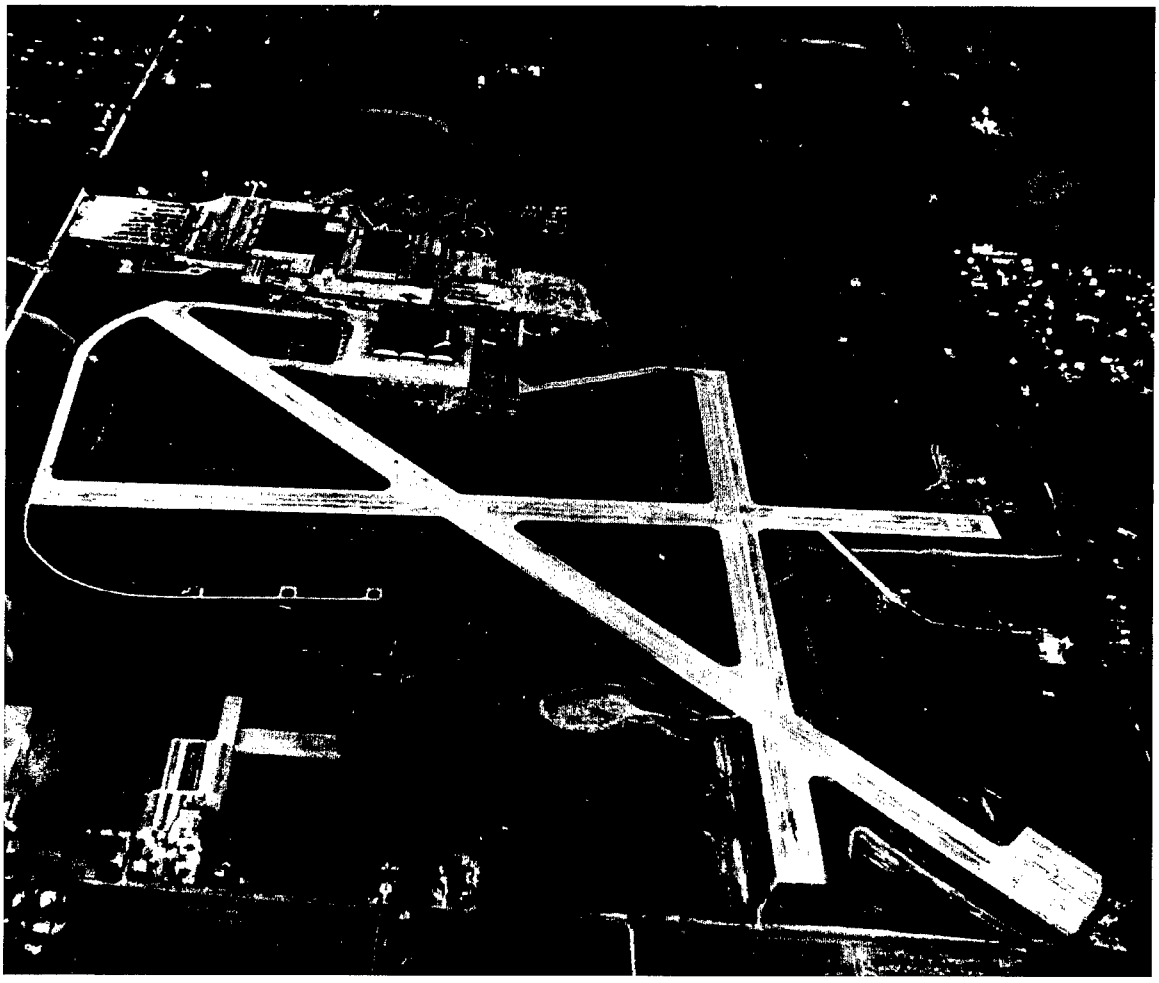
FINAL ENVIRONMENTAL IMPACT STATEMENT



DISPOSAL AND REUSE NAVAL AIR WARFARE CENTER AIRCRAFT DIVISION WARMINSTER, PENNSYLVANIA

DTIC QUALITY INSPECTED 3

Department of the Navy
December 1998

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Final Environmental Impact Statement

Disposal and Reuse
of
Naval Air Warfare Center Aircraft Division
Warminster, Pennsylvania

December 1998

Please contact the following person
with comments and questions:

Kurt C. Frederick
Phone: (610) 595-0728
Fax: (610) 595-0778
Northern Division
Naval Facilities Engineering Command
10 Industrial Highway
Lester, PA 19113

The photograph reproduced on the cover of this EIS depicts NAWCAD Warminster in the mid-1940s.

