation of Alternative 1 would result in a net increase of approximately 60 acres of undeveloped land compared to current conditions. The proposed undeveloped lands would consist of parks, open space, and fields. In the absence of a site-specific development plan, it is anticipated that currently developed areas proposed to be returned to an undeveloped state would be planted with grasses and landscaping trees and shrubs. Areas surrounding proposed housing, schools, the golf course, and office parks would also likely be revegetated in a similar fashion. While this would offset some of the loss of existing vegetation, it is likely that the quality of habitat for wildlife would still be reduced in the long-term, as landscaped areas would not provide the same quality of habitat as more natural areas. Because of the amount of natural vegetation that would be impacted (68 acres) and the relatively low quality habitat of landscaped areas, overall impacts on vegetation under Alternative 1 would be significant.

Vegetation of Conservation Concern

Implementation of Alternative 1 would not impact vegetation of conservation concern because no rare, threatened, or endangered plants occur on the former installation.

Noxious Weeds

As described in Section 3.12.1, two species on the Pennsylvania noxious weed control list, purple loosestrife and multiflora rose, have been identified on the former installation. Therefore, as required under the Commonwealth's Noxious Weed Control Law, the developer would need to implement procedures to control and prevent the spread of these species. Control measures for purple loosestrife could include hand pulling of small infestations before seeds set; targeted application of glyphosate; or biological control for large infestations (Penn's Corner Resource Conservation and Development Council n.d.). Control measures for multiflora rose could include hand pulling of young plants; repeated (3 to 6 times during the growing season) mowing or cutting of large plants to weaken and kill them; or

application of systemic herbicides, such as glyphosate, to cut stumps to kill the roots (Penn's Corner Resource Conservation and Development Council n.d.).

Procedures to prevent the spread of noxious weeds should also be implemented by the developer. These could include ensuring that construction vehicles arrive at the work site clean and weed free to prevent the transport of weed seed, roots, or other propagules to the area; stockpiling vegetation, soils, and trench spoil material in a location adjacent to the removal site and returning it to its original location following construction; and using compressed air or other means to remove soil and propagules from machinery and vehicles.

4.12.1.2 Birds

As discussed in Section 3.12.2, migratory bird species are likely to occur at the former installation, as various species of waterfowl, raptors, woodpeckers, and passerines have been observed on the property. Implementation of Alternative 1 would have both short- and long-term impacts on birds due to the loss of vegetation and modification of land uses. The removal of approximately 54 percent of the vegetated area at the former installation, much of which is deciduous forest, would result in the permanent loss of habitat for birds. Individuals that use these habitats would be forced to move to other areas with suitable habitat; some individuals may be impacted if unoccupied habitat of equal quality is not available in the immediate vicinity. If construction takes place during the breeding season, individuals of some bird species could be directly impacted through loss of young. In areas where suitable habitat would remain intact, individuals could be temporarily displaced as they would likely avoid areas of construction where equipment and human activities create disturbance.

The developer would be required to develop erosion and sediment control plans for activities in disturbed areas and would also be required to implement BMPs (see also Section 6). Compliance with these mitigation measures would help to minimize impacts on surrounding habitat. Revegetation of the areas designated as parks, open space, and fields under Alternative 1 would also likely benefit individuals of some bird species in the long term, although the habitat types would be different and of lower quality than those being removed. Impacts on birds from implementation of Alternative 1 would be moderate, primarily due to the loss of deciduous forest habitat. Although impacts on individual birds would occur through implementation of Alternative 1, it is expected that there would be no adverse effects on the population of a migratory bird species.

Important Bird Areas

No impact on IBAs would be expected from the implementation of Alternative 1 because the IBA closest to the former installation is approximately 5 miles away.

Bird/Animal Aircraft Strike Hazard

No impact on BASH would result from the implementation of Alternative 1 because no airfield is proposed under this alternative.

4.12.1.3 Mammals

Similar to birds, implementation of Alternative 1 would have both short- and long-term impacts on mammals due to the loss of vegetation and modification of land uses. The primary long-term impact would be loss of habitat, as approximately 68 acres of vegetated habitat would be removed under Alternative 1. Mammals that use these habitats would be forced to move to adjacent areas with suitable habitat. Some individuals may be impacted if unoccupied habitat of equal quality is not available in the immediate vicinity. Individuals of less mobile small mammal species could be directly impacted by construction activities. In addition to habitat loss and direct impacts from construction, individuals of mobile mammal species may be temporarily displaced from peripheral areas during construction, when

noise and human activity levels increase. These individuals would be expected to return once construction is complete.

The developer would be required to develop erosion and sediment control plans for activities in disturbed areas and would also be required to implement BMPs (see also Section 6. Compliance with these mitigation measures would help to minimize impacts on surrounding habitat. Upon completion of construction, it is expected that the former installation would be recolonized by mammal species adapted to urban conditions. Revegetation of the areas designated as parks, open space, and fields under Alternative 1 would likely benefit individuals of some mammal species in the long term, although the habitat types would be different and of lower quality than those being removed. Overall impacts on mammals under Alternative 1 would be expected to be moderate due to habitat loss.

4.12.1.4 Reptiles and Amphibians

Implementation of Alternative 1 would impact reptiles and amphibians primarily through loss of habitat and, due to their limited mobility, direct impacts resulting from construction. Under Alternative 1, approximately 68 acres of vegetated habitat would be removed. Individuals able to avoid direct impacts would be forced to move to adjacent areas with suitable habitat. Some individuals may be impacted if unoccupied habitat of equal quality is not available in the immediate vicinity. Some individuals could also be temporarily displaced from peripheral areas during construction, when noise and human activity increase. These individuals would be expected to return once construction is complete.

The developer would be required to develop erosion and sediment control plans for activities in disturbed areas and would also be required to implement BMPs (see also Section 6). Compliance with these mitigation measures would help to minimize impacts on surrounding habitat. Upon completion of construction, it is expected that the former installation would be recolonized by reptile and amphibian species adapted to urban conditions. Revegetation of the areas designated as parks, open space, and fields under Alternative 1 would likely benefit individuals of some reptile and amphibian species in the long term, although the habitat types and would be different and of lower quality than those being removed. Overall impacts on reptiles and amphibians under Alternative 1 would be expected to be moderate due to the size of the proposed project footprint and the limited mobility of these species.

4.12.1.5 Threatened and Endangered Species

The PNDI review indicated that no species under USFWS jurisdiction occur at the former installation, and no critical habitat is present on the former installation property. Therefore, implementation of Alternative 1 would have no effect on federally listed threatened or endangered species. While the PNDI review indicated that further review by the PFBC was required, no state-listed threatened or endangered species have previously been identified at the former installation. Further coordination with the PFBC indicated that a species of concern (the species name was not provided) is known from the vicinity of the former installation. The PFBC indicated that no adverse impacts on that species would be expected under Alternative 1 (Urban 2013).

4.12.2 Alternative 2 (HLRA Plan with Increased Residential Development)

4.12.2.1 Vegetation

Under Alternative 2, approximately 590 of the approximately 861 acres (69 percent) of the former installation would be redeveloped. The remaining approximately 270 acres (31 percent) would remain undeveloped in the form of open space and parks (for the purposes of assessing impacts to vegetation, the proposed golf course is considered “developed” as the natural vegetation would be converted to maintained lawn). In the short-term, currently undeveloped areas of the former installation would be

impacted by development. Potential impacts on vegetation from development have been assessed for each proposed land use through GIS spatial analyses, the results of which are presented in Table 4.12-2.

Table 4.12-2 Vegetative Cover Types Impacted by Development at the Former NAS JRB Willow Grove Under Alternative 2

Cover Type	Existing Acres	Acres Impacted[1]	Percent Impacted
Barren Land	1.33	1.33	100
Cultivated Crop	1.46	0	0
Deciduous Forest	89.27	34.99	39
Emergent Herbaceous Wetland	5.73	4.30	75
Grassland/Herbaceous	4.36	4.36	100
Mixed Forest	0.20	0	0
Pasture/Hay	14.23	10.13	71
Shrub/Scrub	6.45	1.14	18
Woody Wetlands	2.07	0	0
Total	**125.10**	**56.25**	**45**

[1] Wetland acres impacted are estimated from the USGS NLCD. Refer to Section 3.11, Water Resources, for a more detailed discussion of wetland impacts.

Under Alternative 2, proposed construction activities could result in the long-term loss or alteration of approximately 56 acres (45 percent) of currently undeveloped land at the former installation (Table 4.12-2). Vegetative cover types that could be impacted by construction include barren land, deciduous forest, emergent herbaceous wetland, grassland/herbaceous, pasture/hay, and shrub scrub. It is anticipated that these would be the maximum impacts based on the proposed size and dimensions of development areas. Preparation of a site-specific development plan could reduce impacts on vegetation by maximizing the use of existing cleared areas and minimizing encroachment into vegetated areas. However, in the absence of a site-specific development plan, the maximum impacts are presented.

There would be a much greater net increase over current conditions in undeveloped land under Alternative 2 than under Alternative 1 (145 acres vs. 60 acres). The proposed undeveloped lands would consist of parks, open space, and fields. In the absence of a site-specific development plan, it is anticipated that currently developed areas proposed to be returned to an undeveloped state would be planted with grasses and landscaping trees and shrubs. Areas surrounding proposed housing, schools, the golf course, and office parks would also likely be revegetated in a similar fashion. While this would offset some of the loss of existing vegetation, it is likely that the quality of habitat available for wildlife would still be reduced in the long term, as landscaped areas would not provide the same quality of habitat as more natural areas. While the amount of vegetation impacted under Alternative 2 is expected to be less than under Alternative 1, it is expected that Alternative 2 would still result in a significant impact on vegetation.

Vegetation of Conservation Concern

Implementation of Alternative 2 would have no impact on vegetation of conservation concern because no rare, threatened, or endangered plants occur on the former installation.

Noxious Weeds

Procedures to control and to prevent the spread of noxious weeds would be the same as those described for Alternative 1 (see Section 4.12.1.1).

4.12.2.2 Birds

The types of impacts on birds under Alternative 2 would be similar to those described under Alternative 1. However, the scale of impacts under Alternative 2 would be less than under Alternative 1 because less

habitat, particularly deciduous forest, would be removed under Alternative 2 compared to Alternative 1 (56 acres vs. 68 acres). Additionally, there would be a much greater net gain from baseline conditions in undeveloped area under Alternative 2 than under Alternative 1 (145 acres vs. 60 acres).

Similar to Alternative 1, the developer would be required to develop erosion and sediment control plans for activities in disturbed areas and would also be required to implement BMPs (see also Section 6). Compliance with these mitigation measures would help to minimize impacts on surrounding habitat. Revegetation of the areas designated as parks, open space, and fields under Alternative 2 would also likely benefit individuals of some bird species in the long term, although the habitat types would be different and of lower quality than those being removed. Impacts on birds from implementation of Alternative 2 would be moderate, primarily due to the loss of deciduous forest habitat. Although impacts on individual birds would occur through implementation of Alternative 2, it is expected that there would be no adverse effects on the population of a migratory bird species.

Important Bird Areas

No impact on IBAs would be expected from implementation of Alternative 2 because the IBA closest to the former installation is approximately 5 miles away.

Bird/Animal Aircraft Strike Hazard

No impact on BASH would occur from implementation of Alternative 2 because no airfield is proposed under this alternative.

4.12.2.3 Mammals

The types of impacts on mammals under Alternative 2 would be similar to those described under Alternative 1. However, the scale of impacts under Alternative 2 would likely be less than under Alternative 1 because less habitat would be removed under Alternative 2 compared to Alternative 1 (56 acres vs. 68 acres). Additionally, there would be a much greater net gain from baseline conditions in undeveloped area under Alternative 2 than under Alternative 1 (145 acres vs. 60 acres).

Similar to Alternative 1, the developer would be required to develop erosion and sediment control plans for activities in disturbed areas and would also be required to implement BMPs (see also Section 6). Compliance with these mitigation measures would help to minimize impacts on surrounding habitat. Upon completion of construction, it is expected that the former installation would be recolonized by mammal species adapted to urban conditions. Revegetation of the areas designated as parks, open space, and fields under Alternative 2 would likely benefit individuals of some mammal species in the long term, although the habitat types would be different and of lower quality than those being removed. Impacts on mammals from implementation of Alternative 2 would be moderate, primarily due to the loss of habitat.

4.12.2.4 Reptiles and Amphibians

The types of impacts on reptiles and amphibians under Alternative 2 would be similar to those described under Alternative 1. However, the scale of impacts under Alternative 2 would likely be less than under Alternative 1 because less habitat would be removed under Alternative 2 compared to Alternative 1 (56 acres vs. 68 acres). Additionally, there would be a much greater net gain from baseline conditions in undeveloped area under Alternative 2 than under Alternative 1 (145 acres vs. 60 acres).