EXECUTIVE SUMMARY

S.1 Purpose and Need

The Navy plans to dispose of Naval Air Warfare Center Aircraft Division (NAWCAD) Warminster pursuant to the 1991 and 1995 Defense Base Closure and Realignment Act (BRAC) recommendations. NAWCAD is located in Bucks County, Pennsylvania, approximately 18 miles (mi) (29 kilometers [km]) north of Center City Philadelphia. The NAWCAD property's approximately 824 acres (333 hectares) lie within three municipalities: 609 acres (247 hectares) are within Warminster Township (74 percent); 46 acres (19 hectares) are within Ivyland Borough (six percent); and 169 acres (68 hectares) are within Northampton Township (20 percent). NAWCAD has been the principal Navy research, development, test, and evaluation (RDT&E) center for Naval avionics and airborne and antisubmarine warfare systems.

In 1991, the BRAC Commission (Commission) recommended the realignment of NAWCAD Warminster. The majority of the aircraft systems RDT&E would be relocated to NAWCAD Patuxent River, Maryland. A few specialized, immovable facilities would remain at NAWCAD Warminster.

In 1995, the Commission recommended that several NAWCAD facilities designated in 1991 to be retained by the Navy should, in fact, be closed and disposed of: the inertial laboratory (Building [Bldg] 108); the dynamic flight simulator buildings (Bldgs 70 and 72); and extensions of the main complex of buildings (Bldgs 125 and 138). The military family housing would be retained and transferred to the Naval Air Station Joint Reserve Base (NAS JRB) Willow Grove.

The Navy, acting as the disposal agency for NAWCAD, has completed its formal procedures for disposal of the property. With respect to the Base Closure Community Redevelopment and Homeless Assistance Act of 1994, the Department of Housing and Urban Development (HUD) has approved four proposals for individual NAWCAD properties by agencies serving the homeless. No additional interest was expressed regarding the properties during the formal screening process. As such, they were considered surplus to the DoD and Bucks County will acquire them. Bucks County established the Federal Lands Reuse Authority (FLRA) in 1995 to formulate a reuse plan for the NAWCAD site.

In March 1995, the FLRA adopted a proposed reuse plan titled *Reuse Plan, Naval Air Warfare Center, Bucks County, Pennsylvania*. This plan was the preferred reuse alternative presented in the Draft Environmental Impact Statement (DEIS) that was released by the Navy in December 1996. The FLRA has since revised this plan, and a new preferred plan (hereafter referred to as the Reuse Plan) was adopted on June 10, 1997. The current Reuse Plan incorporates land use components similar to those of the former plan, but it features greater park and recreation use and less intensive

development. Presented as the preferred alternative in this document, the Reuse Plan and its alternatives are described herein.

S.2 Description of the Proposed Action and Alternatives

The proposed action is the disposal and reuse of NAWCAD pursuant to the FLRA's current preferred Reuse Plan that was adopted on June 10, 1997.

Other alternatives are also considered in this EIS: the No Action Alternative, the University/Institutional Alternative (the FLRA's former preferred Reuse Plan that was presented in the DEIS), the Residential Alternative, and the Aviation Alternative. These alternatives represent the full range of alternative development intensities and resulting impacts that might occur with disposal and reuse of NAWCAD.