Similar to Alternative 1, the developer would be required to develop erosion and sediment control plans for activities in disturbed areas and would also be required to implement BMPs (see also Section 6). Compliance with these mitigation measures would help to minimize impacts on surrounding habitat. Upon completion of construction, it is expected that the former installation would be recolonized by reptile and amphibian species adapted to urban conditions. Revegetation of the areas designated as parks,

open space, and fields under Alternative 2 would likely benefit individuals of some reptile and amphibian species in the long-term, although the habitat types would be different and of lower quality than those being removed. Overall impacts on reptiles and amphibians under Alternative 2 would be expected to be moderate due to loss of habitat and direct impacts on individuals due to the size of the proposed project footprint and the limited mobility of these species.

4.12.2.5 Threatened and Endangered Species

The PNDI review indicated that no species under USFWS jurisdiction occur at the former installation, and no critical habitat is present on the former installation property. Therefore, implementation of Alternative 2 would have no effect on federally listed threatened or endangered species. While the PNDI review indicated that further review by the PFBC was required, no state-listed threatened or endangered species have previously been identified at the former installation. Further coordination with the PFBC indicated that a species of concern (the species name was not provided) is known from the vicinity of the former installation. The PFBC indicated that no adverse impacts on that species would be expected under Alternative 2 (Urban 2013).

4.12.3 Alternative 3 (Airfield Reuse)

4.12.3.1 Vegetation

Under Alternative 3, approximately 624 of the approximately 861 acres (73 percent) of the former installation would be redeveloped. The remaining approximately 236 acres (27 percent) would remain undeveloped in the form of open space and parks (for the purposes of assessing impacts to vegetation, the proposed golf course is considered "developed" as the natural vegetation would be converted to maintained lawn). In the short term, currently undeveloped areas of the former installation would be impacted by development. Potential impacts on vegetation from development have been assessed for each proposed land use through GIS spatial analyses, the results of which are presented in Table 4.12-3.

Table 4.12-3 Vegetative Cover Types Impacted by Development at the Former NAS JRB Willow Grove Under Alternative 3

Cover Type	Existing Acres	Acres Impacted[1]	Percent Impacted
Barren Land	1.33	1.33	100
Cultivated Crop	1.46	0	0
Deciduous Forest	89.27	33.94	38
Emergent Herbaceous Wetland	5.73	5.48	96
Grassland/Herbaceous	4.36	0.03	<1
Mixed Forest	0.20	0	0
Pasture/Hay	14.23	5.11	36
Shrub/Scrub	6.45	1.38	21
Woody Wetlands	2.07	0	0
Total	**125.10**	**47.27**	**38**

[1] Wetland acres impacted are estimated from the USGS NLCD. Refer to Section 3.11, Water Resources, for a more detailed discussion of wetland impacts.

Under Alternative 3, proposed construction activities could result in the long-term loss or alteration of approximately 47 acres (38 percent) of currently undeveloped land at the former installation (see Table 4.12-3). Vegetative cover types that could be impacted by construction include barren land, deciduous forest, emergent herbaceous wetland, grassland/herbaceous, pasture/hay, and shrub scrub. It is anticipated that these would be the maximum impacts based on the proposed size and dimensions of development areas. Preparation of a site-specific development plan could reduce impacts on vegetation

by maximizing the use of existing cleared areas and minimizing encroachment into vegetated areas. However, in the absence of a site-specific development plan, the maximum impacts are presented.

The net increase in undeveloped land compared to baseline conditions under Alternative 3 would be greater than under Alternative 1 (111 acres vs. 60 acres) but less than under Alternative 2 (111 acres vs. 145) . The proposed undeveloped lands would consist of parks, open space, and fields. In the absence of a site-specific development plan, it is anticipated that currently developed areas proposed to be returned to an undeveloped state would be planted with grasses and landscaping trees and shrubs. Areas surrounding proposed housing, schools, the golf course, and office parks would also likely be revegetated in a similar fashion. While this would offset some of the loss of existing vegetation, it is likely that the quality of habitat for wildlife would still be reduced in the long term, as landscaped areas would not provide the same quality of habitat as more natural areas. While the amount of vegetation impacted under Alternative 3 is expected to be less than under both Alternative 1 and Alternative 2, it is expected that Alternative 3 would still result in a significant impact on vegetation.

Vegetation of Conservation Concern

Implementation of Alternative 3 would have no impact on vegetation of conservation concern because no rare, threatened, or endangered plants occur on the former installation.

Noxious Weeds

Procedures to control and to prevent the spread of noxious weeds would be the same as those described for Alternative 1 (see Section 4.12.1.1).

4.12.3.2 Birds

The types of impacts on birds under Alternative 3 would be similar to those described under Alternatives 1 and 2. However, the scale of impacts under Alternative 3 would be less than under Alternatives 1 and 2 because less habitat would be removed under Alternative 3 compared to Alternatives 1 and 2 (47 acres vs. 68 acres and 56 acres, respectively). The net gain in undeveloped area compared to baseline conditions under Alternative 3 would be greater than under Alternative 1 (111 acres vs. 60 acres) but less than under Alternative 2 (111 acres vs. 145 acres).

Similar to Alternatives 1 and 2, the developer would be required to develop erosion and sediment control plans for activities in disturbed areas and would also be required to implement BMPs (see also Section 6). Compliance with these mitigation measures would help to minimize impacts on surrounding habitat. Revegetation of the areas designated as parks, open space, and fields under Alternative 3 would also likely benefit individuals of some bird species in the long term, although the habitat types would be different and of lower quality than those being removed.

Reuse of the airfield under Alternative 3 would result in an increase in noise levels compared to current conditions. Several studies have been conducted by the scientific community on the impacts of aircraft noise on wildlife. The literature suggests that species differ in their response to aircraft noise (Manci et al. 1988). However, individual animals of all species not previously exposed to aircraft noise seem to react with some form of a startle response. The level of response depends on a number of factors, including the life-history characteristics of the species, characteristics of the aircraft and flight activities, habitat type, and the species' previous exposure to aircraft (NPS 1994). The behavioral responses can cause injury and impose an energy response that may affect survival or growth over the long term (Ellis et al. 1991). Additionally, time spent on noise avoidance activity may cause birds to spend less time on necessary activities such as feeding, preening, or caring for young (NPS 1994).

It has been widely reported in the scientific literature that the intensities and durations of the startle response decrease with the number and frequency of exposures. Several studies indicate a strong

tendency for individuals to acclimate or habituate to noise disturbances (Grubb and King 1991; Ellis et al. 1991; Black et al. 1984; Conomy et al. 1998). Other studies have reported physiological responses in birds, such as increased hormonal production and increased heart rates, particularly among nesting individuals. These physiological responses are almost always accompanied by a behavioral response that can range from a slight change in body position to engagement in escape or avoidance behavior, such as flushing from perches or nests (NPS 1994; Ellis et al. 1991).

Given the recent past aircraft operations at NAS JRB Willow Grove, some birds present at or in the vicinity of the airfield would likely be already acclimated to aircraft noise. However, some individuals may not have been present when aircraft operations were conducted and may not be currently acclimated to aircraft noise. Based on the noise studies mentioned above, some individuals may endure longer-term effects due to repeated physiological responses, but most would be expected to acclimate or habituate to noise exposure after experiencing short-term effects (Grubb and King 1991; Ellis et al. 1991; Black et al. 1984; Conomy et al. 1998). Therefore, noise associated with aircraft operations under Alternative 3 would not impact birds. Overall impacts on birds from implementation of Alternative 3 would be moderate, primarily due to the loss of deciduous forest habitat. Although impacts on individual birds would occur through implementation of Alternative 3, it is expected that there would be no adverse effects on the population of a migratory bird species.

Important Bird Areas

No impact on IBAs would be expected from implementation of Alternative 3 because the IBA closest to the former installation is approximately 5 miles away.

Bird/Animal Aircraft Strike Hazard

Reuse of the airfield under Alternative 3 would result in the potential for bird/animal aircraft strikes. It is anticipated that the airfield operator would develop and implement a Wildlife Hazard Management Plan to minimize the risk of a strike occurring.

4.12.3.3 Mammals

The types of impacts on mammals under Alternative 3 would be similar to those described under Alternatives 1 and 2. However, the scale of impacts under Alternative 3 would likely be less than under Alternatives 1 and 2 because less habitat would be removed under Alternative 3 compared to Alternatives 1 and 2 (47 acres vs. 68 acres and 56 acres, respectively). The net gain in undeveloped area compared to baseline conditions under Alternative 3 would be greater than under Alternative 1 (111 acres vs. 60 acres) but less than Alternative 2 (111 acres vs. 145 acres).

Similar to Alternatives 1 and 2, the developer would be required to develop erosion and sediment control plans for activities in disturbed areas and would also be required to implement BMPs (see also Section 6). Compliance with these mitigation measures would help to minimize impacts on surrounding habitat. Revegetation of the areas designated as parks, open space, and fields under Alternative 3 would likely benefit individuals of some mammal species in the long-term, although the habitat types would be different and of lower quality than those being removed.

Reuse of the airfield under Alternative 3 would result in an increase in noise levels compared to current conditions. Several studies have been conducted by the scientific community on the impacts of aircraft noise on wildlife. The literature suggests that species differ in their response to aircraft noise (Manci et al. 1988). However, individual animals of all species not previously exposed to aircraft noise seem to react with some form of a startle response. The level of response depends on a number of factors, including the life-history characteristics of the species, characteristics of the aircraft and flight activities, habitat type, and the species' previous exposure to aircraft (NPS 1994). The behavioral responses can

cause injury and impose an energy response that may affect survival or growth over the long term (Ellis et al. 1991).

It has been widely reported in the scientific literature that the intensities and durations of the startle response decrease with the number and frequency of exposures. Several studies indicate a strong tendency for species to acclimate or habituate to noise disturbances (Grubb and King 1991; Ellis et al. 1991; Black et al. 1984; Conomy et al. 1998). For mammals, some studies have reported physiological responses, such as increased hormonal production, increased heart rates, and a reduction in milk production, in some species (Manci et al. 1988). The majority of studies, however, have reported short-term or no effects.

Given the recent past aircraft operations at NAS JRB Willow Grove, some mammals present at or in the vicinity of the airfield would likely be already acclimated to aircraft noise. However, some individuals may not have been present when aircraft operations were conducted and may not be currently acclimated to aircraft noise. Based on the noise studies mentioned above, some individuals may endure longer-term effects due to repeated physiological responses, but most would be expected to acclimate or habituate to noise exposure after experiencing short-term effects (Grubb and King 1991; Ellis et al. 1991; Black et al. 1984; Conomy et al. 1998). Therefore, noise associated with aircraft operations under Alternative 3 would have not impact mammals. Overall impacts on mammals from implementation of Alternative 3 would be moderate, primarily due to the loss of habitat.

4.12.3.4 Reptiles and Amphibians

The types of impacts on reptiles and amphibians under Alternative 3 would be similar to those described under Alternatives 1 and 2. However, the scale of impacts under Alternative 3 would likely be less than under Alternatives 1 and 2 because less habitat would be removed under Alternative 3 compared to Alternatives 1 and 2 (47 acres vs. 68 acres and 56 acres, respectively). The net gain in undeveloped area compared to baseline conditions under Alternative 3 would be greater than under Alternative 1 (111 acres vs. 60 acres) but less than Alternative 2 (111 acres vs. 145 acres).

Similar to Alternatives 1 and 2, the developer would be required to develop erosion and sediment control plans for activities in disturbed areas and would also be required to implement BMPs (see also Section 6). Compliance with these mitigation measures would help to minimize impacts on surrounding habitat. Upon completion of construction, it is expected that the former installation would be recolonized by reptile and amphibian species adapted to urban conditions. Revegetation of the areas designated as parks, open space, and fields under Alternative 3 would likely benefit individuals of some reptile and amphibian species in the long-term, although the habitat types would be different and of lower quality than those being removed. Little information is available on the impacts of aircraft noise on reptiles and amphibians; however, it is expected that, as with other animal species, some individuals may endure longer-term effects due to repeated physiological responses, but most would be expected to acclimate or habituate to noise exposure after experiencing short-term effects. Overall impacts on reptiles and amphibians under Alternative 3 would be expected to be moderate due to loss of habitat and direct impacts on individuals due to the size of the proposed project footprint and the limited mobility of these species.

4.12.3.5 Threatened and Endangered Species

The PNDI review indicated that no species under USFWS jurisdiction occur at the former installation, and no critical habitat is present on the former installation property. Therefore, implementation of Alternative 3 would have no effect on federally listed threatened or endangered species. While the PNDI review indicated that further review by the PFBC was required, no state-listed threatened or endangered species have previously been identified at the former installation. Further coordination with the PFBC

indicated that a species of concern (the species name was not provided) is known from the vicinity of the former installation. The PFBC indicated that no adverse impacts on that species would be expected under Alternative 3 (Urban 2013).