S.2.1 Reuse Plan - The Preferred Alternative

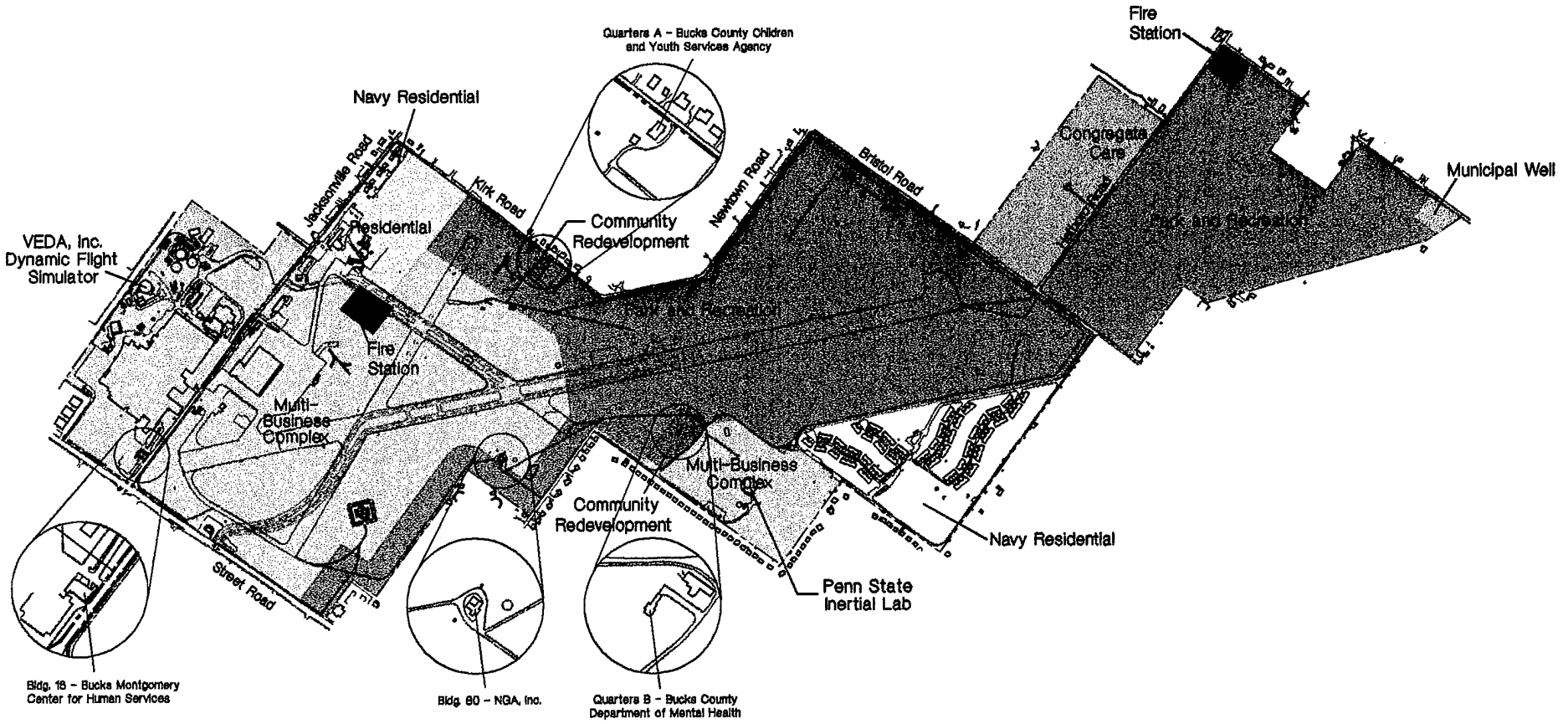
A dynamic planning process (begun in 1994) went into the ultimate formulation of the FLRA's current Reuse Plan (the preferred alternative). This process had several principal steps as follows:

- Preliminary planning and development of county goals and objectives;
- Screening of potential reuses;
- Development of the March 1995 FLRA Reuse Plan;
- Reevaluation of the March 1995 plan based upon BRAC 1995 and additional planning studies; and
- Adoption of the current Reuse Plan on June 10, 1997.

The FLRA's proposed Reuse Plan is shown in Figure S-1 (The Reuse Plan), and its land use elements are shown in Table S-1. Following is a brief description of each component of the Reuse Plan:

- **Multi-Business Complex** - This land use would encompass roughly 292 acres (118 hectares). It includes use of the existing main complex (Bldgs 1, 2, and 3) west of Jacksonville Road, as well as the areas associated with the existing dynamic flight simulator (Bldgs 70 and 72, which have been leased to VEDA, Inc.), and the inertial

The Reuse Plan



Park and Recreation		Community Redevelopment	
Multi-Business Complex		Fire Station	
Congregate Care		ROW-Open Space	
Navy Residential		Municipal Well	
Residential		Property Boundary	

Source: Ernst & Young, LLP, June, 1997.

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Scale in Feet
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Scale in Meters

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Figure S-1

Table S-1

Reuse Plan Land Use Program

Use	Land Acreage			Estimated Sq Ft of Development (Sq M)
	Acres	Hectares	% of Total	
Multi-Business Complex[1]	292	118	35	2,855,000 (265,230)
Residential				
Navy (retained)	67	27		
New (150 - 200 units)	26	11		
Total	93	38	11	n/a
Fire Stations	5	2	<1	n/a
Congregate Care	38	15	5	250,000 (23,000)
Municipal Well	2	1	<1	n/a
Community Redevelopment	6	2	<1	n/a
Park and Recreation	370	150	45	n/a
ROW-Open Space	18	7	2	n/a
Total	824	333	100	

Homeless Providers (Approved by the Department of Housing and Urban Development)
Bucks County Children and Youth Services Agency - Quarters A
Bucks County Department of Mental Health - Quarters B
Needlework Guild of America (NGA) - Bldg 80
Bucks Montgomery Center for Human Services - Bldg 16

Notes: Land use acreage and amount of development are approximate based on estimates for a long-term development plan that is subject to change. Numbers may not total exactly due to rounding and metric conversions.
n/a = square feet not appropriate measure of development.
[1]Multi-Business Complex includes the inertial lab, which has been conveyed to Penn State and the dynamic flight simulator, which has been conveyed to VEDA, Inc.
Refer to Figure S-1

Source: Proposed Reuse Plan prepared for FLRA by Ernst & Young LLP and E&Y Kenneth Leventhal Real Estate Group, June 1997.

laboratory (Building 108), which has been leased to Pennsylvania State (Penn State) for educational purposes. New development would occur on the proposed 187-acre (76-hectare) multi-business complex east of Jacksonville Road. A total of 5,995 jobs are anticipated to be associated with the reuse of existing facilities and the construction of approximately 1.5 million sq ft of new business space.

- **Residential** - This would be a new single-family residential complex of 26 acres (11 hectares) in Ivyland Borough. A development of 150 to 200 homes is projected (ERA, 1995). For the purposes of this document 175 units are projected, at densities of approximately six units per acre.

- **Fire Station** - There would be two fire stations under this alternative. One would be the existing facility located on roughly three acres (one hectare) northeast of the hangar in Ivyland Borough, while the other would be a new facility on two acres (one hectare) at the northwest corner of the site along New Road in Northampton Township.

- **Congregate Care** - This would be a new facility for senior living, occupying 38 acres (15 hectares) in Northampton, and fronting on Bristol and Hatboro Roads. The number of jobs associated with this facility is 800 (ERA, 1995) and the FLRA indicated that a development of 250,000 square feet (sq ft) (23,225 square meters [sq m]) is sought. At this time, there is no specific plan indicating the proposed program of long-term care, assisted living, etc. However, assuming a ratio of 500 gross sq ft (46 sq m) per person implies that there would be 500 residents.

- **Municipal Well** - A new water well and pump would occupy two acres (one hectare) located on New Road at the eastern border of NAWCAD in Northampton Township.

- **Community Redevelopment** - There would be two parcels designated for community redevelopment and social services. One parcel would occupy roughly two acres (one hectare) along Kirk Road, while the other parcel would occupy roughly four acres (two hectares) along Street Road.

- **Park and Recreation** - Park and recreation use would be planned for approximately 250 acres (101 hectares) in Warminster and roughly 120 acres (49 hectares) in Northampton for a total of approximately 370 acres (150 hectares). Roughly 35 jobs are estimated as associated with this land use (ERA, 1995).

- **Right-of-Way (ROW)** - ROW would utilize portions of existing runway and provide access to the business campus at Street Road and Jacksonville Road. Approximately 18 acres (7.3 hectares) are allocated to ROW.

The Department of Housing and Urban Development has approved four proposals that are incorporated into the Reuse Plan:

- Bucks County Children and Youth Services Agency - Quarters A;
- Bucks County Department of Mental Health - Quarters B;
- Needlework Guild of America (NGA) - Bldg 80; and
- Bucks Montgomery Center for Human Services - Bldg 16.

The existing housing complex of 64 acres (26 hectares) accommodating 199 enlisted-family housing units, together with the six units of officer family housing comprising three acres (one hectare) on Jacksonville Road (for a total of 67 acres [27 hectares] of Navy housing), would be retained for Navy families serving NAS JRB Willow Grove.

On the basis of anticipated market demand and the limiting factor of traffic capacity on the highway network proximate to the site, the Reuse Plan anticipates that approximately 6,850 jobs can be generated at the site over a build period of 15 years.