4.12.4 No Action Alternative

4.12.4.1 Vegetation

Under the No Action Alternative, the former installation would be retained by the federal government in caretaker status. Reuse or redevelopment of the property would not occur. The grounds around the airfield would be maintained according to the guidelines in *The Department of the Navy Base Realignment and Closure Implementation Guidance* (Navy 2007b). In accordance with the BRAC PMO *Building, Vacating, Facility Layaway and Caretaker Maintenance Guidance* (which is Appendix B of *The Department of the Navy Base Realignment and Closure Implementation Guidance*), only conditions adversely affecting public health, the environment, and safety would be corrected in nonresidential areas. Therefore, vegetation maintenance would be limited to the prevention of fire hazards and damage to building and utility lines. According to these guidelines, the area around the airfield should "be maintained to the minimum extent necessary to protect against fire and erosion, and to assure proper forest and wildlife management where applicable." The guidelines require that the grass around the airfield be mowed at least once annually to a height no shorter than 8 inches and no longer than 12 inches. Mowing will not be conducted between May 1 and August 15 to protect nesting birds. This maintenance would be sufficient to prevent hardwood encroachment and maintain the grassland habitat around the runway.

Vegetation of Conservation Concern

The No Action Alternative would have no impact on vegetation of conservation concern because no rare, threatened, or endangered plants occur on the former installation.

Noxious Weeds

Under the No Action Alternative, vegetation maintenance would be limited to the prevention of fire hazards and damage to building and utility lines. No measures to control noxious weeds would be implemented.

4.12.4.2 Birds

Under the No Action Alternative, the former installation would be retained by the federal government in caretaker status. Reuse or redevelopment of the property would not occur. The abundance of birds on the property would likely increase as a result of decreased human activity. Diversity would likely remain constant as the variety of habitats on the property would be maintained.

Important Bird Areas

No impacts on IBAs would occur under the No Action Alternative.

Bird/Animal Aircraft Strike Hazard

No impact on BASH would occur under the No Action Alternative.

4.12.4.3 Mammals

Under the No Action Alternative, the former installation would be retained by the federal government in caretaker status. Reuse or redevelopment of the property would not occur. The abundance of mammals on the property would likely increase as a result of decreased human activity. Diversity would likely remain constant as the variety of habitats on the property would be maintained.

4.12.4.4 Reptiles and Amphibians

Under the No Action Alternative, the former installation would be retained by the federal government in caretaker status. Reuse or redevelopment of the property would not occur. The abundance of reptiles and amphibians on the property would likely increase as a result of decreased human activity. Diversity would likely remain constant as the variety of habitats on the property would be maintained.

4.12.4.5 Threatened and Endangered Species

The PNDI review indicated that no species under USFWS jurisdiction occur at the former installation, and no critical habitat is present on the former installation property. Therefore, under the No Action Alternative, there would be no impact on federally or state-listed threatened and endangered species.

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5 Cumulative Impacts

5.1 Introduction

This section examines the potential cumulative effects of the disposal and reuse of surplus property at NAS JRB Willow Grove. This cumulative impact analysis was developed to be consistent with guidance published by the CEQ (January 1997) and the EPA (May 1999). In addition, the CEQ issued further guidance to federal agencies in June 2005 regarding the consideration of past actions in cumulative effects analysis. The guidance directs the agency preparing a NEPA document to determine the relevant information pertaining to past actions that could be useful in illuminating or predicting the reasonably foreseeable direct and indirect effects of a proposed action.

CEQ regulations stipulate that the cumulative effects analysis within an EIS should consider the potential environmental impacts resulting from "the incremental impacts of the action when added to past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions" (40 CFR 1508.7). CEQ guidance in considering cumulative effects involves defining the scope of the other actions and their interrelationship with the proposed action. The scope must consider geographical and temporal overlaps among the proposed action and other actions and must evaluate the nature of interactions among these actions.

Cumulative effects are most likely to arise when a relationship or synergy exists between the proposed action and other actions expected to occur in a similar location or during a similar time period. Actions overlapping with or in proximity to the proposed action would be expected to have more potential for a relationship than those geographically separated. Research, literature reviews, and contacts with applicable government and nongovernment agencies were used to identify past, present, and future actions within the project area.

5.2 Approach to Analysis

The study area for this cumulative impacts analysis was identified by first determining the geographic area that includes the resources that would be directly affected by the Proposed Action and, second, by extending the boundaries of the initial geographic area to include the same and other resources affected by the combined impacts of the Proposed Action and other actions. The geographic range varies depending on the resource area being analyzed; resource-specific geographic study areas are specifically described. The cumulative impacts analysis is provided by resource areas that can be evaluated meaningfully and that are of concern to resource agencies, local officials, and/or the public. Resource areas evaluated for cumulative impacts include land use, socioeconomics, community facilities, transportation, air quality, infrastructure and utilities, and water resources. The cumulative impacts analysis includes a description and evaluation of the past, present, and reasonably foreseeable future actions that could potentially have direct or indirect impacts in combination with the Proposed Action on these resource areas.

5.3 Past, Present, and Reasonably Foreseeable Actions

U.S. Navy representatives met with local officials to identify and discuss any recently completed or reasonably foreseeable future actions in the vicinity of the former installation. Local township council meeting minutes and local land use and development plans were also reviewed to identify other reasonably foreseeable future actions nearby. Specific projects or actions that were either recently implemented or considered reasonably foreseeable in the future are listed and described in Table 5-1. The locations of these projects in relation to the former installation are shown on Figure 5-1.

Table 5-1 Recently Completed or Reasonably Foreseeable Actions

Project Name	Description	Location	Distance to NAS JRB Willow Grove (miles)	Status
Ground Command Center at Horsham Air Guard Station	Ground Command Center for remote aircraft; includes expanded facilities and nearly 250 new positions.	Horsham Air Guard Base	0	Ongoing
Disposal and Reuse of Shenandoah Woods and Jacksonville Road Housing Areas	Disposal and reuse of the Jacksonville Road and Shenandoah Woods housing areas, both associated with the former NAS JRB Willow Grove.	Ivyland Borough and Warminster Township in Bucks County	4	Pending
Incoming Tenants in Newly Renovated Elements Strip Mall	Several empty spaces are available for rent in the newly renovated Elements strip mall. The area is zoned commercial. More than 30,000 square feet is available, divided among various spaces ranging in size from 357 square feet to 5,498 square feet.	Horsham Township	Less than a quarter mile	Ongoing
Horsham Village Mall Expansion	Expansion and improvement of the shopping center, including new stores, upgraded building facades, and landscaping, stormwater management, and traffic improvements.	Horsham Township	1	Ongoing
Redevelopment of the Horsham Valley Golf Course	Redevelopment of the closed 70-acre golf course with 94 single-family homes.	Horsham Township	1	Pending
Valley Gate Development	A 67-acre mixed-use development that will include retail stores, restaurants, townhomes, and a hotel is planned on the east side of Route 611, north of County Line Road.	Warrington Township	Less than a quarter mile	Ongoing; obtained approval in February 2013; construction to begin in Spring 2013.
Park Creek Wastewater Treatment Plant Expansion	The Horsham Water and Sewer Authority is upgrading and expanding the Park Creek Sewage Treatment Plant. The plant's capacity will more than double and the treatment process will be upgraded from advanced secondary to tertiary treatment. The plant will continue to serve the same area.	Horsham Township	Less than a quarter mile	Pending

Table 5-1 Recently Completed or Reasonably Foreseeable Actions

Project Name	Description	Location	Distance to NAS JRB Willow Grove (miles)	Status
Construction of Pete's Express Car Wash	Construction of a 5,380 square foot car wash facility on a 2.9-acre tract located on the eastern side of Easton Road at Poplar Road.	Warrington Township	Less than a quarter mile	Ongoing
Construction of Penrose Walk Residential Development	Fifty-four semi-detached single-family dwellings are being constructed on a 31-acre tract located on the east and west sides of Street Road, between Phillips and Bradford Avenues.	Warrington Township	1	Ongoing
Construction of Oak Creek at Warrington Residential Development	Twenty-three single-family detached houses are being constructed with frontage on County Line Road.	Warrington Township	unknown	Pending or Ongoing
Construction of Warrington Glen Subdivision	A subdivision is proposed for the 90-acre Meehan-Lacy tract, which is located along the north side of Street Road, approximately 600 feet east of Folly Road.	Warrington Township	2	Pending
Development of Lamplighter Village Phase IV Lots with Houses	The developer of Lamplighter Village, an active adult community, went bankrupt before completing Phase IV of the development, resulting in 21 empty lots. It is expected that these lots will be purchased and houses will be constructed.	Warrington Township	1	Pending
Construction of a New Recreation Center at Warminster Community Park	The Warminster Recreation and Education Center (WREC) that was operating out of the former Hart Elementary School is closed, and the Warminster Township Parks and Recreation Department is currently operating out of a temporary facility at Warminster Community Park. The township is seeking a state grant to build a new WREC at Warminster Community Park.	Warminster Township	4	Pending

Table 5-1 Recently Completed or Reasonably Foreseeable Actions

Project Name	Description	Location	Distance to NAS JRB Willow Grove (miles)	Status
Upper Neshaminy Creek Trail Feasibility Study	Bucks County is studying the feasibility of creating a trail along the Upper Neshaminy Creek, from Twin Streams Park in Chalfront Borough to the Forks of the Neshaminy in Rushland, Wrightstown Township.	Chalfront Borough, New Britain Borough, Doylestown Township, Buckingham Township, and Warwick Township in Bucks County	4	Ongoing
U.S. Route 202 Parkway	The 9-mile-long U.S. Route 202 Parkway connecting Route 63 in Lower Gwynedd Township with Route 611 in Doylestown Township opened on December 3, 2012.	Warrington Township	4	Completed
Sumneytown Pike/ PA 309 Connector	A 5-mile-long, two-lane connector road from Sumneytown Pike in Montgomery County to PA 309 in Bucks County is being constructed in two phases. This project will relieve existing and projected traffic congestion along the corridor.	Towamencin, Lower Salford, Hatfield, and Franconia townships in Montgomery County and Hilltown Township in Bucks County	9	Ongoing

Path: M:\VA_Beach\Willow_Grove\Maps\MXD\Report\EIS\Reasonably_Forseeable_Actions2.mxd

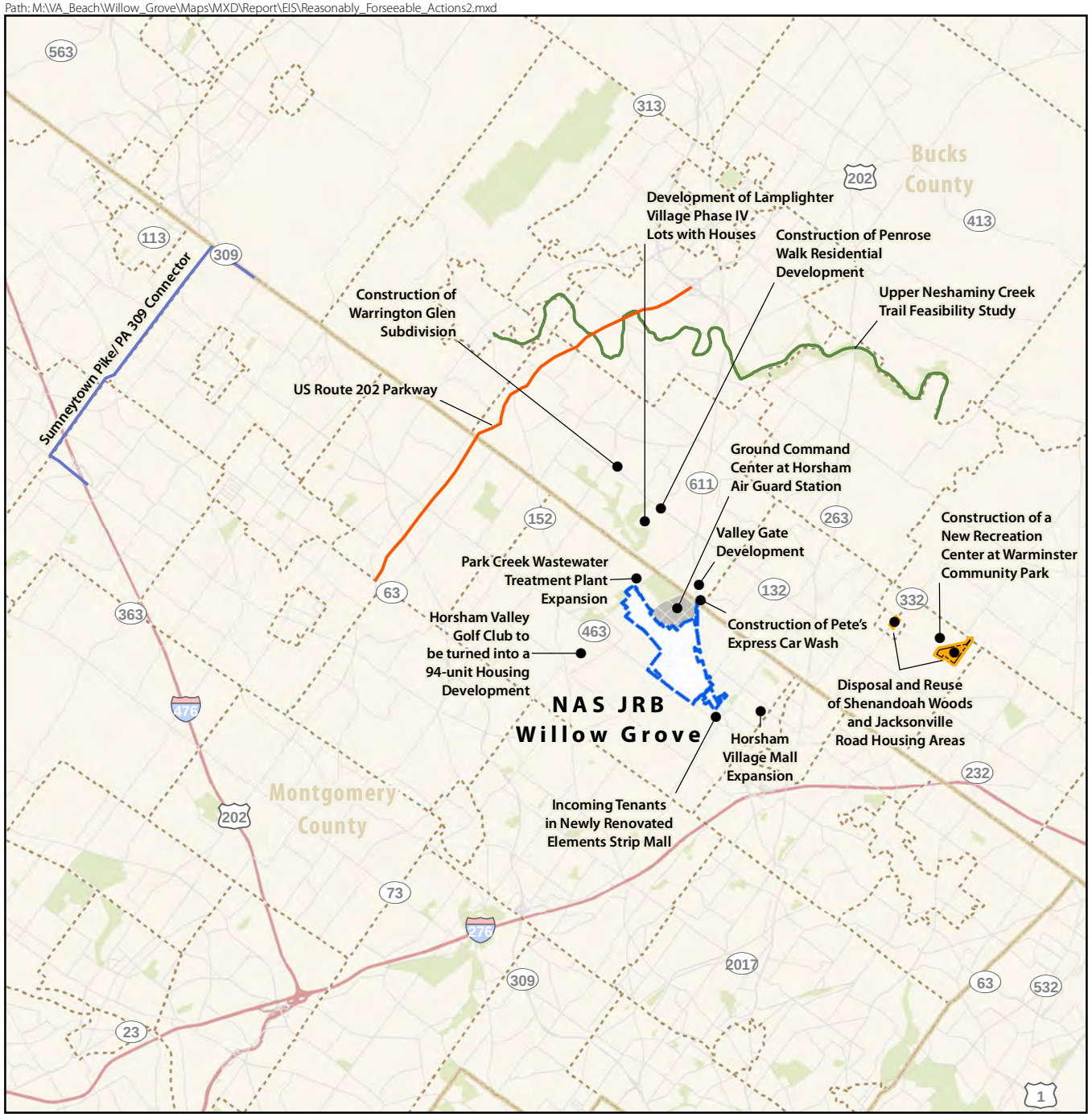

Figure 5-1

Reasonably Foreseeable Actions in the Vicinity of Former NAS JRB Willow Grove

Horsham, PA

Legend

- Reasonably Forseeable Actions
  Not Shown: Oak Creek at Warrington Residential Development
- US Route 202 Parkway
- Sumneytown Pike/ PA 309 Connector
- Upper Neshaminy Creek Trail Feasibility Study
- Freeway
- Major Road
- NAS JRB Willow Grove
- FAA Tower and Horsham Air Guard Station (not included in redevelopment)
- Shenendoah Woods and Jacksonville Road Housing Areas
- County Boundary
- Town/City Boundary
- Park

SCALE

0 1 2 Miles

SOURCE: ESRI 2010; Ecology and Environment 2013; Tetra Tech 2012.

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This section identifies foreseeable non-project actions and long-term trends in or near the study area that may pose a cumulative effect on the resources, ecosystems, and human environment in the project area when considered with the effects of the Proposed Action. Actions are considered reasonably foreseeable future actions if they have been formally proposed, environmental documents have been prepared, or the relevant authorization and/or permits have been obtained but construction has not yet started.

5.3.1 Federal Actions

Ground Command Center at Horsham Air Guard Station

The U.S. Air Force has selected the Pennsylvania Air National Guard's 111th Fighter Wing, located at Horsham Air Guard Base within the boundaries of the former NAS JRB Willow Grove, for a Ground Command Center. The center would be established at the base to control remote aircraft from a virtual cockpit (PRNewswire 2013).

As a result of the new mission, the composition, operational tempo, and infrastructure of the unit will expand, and nearly 250 jobs will be added, 75 of which are expected to be full-time positions (PRNewswire 2013). The mission will become active on October 1, 2013, and it will take about two years for the command center to be fully operational with trained pilots and modified facilities (Palmer 2013). The aircraft will be deployed at overseas locations.

Disposal and Reuse of Shenandoah Woods and Jacksonville Road Housing Areas

The closure of NAS JRB Willow Grove and its outlying housing areas, Shenandoah Woods and the Jacksonville Road housing areas, was required by the BRAC Closure Law. A separate NEPA document was prepared for these housing areas because they are physically separate from the former installation (about 4 miles away from the main base and in a different county) and because a separate reuse plan was developed in advance of the reuse plan for NAS JRB Willow Grove.

The Navy completed the Environmental Assessment for the disposal and reuse of the housing areas in September 2012. The proposed action is the disposal and reuse of the housing areas in a manner consistent with the *Amendment and Supplement to: Redevelopment Plan and Homeless Assistance Submission* (HLRA and BBP & Associates, LLC. 2011). This redevelopment plan would dispose of the Jacksonville Road housing area by conveyance to the Bucks County Housing Group, which would demolish the six single-family one-story houses at the site and construct a one-story office building for their use. The Shenandoah Woods housing area would be disposed of by a negotiated sale to the Bucks County Redevelopment Authority, which would redevelop the site with a maximum of 25 detached single-family houses and 88 semi-detached duplex housing units. The Finding of No Significant Impact (FONSI) for this action was signed on October 3, 2012.

5.3.2 Non-Federal Actions

Incoming Tenants in the Newly Renovated Elements Strip Mall

The Elements strip mall at 301 to 307 Horsham Road is newly renovated, and several empty spaces are available for rent. The area is zoned commercial, and possible uses include retail, restaurant, business office, medical office, and bank. More than 30,000 square feet is available, divided among various spaces ranging in size from 357 square feet to 5,498 square feet (Katalinas 2012a).

Horsham Village Mall Expansion

Carlyle Management Corporation, the New York-based company that owns the Horsham Village Mall, has plans to expand and improve the shopping center. It will add satellite stores and one or two additional stores beside the center's main anchor store, Acme (a grocery store). The building facades are being

renovated and upgraded, and there will be landscaping, stormwater management, and traffic improvements (Katalinas 2012b).

Redevelopment of the Horsham Valley Golf Club

The 18-hole Horsham Valley Golf Club went out of business and was shut down on Tuesday, July 3, 2012. The course had more than 1,200 pine trees, as well as water features at holes 13 through 16 (Prince 2012). The Horsham Township Council has approved redevelopment of the approximately 70-acre property with 94 single-family houses (Katalinas 2011). The developer, Cutler Group, announced that the redevelopment will occur in three phases, with the first phase located closest to Babylon Road. Tree clearing will occur during the first phase, with over half the trees being removed. A project representative indicated that trees will be planted elsewhere in the area (Colletta 2012). The development will also have a pedestrian connection with the township's Power Line Trail and a stormwater retention basin (Katalinas 2011; Colletta 2012).

Valley Gate Development

The 67-acre, mixed-use Valley Gate development is planned at a site in Warrington Township, on the east side of Easton Road (SR 611) across from BJ's Wholesale Club. Prior to becoming the future site of the Valley Gate development, the land was referred to as the Penrose Tract due to the Penrose House, circa 1749, that was located on the property (Pietras 2012; Freedman 2013). The new mixed-use development is to include 82 townhomes with an estimated selling price of over $300,000 (Freedman 2013); a 153,000-square-foot Walmart (Pietras 2012); a hotel that in 2012 was slated to be a Hilton Garden Inn (Pietras 2012) but as of 2013 is likely to be a Marriott Courtyard (Freedman 2013); a McDonald's; a Buffalo Wild Wings; a Red Robin; a GNC store; a yogurt shop; and a Hair Cuttery (Freedman 2013). The development would have two access driveways on Easton Road and one access driveway on Paul Valley Road (Pietras 2012). The Warrington Township Supervisors approved the development in February 2013, and the Penrose House was demolished the same week that approval was obtained. Warrington's Historical Commission and Historical Society favored preservation of the house (Freedman 2013).

Park Creek Wastewater Treatment Plant Expansion

The HWSA is upgrading and expanding the Park Creek Sewage Treatment Plant to more than double its capacity. The plant currently treats an average of 1.0 million gpd and is capable of treating up to 1.3 million gpd. Once the expansion is complete, the plant will treat an average of 2.25 million gpd and be capable of treating up to 2.79 million gpd. Additionally, the treatment process will be upgraded from advanced secondary to tertiary treatment. The plant will continue to serve Horsham Township and portions of Upper Dublin Township, in Montgomery County, as well as portions of Warrington Township, in Bucks County. Treated effluent will continue to be discharged to Park Creek, and waste sludge will continue to be transported off-site by a licensed hauler for disposal at a state-approved facility. Construction is scheduled to begin in 2013 and to be completed in 2014 (Carroll Engineering Corporation n.d.; DRBC 2013).

Construction of Pete's Express Car Wash

On October 23, 2012, the Board of Supervisors of Warrington Township approved the construction of a 5,380-square-foot car wash facility on a 2.9-acre tract located on the eastern side of Easton Road at Poplar Road. The site plans include an underground detention basin. The site will be served by public water and sewer (Warrington Township 2012a).

Construction of Penrose Walk Residential Development

Fifty-four semi-detached single family houses are being constructed on a 31-acre tract located on the east and west sides of Street Road between Phillips and Bradford Avenues in Warrington Township. The units will be connected to public water and sewer services. The developer is responsible for constructing

all roads, streets, road traffic and street signs, grading and drainage facilities, and public water supply and sewer lines (Warrington Township 2013).

Construction of Oak Creek at Warrington Residential Development

Twenty-three single family detached houses are being constructed with frontage on County Line Road in Warrington Township. The units will be connected to public water and sewer services. The developer is responsible for constructing all roads, streets, road traffic and street signs, grading and drainage facilities, and public water supply and sewer lines (Warrington Township 2012b).

Construction of Warrington Glen Subdivision

A subdivision called Warrington Glen is proposed for the 90-acre Meehan-Lacy tract, which is located along the north side of Street Road, approximately 600 feet east of Folly Road in Warrington Township (Warrington Township 2012c).

Development of Lamplighter Village Phase IV Lots with Houses

The developer of Lamplighter Village, an active adult community, went bankrupt before completing Phase IV of the development, resulting in 21 empty lots. It is expected that these lots will be purchased and houses will be constructed (DeBree 2011).

Construction of a New Recreation Center at Warminster Community Park

Previously, the Warminster Township Parks and Recreation Department operated the Warminster Recreation and Education Center (WREC) in the former Hart Elementary School. The Centennial School District gave to building to the township in 1988. A 2001 township assessment determined that the building was in fair to poor condition, requiring major repairs. In 2012 the township announced the closure of the WREC because of lack of funding for repairs to the deteriorating building, and the school district could invoke a reversionary clause in the lease that would allow it to take back the property. With the WREC closed, the Warminster Township Parks and Recreation Department moved to a temporary facility (a 2,800-square-foot modular building) at Warminster Community Park in May 2013. The township is currently seeking a $1.7 million grant from Pennsylvania's Redevelopment Assistance Capital Program to build a new 10,000-square-foot WREC at Warminster Community Park. The old WREC was 40,000 square feet but also had rent-paying tenants. One tenant, a preschool, left the WREC in 2011; therefore, less space is needed for the new facility (Wagh 2012; Ruvo 2012; Boyle 2013).

Upper Neshaminy Creek Trail Feasibility Study

Bucks County is studying the feasibility of creating a trail along the Upper Neshaminy Creek, from Twin Streams Park in Chalfront Borough to the Forks of the Neshaminy in Rushland, Wrightstown Township. The county is soliciting public input into the trail design, including potential uses of the trail, amenities and features, trailhead locations, and connections to the trail (Bucks County 2013).

U.S. Route 202 Parkway

The new 9-mile-long U.S. Route 202 parkway opened on December 3, 2012, connecting Route 63 in Lower Gwynedd Township with Route 611 in Doylestown Township. It is projected that in the next decade, over 30,000 vehicles a day will use this roadway (Sokil 2012). The parkway is four lanes in the more densely populated portions in Montgomery County and two lanes in proximity to its connection with Route 611 in Bucks County. The parkway was built parallel to the existing Route 202 to alleviate traffic on the existing route in Warrington and Chalfont. It was originally planned to be a four-lane expressway bypass with sound walls, but funding constraints led to the parkway design. The Montgomery County Planning Commission said that the parkway design also better fits into the landscape. The parkway includes landscaping, traffic-calming islands, split-rail fencing, a 12-foot-wide trail for walking and bicycling, and five trailhead parking lots along the route (Savana 2012).

Sumneytown Pike/PA 309 Connector

A 5-mile-long, two-lane connector road from Sumneytown Pike in Montgomery County to PA 309 in Bucks County is being constructed in two phases. Construction of Phase I, Wambold Road from Sumneytown Pike to Allentown Road and the Sumneytown Pike Realignment, was completed in May 2012. Construction of Phase II, from Allentown Road to County Line Road and the 309 Interchange, is currently scheduled to begin in 2021, unless construction funding becomes available earlier. The project is designed to accommodate two 11-foot-wide lanes with 8-foot-wide paved shoulders. In addition to achieving these dimensions by widening existing roads, the project also includes the realignment of sharp bends and the addition of right and left turn lanes and traffic signals. This project will relieve existing and projected traffic congestion along the corridor, which crosses five townships: Towamencin, Lower Salford, Hatfield, and Franconia in Montgomery County, and Hilltown in Bucks County (Pennsylvania Department of Transportation n.d.)

5.4 Cumulative Impact Analysis

This section identifies the cumulative effects associated with redevelopment of the former installation and the projects listed above in Section 5.3. This analysis focuses on the human environment. If redevelopment of the former installation does not result in a direct or indirect impact, then no further analysis of potential cumulative effects is necessary. The following resources have been included in the cumulative effects analysis because redevelopment could result in direct or indirect impacts on these resources:

- Land Use
- Socioeconomics
- Community Facilities
- Transportation
- Air Quality
- Infrastructure and Utilities
- Water Resources

5.4.1 Land Use

5.4.1.1 Geographic Study Area

The geographic study area for land use included Horsham Township, Warminster Township, and Warrington Township.