S.2.2 No Action Alternative

The No Action Alternative, developed as the future condition against which the impacts of the proposed action are measured, means that NAWCAD is closed (except the officer family housing and enlisted family housing), all military activities are relocated, and the land is not disposed of – it remains as federal government land. The operation of the Navy family housing complex with 199 family units for enlisted personnel and six family units for officers would be transferred to NAS JRB Willow Grove.

S.2.3 University/Institutional Alternative

The University/Institutional Alternative (the FLRA's former preferred Reuse Plan, which was presented in the DEIS) incorporates land use components similar to those of the new Reuse Plan, but with more intensive development and less park and recreation use (Figure S-2, University/Institutional Alternative, Table S-2). Its primary difference from the Reuse Plan is the university/institutional land use, which would consist mostly of a new complex located toward the east end of the site, with frontage on Bristol Road and occupying 84 acres (34 hectares). This use would support a projected employment of 400 and an estimated 2,000 students. In addition, BRAC 95-relinquished Bldgs 125 and 138, occupying 12 acres (34 hectares) west of Jacksonville Road, would be occupied by approximately 700 students and faculty. Thus, the combined acreage for the university component of this alternative is 96 acres (39 hectares). Other University/Institutional Alternative components that vary from the Reuse Plan are:

Table S-2

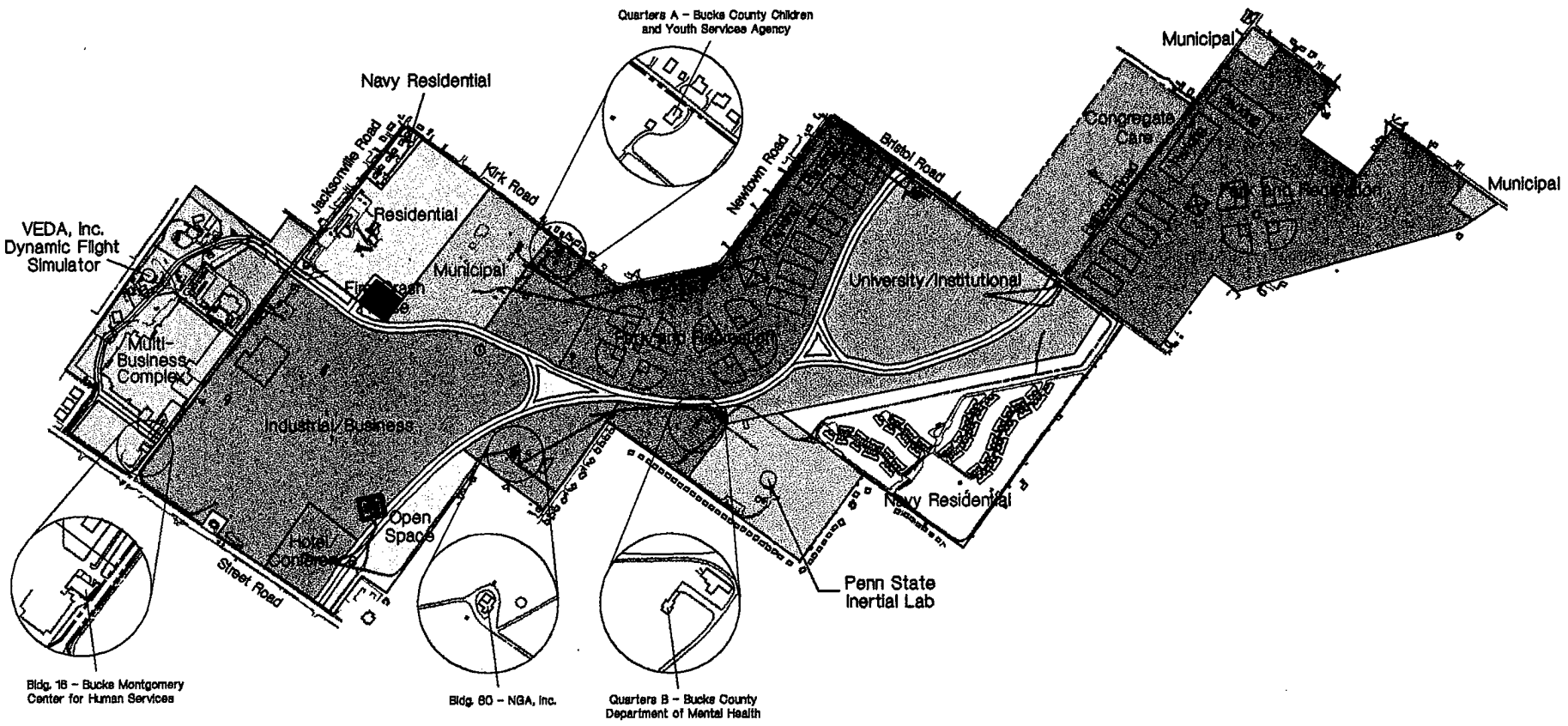
University/Institutional Land Use Program