5.4.1.2 Cumulative Impact Analysis

Future actions that would convert existing land uses to new uses were considered to assess cumulative impacts on land use. Projects identified include new mixed-use, residential, commercial, recreation, transportation, and industrial development. These land uses in conjunction with the Proposed Action could result in changes to the built environment and land use types within the study area.

The Proposed Action would reintegrate approximately 861 acres of federal land to Horsham Township. Under all action alternatives, existing land use on the installation would change. Under Alternatives 1 and 2, the installation would be converted into a mixed-use development with varying residential densities. Alternative 3 would retain use of the airfield, and limited residential development would occur. All three alternatives would include office, retail, recreation, open space, and BCHG units.

The federal, state, local, and private projects identified in Section 5.3 would result in land use changes in the study area, either through redevelopment or development of vacant land. Most of these projects would be small scale and would not be located adjacent to the former installation property. Compliance with local zoning ordinances would be expected to ensure consistency of these projects with existing land uses in the study area and local land use controls (i.e., general or comprehensive plans).

The Proposed Action and the planned projects described in Section 5.3 would increase the overall building density of the townships within the study area. Depending on the availability of land and economic incentives for additional development, these projects could result in conversion of undeveloped open space or agricultural lands into denser development. The addition of more commercial and retail space could result in abandonment of older commercial and retail areas; however, the addition of more residences could offset this impact and even increase the need for more commercial and retail space.

Increased employment at the Horsham Air Guard Station, expansion of the Park Creek STP, and construction of the recently opened U.S. Route 202 Parkway have the potential for accommodating, encouraging, and increasing future growth. This, along with the Proposed Action, would further increase the density of the townships within the study area.

Therefore, the Proposed Action, when considered with other development and redevelopment projects identified in Section 5.3, could result in long-term changes to and potential cumulative impacts on land uses in the study area. The local planning processes are in place to ensure that changes in land use associated with the proposed development and redevelopment projects would be consistent with local land use controls and compatible with existing surrounding land use or planned land uses at the former installation.

5.4.2 Socioeconomics

5.4.2.1 Geographic Study Area

The geographic study area has been defined as Horsham Township and Montgomery and Bucks counties, Pennsylvania. This geographic study area is comprised of the communities that are most likely to be impacted by the proposed redevelopment scenarios with regards to employment, population growth, impacts on the housing market, and fiscal impacts on local government entities.

5.4.2.2 Cumulative Impact Analysis

As described in Section 4.2, implementation of the proposed alternatives would have positive economic impacts on the regional economy through (1) short-term employment impacts caused by the construction phase of proposed redevelopment and (2) long-term employment impacts, which would occur during the operations phase of proposed redevelopment. If full build-out is achieved over the estimated 20-year construction period, it would be expected that approximately 483 annual construction jobs would be generated under Alternative 1; 492 annual construction jobs would be generated under Alternative 2; and 143 construction jobs would be generated under Alternative 3. These impacts would be considered short term and temporary in nature, as construction costs and would occur only during the construction phase of the proposed redevelopment. If construction of the projects defined in Section 5.3 were conducted simultaneously with redevelopment of the former installation, there would be the potential for a cumulative positive impact on the local economy and employment in the study area. In addition, the existing construction labor force in the greater Philadelphia area is sufficient to handle the completion of all of these projects simultaneously; therefore, no labor shortages would be anticipated. Labor from outside of the region would not be required even if all projects identified in Section 5.3 were completed simultaneously; therefore, cumulative in-migration during construction would not be expected to occur.

Long-term positive economic impacts would also occur as a result of operation of the proposed built facilities. These impacts would begin as construction was completed for each facility. Assuming full build-out potential would be met and that the property would be used by business enterprises new to the region, an estimated 7,577 new permanent jobs would be generated under Alternative 1; 7,131 new permanent jobs would be generated under Alternative 2; and 5,283 new permanent jobs would be generated under Alternative 3. In addition to these direct permanent jobs, indirect and induced employment impacts would be expected to occur as the increased employment and business activity stimulates the regional economy.

Development of the Ground Command Center at Horsham Air Guard Station would generate 250 jobs for the study area, 75 of which would be full-time. Incoming tenants in other projects, including the newly renovated Elements strip mall, Horsham Village Mall expansion, Valley Gate Development, and Pete's Express Car Wash, would all have a positive cumulative impact on employment opportunities in the study area and in the greater Philadelphia area. Given the size of the total labor force in the Philadelphia MSA and current unemployment rates, the existing population should be able to fill these new job vacancies, creating only limited in-migration to the area due to increased employment.

There could be a moderate cumulative impact on the local housing market if all of the proposed housing projects discussed in Section 5.3 and the redevelopment of the former installation were to occur at the same time. If Alternative 1 were implemented, 340 single-family homes, 350 townhomes, 726 multi-unit homes and/or condominiums, and 70 BCHG units would be constructed. Implementation of Alternative 2 would create an additional 396 single-family homes, 396 townhomes, 1,137 multi-unit homes and/or condominiums, and 70 BCHG units in the local housing market. Limited new housing would be constructed in the local area under Alternative 3. The projects listed in Table 5-2 include plans for an additional 217 single-family homes, 88 duplexes (or 176 units), and 82 townhomes to be constructed in the reasonably foreseeable future. When the impacts of Alternative 1 or Alternative 2 on the local housing market are considered in conjunction with the addition of the other proposed new housing units, the additional housing may have a cumulative impact on local prices and availability, as the increase in housing supply may decrease the demand for existing homes. This impact would be moderate given the low home-owner and rental vacancy rates in the study area and the high demand for housing in the local market.

Table 5-2 Housing Units Proposed as Recently Completed or Reasonably Foreseeable Projects

Project	Single-Family Homes	Duplex	Townhomes
Shenandoah Woods and Jacksonville Roads Housing Areas	25	88	0
Horsham Valley Golf Club	94	0	0
Valley Gate Redevelopment	0	0	82
Penrose Walk	54	0	0
Oak Creek at Warrington	23	0	0
Lamplighter Village Phase IV Lots[1]	21	0	0
Total	**217**	**88**	**82**

Notes:
[1] Up to 21 lots that could be constructed as single-family homes.

Proposed redevelopment of the former NAS JRB Willow Grove property, in conjunction with the other foreseeable projects, could have a cumulative impact on the local population. Utilizing the same multipliers and methodology as described in Section 4.2, population impacts were calculated for the proposed housing projects identified in Table 5-2. For all owner-occupied houses (single-family units and townhomes) a 2.89 household size was assumed, while for all renter-occupied units (multi-family

units) a 1.96 household size was assumed. It was also assumed that all newly constructed housing units would be populated by persons moving into the local communities. Using this methodology, the estimated population in the geographic study area would increase by 1,209 persons as a result of construction of the projects listed in Table 5-2.

Approximately 3,555 persons would reside in the newly constructed homes that would be built under Alternative 1, and approximately 4,653 persons would reside in the newly constructed homes that would be built under Alternative 2. Alternative 3 would not result in a substantial increase in the local population (increase of 137 persons). Cumulatively, implementation of Alternative 1 and the proposed projects from Section 5.3 would increase the local population by an estimated 4,163 residents. This increase population would represent 0.3 percent of the 2010 population for Montgomery and Bucks counties. Implementation of Alternative 2 in conjunction with the proposed projects from Section 5.3 would increase the local population by an estimated 5,711 residents, or 0.4 percent of the 2010 population for the both counties.

In addition to an increase in housing units, there would be an increase in commercial and retail space from redevelopment of the former installation and implementation of the other foreseeable projects in the study area. Proposed commercial/retail development projects include 30,000 square feet from the Elements strip mall, additional space from Horsham Village Mall expansion, the Valley Gate Development (including a hotel), and construction of Pete's Express Car Wash. The additional supply of commercial and retail space could result in lower rental rates if new tenants from outside the region are not found, and there would be less demand for space.

Aside from the expansion of the Horsham Village Mall and renovation of the Elements strip mall, tenants have already been secured for the development of commercial and retail space in the area at the Valley Gate Development, including: Courtyard Marriott, Walmart, McDonalds, Buffalo Wild Wings, Red Robin, a GNC store, a frozen yogurt shop, and Hair Cuttery. In addition, Pete's Express Car Wash has been identified as a tenant for the newly developed commercial and retail space in the area. Plans to expand the Horsham Village Mall and renovate the Elements strip mall would add more than 30,000 square feet of additional commercial and retail space without specific tenants identified. Given the large amount of retail space currently occupied in the study area, the cumulative impact of this additional retail space would not be significant, especially considering the 20-year build-out duration of the redevelopment of the former installation and because the actual amount of commercial and retail space built would be dictated by market conditions.

5.4.3 Community Facilities

5.4.3.1 Geographic Study Area

The study area includes the Hatboro-Horsham School District for schools, Horsham Township for police and fire protection, an approximately 7-mile-radius area around the former installation property for health services, and Horsham Township for recreational facilities.

5.4.3.2 Cumulative Impact Analysis

The transformation of the Horsham Valley Golf Club into a 94-unit housing development was the only housing project that could have a potential cumulative impact on education with Alternatives 1 or 2. Both projects would increase the number of housing units in Horsham Township and, therefore, the number of school-aged children within the school district. The increase in school-aged children would be partially offset with the decrease in students associated with the closure of NAS JRB Willow Grove, the 20-year build-out duration of Alternatives 1 or 2, and because the actual number of homes built for both projects would be dictated by market conditions.

The 94-unit housing development would also have a potential cumulative impact with Alternatives 1, 2, or 3 because both projects would contribute to an increase in demand for police and fire protection. However, they would also provide additional taxes, a portion of which would offset additional expenses incurred. New tenants (e.g., retail shops, businesses) in the recently renovated Elements strip mall and at the Horsham Village Mall would also require police and fire protection, but would also contribute to the local tax base.

All of the new housing areas described in Section 5.3 (the 94-unit housing development at Horsham Golf Club, the reuse of Shenandoah Woods, housing at the Valley Gate Development, Warrington Glen subdivision, Penrose Walk, and the development of Lamplighter Village Phase IV lots with houses) would add to the local population, resulting in a cumulative increase in demand for healthcare and medical services. Local hospitals and healthcare providers would be able add capacity, as needed, to accommodate the additional demand for services, especially considering the 20-year build-out duration.

The construction of the 94-unit housing development and Alternatives 1, 2, or 3 would increase the number of residents accessing recreational facilities in Horsham Township. The proposed redevelopment would add a new indoor recreational facility to the township's assets, helping to better serve the needs of the existing and growing population. Approximately 220 acres of open space land would also be added, helping to further serve the recreational needs of the township. Therefore, the proposed action would have a beneficial impact on recreational facilities, even when considering the additional housing under Alternatives 1 or 2 and the proposed 94-unit development.

5.4.4 Transportation

5.4.4.1 Geographic Study Area

For the purposes of this analysis, the study area includes the area defined in the *Traffic Assessment Study: Naval Air Station Joint Reserve Base (NAS JRB) Willow Grove* (TechniQuest 2013). The traffic study area encompasses key roadways and intersections in the vicinity of the former installation. The property, located in the eastern area of Horsham Township, is bordered by Easton Road, Horsham Road, Keith Valley Road, and County Line Road.

5.4.4.2 Cumulative Impact Analysis

Trips generated by Alternatives 1, 2, or 3 would likely be concentrated in Horsham Township and Warrington Township and would have some impact throughout Montgomery and Bucks counties. Cumulative impacts on traffic from the Proposed Action and projects discussed in Section 5.3 could occur. The analysis for transportation impacts in Section 4.4 incorporated a PennDOT background growth factor of 0.73 to account for other general population growth and other developments in the vicinity and county. It is assumed that this background growth would include some of the growth that would result from the projects listed in Section 5.3. Therefore, the cumulative impacts from the projects listed in Section 5.3 would not significantly affect projected traffic volumes or the LOS of surrounding roadways, based on the potential increase in traffic from the overall projected growth rate incorporated into this analysis. Any proposed project accessing a state road that would result in a drop in LOS and an increase in delay of more than 10 seconds would be required to mitigate the drop in LOS (PennDOT 2009).

In addition, any proposed project accessing a state road that is expected to generate 3,000 or more average daily trips or 100 or more peak hour trips would be required to conduct a traffic impact study and follow mitigation requirements. Mitigation would be required for intersections expected to have a drop in LOS

and an increase in delay of more than 10 seconds during the design horizon year with the proposed project compared to the design horizon year without the proposed project (PennDOT 2009).

The proposed Ground Command Center at Horsham Air Guard Station would create approximately 250 additional positions, which would generate additional vehicle trips in the area. Traffic from this project could be concentrated along County Line Road and Easton Road and their intersection directly north of the property. Cumulative impacts from the proposed Ground Command Center and redevelopment of the former installation property could occur.

Incoming tenants to the newly renovated Elements strip mall would likely generate additional evening traffic along Horsham Road and Dresher Road near the southern edge of the former installation. Cumulative impacts on traffic from additional tenants at the renovated Elements strip mall and redevelopment of the former installation property could also occur.

Expansion of the Horsham Village Mall could be expected to generate additional traffic during and after construction. Traffic impacts would be concentrated on West Moreland Avenue and Blair Mill Road, with some additional potential impacts at the intersection of Blair Mill Road and Easton Road, between the former installation property and I-276. Cumulative impacts on traffic from the proposed expansion of the Horsham Village Mall and redevelopment of the former installation property could occur.

Redevelopment of the Horsham Valley Golf Course would result in 94 new single-family homes in the township. The proposed housing units could be expected to generate additional traffic on Horsham Road to the west of the former installation property. Cumulative impacts on traffic from the proposed redevelopment of the Horsham Valley Golf Course and redevelopment of the former installation property could occur.

The proposed Valley Gate Development would include a mix of commercial and residential uses that would generate additional traffic along Easton Road and County Line Road during and after construction. The proposed 67-acre development would be expected to generate a moderate number of additional vehicle trips in the area, but the number of vehicles would vary depending on the final mix of uses, number of units, and square footage constructed for the development. Cumulative impacts on traffic from the proposed Valley Gate Development and redevelopment of the former installation property could occur.

Expansion of the Park Creek STP could generate additional traffic in the area along Keith Valley Road during construction. Temporary cumulative impacts on traffic from the proposed expansion of the Park Creek STP and redevelopment of the former installation property could occur.

Construction of Pete's Express Car Wash would generate additional traffic in the area during and after construction, along Easton Road and County Line Road. Without specific construction plans for the project, the amount of additional traffic cannot be determined at this time. However, cumulative impacts on traffic from the project and redevelopment of the former installation property could occur.

The construction of 54 semi-detached housing units as part of the Penrose Walk Residential Development would be expected to generate minor to moderate additional traffic in the area during and after construction. Traffic would be concentrated to the north of the former installation property, with some traffic utilizing Easton Road. Cumulative impacts on traffic from the proposed Penrose Walk Residential Development and redevelopment of the former installation property could occur.

Construction of 23 single-family homes at the Oak Creek at Warrington Residential Development would generate additional traffic during and after construction, north of the former installation property and

along County Line Road. The number of additional vehicle trips generated could be minor to moderate. Cumulative impacts on traffic from the proposed Oak Creek at Warrington Residential Development and redevelopment of the former installation property could occur.

U.S. Route 202 Parkway was opened in December 2012. Traffic counts from the Traffic Assessment Study (TechniQuest 2013) were conducted after the completion of U.S. Route 202 and, therefore, captured existing transportation impacts of the completed parkway on roadways near the property. Cumulative transportation impacts of U.S. Route 202 along with the redevelopment of the property are reflected in projected traffic volumes discussed in Section 4.4.

Construction of the Sumneytown Pike/ PA 309 Connector would alleviate ongoing traffic congestion to the west of the former installation property, creating a beneficial cumulative impact on traffic in the area.

There are several projects for which there is a potential for cumulative impacts on traffic; however, given the distance from the property, the impacts would be expected to be minor but cannot be accurately determined. These projects include the following:

- Disposal and Reuse of Shenandoah Woods and Jacksonville Road Housing Areas;
- Construction of the Warrington Glen subdivision;
- Development of Lamplighter Village Phase IV lots;
- Construction of a new Recreation Center at Warminster Community Park; and
- The development of a trail along Neshaminy Creek.

The HLRA Redevelopment Plan has goals to (1) improve cross-circulation of traffic through the site, where appropriate; (2) be sensitive to traffic congestion and traffic flow around and through the installation property and attempt to mitigate these impacts; (3) improve transportation management technology and signal coordination; and (4) incorporate the latest green and sustainable design principles, where appropriate. These goals would partially offset potential cumulative impacts on transportation.

5.4.5 Air Quality

5.4.5.1 Geographic Study Area

For the purposes of this analysis, the study area includes the Philadelphia-Wilmington Air Control Region.

5.4.5.2 Cumulative Impact Analysis

The PADEP Bureau of Air Quality is responsible for the preservation, protection and improvement of air quality in Pennsylvania. This is accomplished, in partnership with the EPA, by regulating the emission of air pollutants from stationary and mobile emission sources. PADEP manages state resources and development to protect air quality and ensure the state's progress toward compliance with the NAAQS through actions such as monitoring air quality, inspecting emission sources, planning as part of the SIP, permitting, and inventorying air pollutant emissions.

As discussed in Section 3.6, the former installation property is located within the Philadelphia-Wilmington Air Control Region, which is in moderate nonattainment for the 8-hour ozone standard, and basic nonattainment for both the 1997 and 2006 $PM_{2.5}$ standards. In addition, Pennsylvania as a whole is included in the Northeast Ozone Transport Region (EPA 2013c). The PADEP Division of Air Resource Management addresses cumulative air quality in the state and the regions by developing (PADEP 2013d):

- Regulations, policies, and guidance necessary to implement requirements of the federal Clean Air Act (CAA) and the Pennsylvania Air Pollution Control Act (APCA);
- Strategies and programs to address interstate transport issues;
- State Implementation Plans (SIPs);
- Regulations for stationary and area sources; and
- Programs that reduce the interstate transport of pollutants.

The PADEP Division of Air Resource Management also works with the following:

- Regional and national groups on the development and implementation of stationary and area source emission reduction strategies;
- PennDOT to implement vehicle emissions inspection/maintenance programs;
- Metropolitan planning agencies to ensure transportation projects are consistent with air quality plans; and
- National and regional groups on other mobile source issues, such as improved gasoline and diesel fuels.

In addition, the PADEP Division of Air Resource Management implements voluntary and pilot programs to reduce pollution from cars, trucks, and off-road sources.

Construction Emissions

Under Alternatives 1, 2, and 3, construction would result in a temporary increase in regional emissions. Other construction projects in the region would result in a temporary increase in emissions, and there could be potential for temporary cumulative impacts on air emissions in the region. With the build-out duration of 20 years, the extent of cumulative impacts on air quality would depend on concurrent construction schedules of projects located in the same geographic area. For most projects, specific data regarding construction schedules and final configurations of project size, type, and location are unavailable; therefore, potential cumulative impacts cannot be quantified. Cumulative construction emissions would be reduced through the implementation of BMPs and mitigation measures such as dust control and proper maintenance of and idling restrictions on construction equipment, as discussed in Section 4.6.

Building Use Emissions

Under each of the proposed redevelopment alternatives, building use emissions would be generated from heating and operation of residential, commercial, and/or public buildings. For other proposed construction and community development projects, building use could result in potential cumulative impacts on air emissions. The extent of cumulative impacts on air quality would depend on building size, type, location, use, and construction timeline during the 20-year build-out. This information is currently not available; therefore, the extent of cumulative impacts cannot be accurately quantified. However, as discussed in Section 4.6, these impacts could be reduced by using modern building construction techniques and installing energy-efficient heating and cooling systems and appliances. Large sources of emissions would be controlled through the PADEP's stationary source permitting programs.

Mobile Sources

Cumulative emissions from mobile sources could represent a large source of air emissions in the region. Under Alternative 1 or Alternative 2, mobile source emissions would be generated by the increased use of

motor vehicles. Vehicle traffic patterns and volumes would change, and there would be an increase in the number of automobiles and trucks at full build-out, resulting from the increase in personally owned vehicles (POVs) in the area. Additional growth and development in the region would likely increase vehicle use. As discussed in Section 4.6, stricter CAFE standards would increase the efficiency of vehicles, thereby, reducing energy use and emissions. PADEP and PennDOT continue to review projects and develop programs to reduce emissions from vehicles in the state and region. Cumulative mobile source emissions could be mitigated by further reducing the number of vehicles through the provision of public transportation and carpooling programs. The HLRA Redevelopment Plan incorporated goals to improve transportation management and incorporate the latest green and sustainable design principles, where appropriate. These goals would partially offset potential cumulative air emission impacts.

Under Alternative 3, the change in aircraft use would result in a reduction of all emissions from all criteria pollutants from baseline conditions except CO. However, the increased CO emissions would be spread over the airfield property and would likely not contribute to cumulative impacts.

Greenhouse Gas Emissions and Climate Change

Climate change refers to any significant change in measures of climate lasting for an extended period. Global climate change threatens ecosystems, water resources, coastal regions, crop and livestock production, and human health (EPA 2012a). Many scientific studies correlate the observed rise in global annual average temperature and the resulting change in global climate patterns with the increase in greenhouse gases (GHGs) in Earth's atmosphere. Worldwide use of fossil fuels is the primary cause of that increase (EPA 2012a). GHG emissions occur locally, but GHG impacts are both global in scale and cumulative over time.

In October 2010, the CEQ issued *Guidance on Federal Greenhouse Gas Accounting and Reporting* to establish federal requirements for GHG reporting for compliance with EO 13514, guidance that affirms the requirements of NEPA and CEQ regulations and their applicability to GHGs and climate change impacts (CEQ 2010b). Compliance with these CEQ guidelines requires making an inventory of energy use and related GHG emissions, including evaluating the effects of GHG emissions of the proposed and alternative actions on EO 13514 goals and the relationship of climate change effects to the proposed action or alternatives. Navy NEPA Guidance OPNAVINST 5090.1C, Change 1 states that where appropriate, the EIS must identify the effects of climate change that may occur in executing the proposed action. Greenhouse gas emissions should be quantified (where possible) and the beneficial activities being implemented Navy-wide to reduce greenhouse gas emissions (e.g., energy-efficient construction) should be described.

The EPA and the CEQ have referred to the GHGs identified in the Kyoto Protocol: four primary GHGs (CO_2, methane [CH_4], nitrous oxide [N_2O], and sulfur hexafluoride [SF_6]) and two secondary groups of GHGs (hydrofluorocarbons [HFCs] and perfluorocarbons [PFCs]). Each GHG is assigned a global warming potential (GWP). The GWP is the ability of a gas or aerosol to trap heat in the atmosphere. The GWP rating system is standardized to CO_2, which has a value of one. For example, CH_4 has a GWP of 21, which means that it has a global warming effect 21 times greater than CO_2 on an equal mass basis. The equivalent CO_2 rate is calculated by multiplying the emission of each GHG by its GWP and adding the results together to produce a single, combined emission rate representing all GHGs in terms of CO_2 equivalents (CO_2e) (IPCC 2007).

For the purpose of assessing the cumulative GHG emissions that could result from the action, CO_2, CH_4, and N_2O emissions from building energy use and CO_2 emissions from motor vehicle and aircraft use at full build-out have been quantified in terms of CO_2e. Other emissions and emission sources are considered negligible. Detailed assumptions and calculations are provided in Appendix D. Table 5-3

provides a summary of GHG emissions in CO_2e for all of the redevelopment alternatives, including baseline conditions.

The EIA reports that the estimated CO_2 emissions from Pennsylvania in 2010 are 256.56 million metric tons (MT) CO_2e (EIA 2013). The total GHG emissions from the alternatives represent about two hundredths of a percent (0.02 percent) of total Pennsylvania emissions.

Table 5-3 Annual GHG Emissions for all Redevelopment Alternatives

Emission Source	Global Warming Potential per year (MT CO_2-e)			
	CO_2	N_2O	CH_4	Total
Baseline Conditions, 2010				
Building Emissions	11,383.19	55.42	11.28	11,449.88
Mobile Emissions	8,733.71	N/A	N/A	8,733.71
Total Baseline Emissions	**20,116.89**	**55.42**	**11.28**	**20,183.59**
Alternative 1				
Building Emissions	32,069.82	185.92	28.28	32,284.03
Mobile Emissions	9,036.44	N/A	N/A	9,036.44
Total Alternative 1 Emissions	**41,106.26**	**185.92**	**28.28**	**41,320.47**
Change in Total Emissions	**20,989.37**	**130.50**	**17.01**	**21,136.88**
Alternative 2				
Building Emissions	30,327.80	184.04	48.01	30,559.86
Mobile emissions	12,125.53	N/A	N/A	12,125.53
Total Alternative 2 Emissions	**42,453.33**	**184.04**	**48.01**	**42,685.39**
Change in Total Emissions	**22,336.44**	**128.62**	**36.74**	**22,501.80**
Alternative 3				
Building Emissions	12,970.96	90.28	20.46	13,081.69
Mobile emissions	2,097.11	N/A	N/A	2,097.11
Total Alternative 3 Emissions	**15,068.07**	**90.28**	**20.46**	**15,178.81**
Change in Total Emissions	**–5,048.82**	**34.86**	**9.19**	**–5,004.78**

Key:
MT CO_2e = metric tons of CO_2 equivalents.

On a national scale, federal agencies are addressing emissions of GHGs by reductions mandated in federal laws and Executive Orders. Most recently, EO 13423 (Strengthening Federal Environmental, Energy, and Transportation Management) and EO 13514 (Federal Leadership in Environmental, Energy, and Economic Performance) were enacted to address GHGs, including GHG emissions inventory, reduction, and reporting. Mitigation measures discussed in Section 4.6 to reduce energy use will also reduce GHG emissions.

5.4.6 Infrastructure and Utilities

5.4.6.1 Geographic Study Area

For the purposes of this analysis, the study area consists of the HWSA, Park Creek STP, and PECO distribution area within Horsham Township.

5.4.6.2 Cumulative Impact Analysis

Water demand would be 668,649 gpd under Alternative 1; 765,298 gpd under Alternative 2; and 201,937 gpd under Alternative 3. When considering additional proposed projects, the potential for cumulative impacts on water demand would occur. The township's existing water supply operations are already at

full capacity; therefore, the HWSA would need to acquire additional water supply to meet the demands of any of the three alternatives plus the other proposed projects. Upgrades, renovation, or new distribution lines would also be required to accommodate all of the proposed projects. Cumulative impacts would be partially offset by the duration of the 20-year build-out and the potential for the generation of revenues through increased residential and commercial development. Other proposed projects would not all be concurrent and would also generate additional tax revenues to support new water infrastructure.

The total wastewater generated by redevelopment would be 590,000 gpd under Alternative 1; 660,000 gpd under Alternative 2; and 190,000 gpd under Alternative 3. These wastewater volumes exceed the capacity of the Park Creek STP, which currently services a portion of Horsham Township. As stated in Section 5.3, the HWSA is planning to complete upgrades and construction to the Park Creek STP in 2014. As a result, an additional 1.25 million gpd of wastewater would be treated in the township. This would have a beneficial cumulative impact on wastewater treatment, as the plant expansion and upgrade of treatment capabilities would reduce cumulative impacts on wastewater management. The HWSA would also be able to further upgrade or expand wastewater system infrastructure when considering the additional tax revenue added to the Horsham Township and the 20-year build-out period for the former installation property. Other proposed projects would not all be concurrent and would also generate additional tax revenues to support new infrastructure.

The proposed development under Alternatives 1, 2, and 3 would increase impervious surface area by 103 acres, 102 acres, and 52 acres, respectively, as a result of new construction. This would increase impervious surface on the former installation by approximately 6 percent to 12 percent. Horsham Township would require the future property developer to comply with PADEP stormwater management policies and incorporate stormwater management into the redevelopment design.

The electricity consumption estimated for each of the alternatives at full build-out is 48,515,031 kWh for Alternative 1; 47,897,027 kWh for Alternative 2; and 23,306,943 kWh for Alternative 3. The natural gas consumption estimated for each of the alternatives at full build-out is 178,935,948 cf for Alternative 1; 196,425,488 cf for Alternative 2; and 55,923,668 cf for Alternative 3. All three alternatives would significantly increase demands on electricity and natural gas, requiring expansion and upgrades to the existing infrastructure to accommodate increased capacity requirements. Utility providers would be able add capacity as needed to accommodate the cumulative demand for services for the redevelopment of the former installation because of the 20-year build-out duration and the other proposed projects.

5.4.7 Water Resources

5.4.7.1 Geographic Study Area

The geographic study area for evaluating cumulative impacts on water resources includes the Pennypack Creek Watershed and the western portion of the Neshaminy Creek Watershed, which includes the sub-watersheds of Little Neshaminy Creek, North Branch Neshaminy Creek, Cooks Run-Neshaminy Creek, Mill Creek-Neshaminy Creek, and Ironworks Creek-Mill Creek.

5.4.7.2 Cumulative Impact Analysis

This analysis focuses on surface waters, wetlands, and water quality.

Surface Waters and Wetlands

The cumulative impacts analysis for this section focuses on direct impacts (alteration, fill, dredging, etc.) and indirect impacts (impacts from erosion and sedimentation) as a result of the proposed action and the projects discussed in Section 5.3. In the absence of specific data pertaining to water resources for the projects described in Section 5.3, a desktop analysis was completed using USFWS wetland and riparian

data, as developed for use in Google Earth. No quantitative information is available regarding proposed impacts on surface waters and wetlands or mitigation for these projects; therefore, only a qualitative analysis of impacts is provided in this section. Project areas where surface waters or wetlands were identified are discussed below.

- The proposed Ground Command Center at Horsham Air Guard Station has the potential to impact an on-site pond and a portion of an unnamed tributary to Park Creek that extends onto the former installation property. No NWI wetlands were identified on the Horsham Air Guard Station property; however, until a field wetland delineation is performed, it is not possible to determine impacts on water resources.
- The proposed disposal and reuse of the Shenandoah Woods and Jacksonville Road housing areas would result in the construction of up to 25 detached single-family homes and 88-semi-detached duplex housing units. These projects would also include the removal of six single family, one-story houses in order to construct a one-story office building. NWI wetlands were identified in the vicinity of the redevelopment areas. The Jacksonville Road housing area most likely would result in impacts (i.e., water quality) based on a desktop analysis of the proposed development location. However, due to the absence of specific construction plans and a field delineation to determine the presence of wetlands on-site, it is not possible to determine direct impacts (permanent fill) that would result from redevelopment of the existing infrastructure at either of these housing areas.
- No NWI wetlands were mapped in the vicinity of the Elements strip mall, but Pennypack Creek is located immediately south of the strip mall. Construction has been completed for this project; therefore, no cumulative impacts on water resources would be expected.
- No NWI wetlands or surface waters were identified in the immediate vicinity of the Horsham Village Mall proposed expansion area. Additional construction as part of the mall expansion may result in insignificant impacts on Pennypack Creek, located approximately 2,000 feet south of the site, and an unnamed tributary of Pennypack Creek located approximately 2,000 feet east of the site.
- The Horsham Valley Golf Club redevelopment could have potential impacts on wetlands shown within the property boundaries. Conversion of the 70-acre golf club property to a housing development with 94 single-family homes may also result indirect impacts on Park Creek and its unnamed tributaries, which are adjacent to the site, due to tree clearing and potential erosion during construction.
- The Valley Gate project would result in a 67-acre, mixed-use development. No NWI wetlands were mapped in the vicinity of the project; however, an unnamed tributary of Little Neshaminy Creek is located approximately 500 feet east of the project site.
- The Park Creek STP Expansion project would result double the plant's capacity for sewage treatment and upgrade the treatment process from advanced secondary to tertiary treatment. Modifications to the existing individual NPDES permit will be required by PADEP as part of the certification process of Section 401 of the CWA. The additional effluent may potentially have a direct cumulative impact on Park Creek; however, given the proposed upgrades to the treatment process, these impacts would likely not be significant.
- Construction of Pete's Express Car Wash is not in the vicinity of any listed NWI wetlands; however, an unnamed tributary of Little Neshaminy Creek is located approximately 1,400 feet to the east of the proposed project area. The carwash would be

connected to public water and sewer, and direct withdrawals and discharges to the surface waters would not be anticipated. Indirect impacts may result during construction.

- Construction of the Penrose Walk Residential Development is not in the vicinity of any listed NWI wetlands; however, an unnamed tributary of Little Neshaminy Creek is approximately 200 feet north of the proposed project area. Impacts on the waterbody may result during construction of the 31-acre project.
- Construction of the Oak Creek at Warrington Residential Development is not in the vicinity of any listed NWI wetlands or surface waters. Impacts on water resources as a result of this project would not be anticipated.
- Construction of the Warrington Glen Subdivision is not in the vicinity of any listed NWI wetlands; however, unnamed tributaries of Little Neshaminy Creek are located southeast and southwest of the proposed project area. Indirect impacts on these waterbodies may result during construction of the 90-acre subdivision.
- Construction of the Lamplighter Village Phase IV lots with houses is not in the vicinity of any listed NWI wetlands; however, an unnamed tributary of Little Neshaminy Creek is located approximately 1,400 feet north of the proposed project area. Impacts on the waterbody may result during construction of the 21 lots. However, no development has been proposed for this site at this time.
- Construction of the new recreation center at Warminster Community Park is approximately 700 feet west of an NWI-listed wetland. Based on the proposed project description, direct impacts on this wetland would not be anticipated; however, indirect impacts may result during construction of the 10,000-square-foot WREC facility.
- The Upper Neshaminy Creek Trail Feasibility Study is a proposal to create a pedestrian trail running parallel to the creek. Several wetlands and riparian zones would be impacted by construction of this project. Specific design plans are not available; therefore, it cannot be determined whether wetlands or the creek would be subject to direct impacts.
- As stated in Section 5.3, the new 9-mile-long U.S. Route 202 Parkway was completed in December 2012. Based on a desktop review of water resources, the parkway crosses Little Neshaminy Creek, unnamed tributaries of Little Neshaminy Creek, Mill Creek, West Branch Neshaminy Creek, and several unnamed tributaries of the West Branch of Neshaminy Creek. Wetlands and riparian zones were likely directly impacted by this project; however, information regarding mitigation or impact minimization associated with the design and construction of the parkway are not available. Minor, indirect impacts on water quality resulting from construction of this project were likely due to the increase in impervious surface to the watershed.
- The 5-mile-long, two-lane Sumneytown Pike/PA 309 Connector would cross several tributaries of Skippack Creek and the West Branch of Neshaminy Creek. Several NWI-listed wetlands are also identified in the vicinity of the project. This project could impact waterbodies and wetlands.

Cumulative impacts on waterbodies and wetlands could occur when considering these projects along with the proposed redevelopment of the former installation property. Any construction that would impact waterbodies would be required to comply with Waterway Management Rules and Regulations (Title 25 of the PA Code, Chapter 105), as regulated by PADEP, as well as Section 404 of the CWA, which regulates the discharge of dredged or fill material into waters of the United States. The developer may be required to prepare a mitigation plan, depending on the total area of disturbance or impacts identified. Agency

consultation and adherence to federal and state permit requirements could prevent potentially significant cumulative impacts.

Water Quality

The cumulative impact analysis for water quality focuses on two primary variables related to water quality: (1) ground disturbance associated with clearing and grading, and (2) the addition of impervious surface area. Any project requiring earth-moving activities during construction or the permanent addition of impervious surface area has the potential to impact water quality. Degradation of water quality could occur from an increase in stormwater volume and uncontrolled runoff.

Construction and implementation of the federal projects discussed in Section 5.3 would result in short- and long-term impacts on surface water quality as a result of increased stormwater runoff. These impacts could be avoided or mitigated by implementing "non-structural" (i.e., design and planning techniques) and structural BMPs that meet current PADEP stormwater management standards, including sediment barriers, minimizing disturbed areas, and planting temporary vegetation cover, where needed, to preserve natural systems and hydrologic functions on a site.

Adhering to these standards and policies during construction and operation would reduce impacts on surface water quality to minimal levels. The federal projects described in Section 5.3, coupled with the implementation of the selected redevelopment alternative, would result in cumulative impacts on water resources; however, these impacts would be expected to be minor due to avoidance, minimization, or mitigation.

The non-federal projects described in Section 5.3, may also impact surface water quality in the area. Similar to the proposed action, temporary impacts would be anticipated as a result of ground-disturbing activities associated with the various development projects, including the Sumneytown Pike/PA 309 Connector and the proposed Upper Neshaminy Creek trail system. However, it is assumed that state, local, and municipal permits, regulations, and ordinances pertaining to stormwater management and erosion and sediment control would be adhered to during project construction and operation. A PADEP NPDES General Permit would be required for any project that disturbs more than 1 acre. Therefore, it is anticipated that minor cumulative impacts on water quality would occur as a result of the projects described in Section 5.3 and implementation of the selected redevelopment alternative.

Due to lack of detail regarding final development plans for the reasonably foreseeable projects, determining the amount of impervious surface to be added as a result of construction of these projects is not feasible. It is assumed that these developments would be required to provide for on-site stormwater management in compliance with local and state regulations. Therefore, minor post-construction cumulative impacts on water quality would be anticipated.

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6 Best Management Practices, Mitigation, and Monitoring

This section provides a summary of the BMPs applicable to the former NAS JRB Willow Grove installation property and the specific mitigation measures that are presented in Section 4 to mitigate potential impacts. These BMPs and mitigation measures are appropriate and reasonable and would reduce the environmental impacts associated with redevelopment of the former installation property.

6.1 Best Management Practices

Transportation

- Before construction, confirm sight distances for the potential access location and design access to maximize visibility for motorists turning into and out of the property while providing accurate signs enabling motorists to identify the site.
- Regularly water graded areas and clean streets after grading to keep roadways clear.
- Implement traffic-easing roadway designs to lower vehicle speed and reduce congestion, and expand public transportation and carpooling programs to reduce vehicle emissions.

Environmental Management

- Ensure that construction and demolition (C&D) contracts contain traditional terms and conditions requiring recycling of C&D waste to the extent practicable.
- Radon screening by the developer would be recommended in any building retained for reuse or constructed in place of Buildings 113, 137, and 601.

Air Quality

- Design buildings to meet energy-efficiency standards to mitigate operational air emissions.
- Utilize fuel-efficient vehicles with emission controls for construction vehicles.
- Dust Control Plan BMPs, including: using traffic control to restrict traffic to predetermined routes; maintaining as much natural vegetation as is practicable; phasing construction to reduce the area of land disturbed at any one time; using temporary mulching, permanent mulching, temporary vegetative cover, permanent vegetative cover, or sodding to reduce the need for dust control; using mechanical sweepers on paved surfaces, where necessary, to prevent dirt buildup, which can create dust; periodically moistening exposed soil surfaces with adequate water to control dust; and applying treatments, as needed, to control dust when temporary dust control measures are used.

Noise

- Construction noise BMPs, including: designating routes for construction-related truck traffic to avoid noise-sensitive areas; using portable barriers to enclose noisier stationary equipment, limiting the use of heavy equipment adjacent to residences or other noise-sensitive receptors to the shortest possible period required; using proper mufflers and other noise reduction equipment that are in good working condition; establishing a telephone hotline to be used by members of the public if there is a noise complaint, and

notifying the public of its availability; laying out construction sites to minimize the need for backup alarms; using broadband noise backup alarms and/or flagmen to keep the area behind maneuvering vehicles clear; placing stationary equipment such as compressors, generators, and welding machines away from noise-sensitive receptors; and sequencing construction operations so as to perform noisy operations during the same time period; and implementing alternative construction methods to reduce the transmission of loud noise to noise-sensitive areas.

Infrastructure and Utilities

- Incorporate the latest green and sustainable design principles where appropriate (e.g., LEED buildings, LID, complete streets, energy efficiency/renewable energy, etc.) (RKG 2012). Energy Star (www.energystar.org) and LEED programs (www.USGBC.org) are examples of programmatic systems that can be employed to ensure that buildings are using the best reasonable energy efficiency techniques.

Topography, Geology, and Soils

- Prior to construction, complete engineering evaluations and identify appropriate engineering techniques to mitigate any soil limitations.

6.2 Mitigation Measures

Transportation

- Improve roadways by revising signs, striping, or by instituting requirements for improving roadway and traffic configurations, depending on final design of the alternative road network.

Environmental Management

- Note the possibility of an on-site underground storage tank (UST) in the construction contract. If a UST is encountered during redevelopment of the property, it will have to be closed in accordance with Pennsylvania Department of Environmental Protection (PADEP) UST regulations.

Air Quality

- Minimize idling of construction vehicles to mitigate air quality.
- Utilize existing power sources (e.g., power poles) or clean-fuel generators rather than diesel-powered generators.
- Develop a project-specific Dust Control Plan, which could include BMPs listed above in Section 6.1.
- Utilize modern building construction and renovation methods, which result in lower criteria pollutant emissions from new and existing buildings (i.e., Energy Star and LEED programs). Some methods include: effective insulation, high-performance windows, tight construction and ducts, efficient heating and cooling equipment, and efficient products (i.e., Energy Star-qualified equipment).

- If applicable, emission sources would be required to meet PADEP permitting requirements prior to construction and during operation.

Noise

- If noise exceeds the maximum permitted sound pressure level (SPL) for the Project, developers may need to implement noise-suppression measures to achieve the permitted SPL.
- Conduct construction between the hours of 7:00 a.m. and 8:00 p.m., when the noise would be less disturbing for area residents.

Infrastructure and Utilities

- Adhere to Horsham Township's requirement to develop a stormwater management plan using a watershed approach.
- Follow standards of Pennsylvania's Clean Streams Law (Chapter 102) to implement BMPs during and after construction practices to control the release of stormwater runoff and total suspended sediments from exposed sites.
- Adhere to General Permit—NPDES Multi-sector General Permit—requirements and conditions, including preparation of an erosion and sediment control (E&S) plan; preparedness, prevention, and contingency (PPC) plan; and post construction stormwater management plan (PCSM).
- Use GI or LID practices such as rain gardens, bioretention, infiltration planters, porous pavements, vegetated swales and bioswales, green roofs, trees and tree boxes, pocket wetlands, reforestation/revegetation using native plants, protection and enhancement of riparian buffers and floodplains, and rainwater harvesting for use to reduce impacts on stormwater systems and soils and reduce erosion.

Topography, Geology, and Soils

- Implement temporary erosion and sediment control measures during construction, permanent stormwater management measures, and appropriate building site location and design.
- Implement appropriate erosion and sediment control measures at construction and demolition sites in accordance with the PA Code, Title 25, Erosion and Sediment Control and Post-Construction Stormwater Management Best Management Practices (PA Code 2013).

Water Resources

- Compliance with the stormwater permits and management plans and the implementation of BMPs as set forth in the current Pennsylvania Erosion and Sediment Pollution Control Program Manual.
- Use standard dewatering techniques and follow erosion and sediment control plans and BMPs that would involve preventing erosion, selecting an appropriate discharge location, removing sediment from collected water, and preserving downgradient natural resources.

- Prior to siting of construction roads, pedestrian paths, or other facilities, the developer would be required to comply with the requirements set forth in Chapter 230-49(E) of the Horsham Township Code, if applicable, for the waterbodies on the former installation.
- Mitigation requirements for direct stream impacts will be determined through coordination with the U.S. Army Corps of Engineers (USACE) and PADEP, and a site-specific mitigation plan will be developed. This will be completed following the final design phase for redevelopment and as part of the Section 401/404 permit process.

6.3 Monitoring

No long-term monitoring has been found to be applicable for the alternatives presented in this EIS.

7 Other Considerations Required by NEPA

7.1 Consistency with Other Federal, State, and Local Land use Plans, Policies, and Controls

Disposal of the surplus property at the former NAS JRB Willow Grove would comply with existing federal regulations and state and local policies and programs.

As discussed in Section 1, This document was prepared by the U.S. Department of the Navy (DON) in accordance with the *National Environmental Policy Act of 1969* (NEPA) (Public Law 91-190, 42 United States Code [U.S.C.] 4321-4370f); the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 Code of Federal Regulations [CFR] 1500-1508); DON regulations implementing NEPA (32 CFR 775); Office of the Chief of Naval Operations Instructions (OPNAVINST) 5090.1C CH-1; DON *Base Realignment and Closure (BRAC) Implementation Guidance* (NBIG); and other applicable Department of Defense (DOD) and DON policy and guidance.

Other federal laws, regulations, and Executive Orders with which the proposed action must demonstrate compliance are discussed below, followed by a discussion of pertinent local and state policies and controls.

7.1.1 Federal Acts, Executive Orders, Policies, and Plans

7.1.1.1 NEPA

Compliance with NEPA is discussed above and in detail in Section 1.6.1, The National Environmental Policy Act.

7.1.1.2 Clean Air Act and General Conformity Rule

Compliance with the CAA and General Conformity Rule are discussed in Section 3.6, Air Quality. Additionally, the redevelopment compliance discussion for the former installation property is found in Section 4.6, Air Quality Impacts, and a regional overview related to greenhouse gas emissions is presented in Chapter 5.

7.1.1.3 Executive Order 12898

Compliance with Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, is discussed in Sections 3.2 and 4.2, Socioeconomics and Environmental Justice.

7.1.1.4 Executive Order 13045

Compliance with Executive Order 13045, Environmental Health Risks and Safety Risk to Children, is discussed in Sections 3.2 and 4.2 (Socioeconomics and Environmental Justice).

7.1.1.5 Endangered Species Act

Compliance with the ESA is discussed in Section 1.6.3, Agency Coordination and Permit Requirements, and Section 3.12.3, Threatened and Endangered Species. Additionally, Section 4.12, Vegetation and Wildlife, provides an effects determination.

7.1.1.6 Migratory Bird Treaty Act

The MBTA is discussed in Section 1.6.3, Agency Coordination and Permit Requirements, and Section 3.12.2.1, Birds. Additionally, Section 4.12, Biological Resources Environmental Consequences, provides an analysis of potential effects on the populations of migratory bird species.

7.1.1.7 Sikes Act

Sections 3.12 and 4.12 states that no threatened and endangered species are known to occur at the former installation property; therefore, the Sikes Act is not applicable.

7.1.1.8 Clean Water Act

Compliance with the CWA is discussed in Section 3.11, Surface Water and Water Quality and Section 4.11, Water Resources.

7.1.1.9 National Historic Preservation Act

Compliance with the above-referenced regulation is discussed in Section 1.6.3 Agency Coordination and Permit Requirements and Section 3.9, Cultural Resources. Additionally, Section 4.9 provides an effects determination.

7.1.1.10 Comprehensive Environmental Response, Compensation, and Liability Act and the Resource Conservation and Recovery Act

Compliance with CERCLA and RCRA are discussed in Section 3.5.1, Regulatory Overview and Section 4.5, Environmental Management.

7.1.2 State, Local, and Regional Plans, Policies, and Controls

Compliance with various state, local and regional plans, policies, and controls is discussed throughout the EIS, including Section 1.6.3, Agency Coordination and Permit Requirements, and Chapters 3 and 4.

7.2 Irreversible and Irretrievable Commitment of Resources

NEPA (42 U.S.C. § 4332 Section 102(2)(C)(v), as implemented by CEQ regulation 40 CFR 1502.16), requires an analysis of significant, irreversible effects resulting from implementation of a proposed action. Resources that are irreversibly or irretrievably committed to a project are those that are typically used on a long-term or permanent basis; however, those used on a short-term basis that cannot be recovered (e.g., non-renewable resources such as metal, wood, fuel, paper, and other natural or cultural resources) also are irretrievable. Human labor is also considered an irretrievable resource. All such resources are irretrievable in that they are used for a project and, thus, become unavailable for other purposes. An impact that falls under the category of the irreversible or irretrievable commitment of resources is the destruction of natural resources that could limit the range of potential uses of that resource.

Short-term irreversible commitments of resources associated with construction include the use of energy and utilities. Construction materials and building supplies would be committed to the redevelopment and reuse of the former installation. The use of materials such as gravel, concrete, steel, glass, etc., represents a long-term commitment of resources that would not be available for other projects. Fuel, lubricants, and electricity would be required during construction for the operation of the various types of construction equipment and vehicles and for the transportation of workers and materials to the construction sites. However, these resources are not in short supply, and their use would not have an adverse effect upon their continued availability.

In the long-term, implementation of Alternatives 1, 2, or 3 would result in irreversible or irretrievable commitments of resources if land development were to physically eliminate or diminish the character of

natural resources on or immediately adjacent to the property. Under Alternatives 1, 2, and 3, permanent wetland impacts could result in portions of the former installation if they cannot be avoided by the final proposed redevelopment layout. Under Alternative 1, 6.8 acres of direct permanent wetland impacts could occur within 13 wetlands; under Alternative 2, 2.5 acres of direct permanent impact could occur within 12 wetlands; and under Alternative 3, 5 acres of direct permanent impact could occur within 10 wetlands. Any wetland impacts would require a permit from the USACE and associated mitigation measures typically in the form of avoidance, minimization, or enhancement.

Disposal of the former installation property, although an irreversible action, does not represent an irretrievable commitment of land resources, since this action makes resources available for future reuses. The proposed action also represents the irretrievable commitment of human resources and materials requiring the use of fossil fuels, electrical energy, and other energy resources during construction and operation of facilities. These resources would be irretrievably committed to the proposed action. However, the HLRA's Redevelopment Plan provided an overview of potential renewable or "green" energy applications at the former installation, as well as federal and state funding opportunities (RKG 2012). It is assumed that these energy-efficient and renewable energy applications could be incorporated into the final construction and design of the redevelopment of the site under Alternatives 1, 2, or 3, thereby reducing the local communities' need for and dependence on fossil fuels and other non-renewable resources.

7.3 Relationship between Short-term Use of the Environment and Long-term Productivity

NEPA requires consideration of the relationship between short-term use of the environment and the impacts that such use could have on the maintenance and enhancement of long-term productivity of the affected environment. Impacts that narrow the range of beneficial uses of the environment are of particular concern. Such impacts include the possibility that one alternative could reduce future flexibility to pursue other alternatives, or that a certain use could eliminate the possibility of other uses at the site.

Long-term benefits resulting from implementation of any of these alternatives would occur at the expense of short-term impacts in the vicinity of the former installation property. These short-term impacts would occur during the construction period of the selected alternative. Implementation of any of the three alternatives would require an estimated 20-year build-out period. During this period, the following types of construction would occur: demolition, clearing, grading, excavating, surfacing, road and parking paving, erection of structures, and landscaping. Short-term impacts on local noise, air quality, water resources, and biological resources, as well as possible traffic detours and delays, could occur in the vicinity of the former installation. However, these impacts would be temporary, and proper controls, in the form of BMPs and other mitigation measures, would be used to prevent these effects from having significant impacts on the environment.

In addition, short-term gains in the local economy would occur if local workers would be hired and if local businesses provide services and supplies during the construction period. Upon completion of redevelopment, the gains in the local economy would evolve into long-term benefits from the reuse of the property, including an expanded municipal tax base, new businesses and job creation and, potentially, new employee and business spending in the region.

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8 References

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