Use	Land Acreage			Estimated Sq Ft of Development (Sq M)
	Acres	Hectares	% of Total	
Multi-Business Complex	46	19	6	1,200,000 (111,000)
Dynamic Flight Simulator (VEDA, Inc.)	3	1	<1	72,000 (6,700)
University/Institutional				
West of Jacksonville Road (BRAC 95)	12	5		1,600,000
East of Jacksonville Road	84	34		(15,000)
Subtotal	96	39	12	
Industrial/Business	159	64	19	1,850,000 (172,000)
Hotel/Conference	10	4	1	50,000 (5,000)
Residential				
Navy (retained)	67	27		
New (150 - 200 units)	34	14		
Subtotal	101	41	12	n/a
Fire/Crash House	2	1	<1	n/a
Municipal	30	12	4	n/a
Congregate Care	38	15	5	250,000 (23,000)
Inertial Lab (Penn State)	31	13	4	25,000 (2,300)
Park and Recreation	246	100	30	n/a
ROW-Open Space	62	25	8	n/a
Total	824	333	100	

Homeless Providers (Approved by the Department of Housing and Urban Development)
Bucks County Children and Youth Services Agency - Quarters A
Bucks County Department of Mental Health - Quarters B
Needlework Guild of America (NGA) - Bldg 80
Bucks Montgomery Center for Human Services - Bldg 16

Notes: Land use acreage and amount of development are approximate based on estimates for a long-term development plan that is subject to change. Numbers may not total exactly due to rounding and metric conversions.
n/a = square feet not appropriate measure of development.
Refer to Figure S-2
Source: Based on Reuse Plan, Naval Air Warfare Center, Bucks County, PA, March 1995.

University/Institutional Alternative



Park and Recreation
Congregate Care
University/Institutional
Navy Residential
Inertial Lab & Dynamic Flight Simulator
Industrial/Business
Municipal
Residential
Fire Crash House
Multi-Business Complex
Hotel / Conference
ROW-Open Space
Proposed Road
Property Boundary

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Scale in Meters

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Figure S-2

- A total of 246 acres (100 hectares) for park and recreational land, as compared to 370 acres (150 hectares) under the Reuse Plan;

- 30 acres (12 hectares) for undesignated municipal uses. The Reuse Plan does not designate a municipal use, although approximately six acres (two hectares) would be set aside for "community redevelopment and social services;"

- A hotel/conference center, not included in the Reuse Plan, which would occupy ten acres (four hectares); and

- An industrial/business use on a new complex of 159 acres (64 hectares) immediately east of Jacksonville Road, with frontage on Street Road. In the Reuse Plan, this area is designated as part of the larger multi-business land use that would occupy 292 acres (118 hectares).

On the basis of anticipated market demand and the limiting factor of traffic capacity on the highway network proximate to the site, it is anticipated that the University/Institutional Alternative would generate approximately 7,600 jobs at the NAWCAD site over a build period of 15 years.

S.2.4 Residential Alternative

Under this alternative, the mostly undeveloped airfield east of Jacksonville Road would be reused, primarily for residential uses plus appropriate local recreational facilities (Figure S-3, Residential Alternative).

The Residential Alternative differs from the Reuse Plan primarily in that it incorporates a 250-acre (101-hectare) golf/residential component that adds 400 dwelling units. This addition of 400 units to the 150 to 200 units on the Ivyland site (as described for the Reuse Plan) would result in approximately 575 new dwelling units (these would be in addition to the congregate housing, plus any residential social services proposed for existing Quarters A and B). Data on this and the other land use components that comprise the Residential Alternative (as shown in Figure S-3) are presented in Table S-3 (the general characteristics of the other land use components have already been described for either the Reuse Plan and/or the University/Institutional Alternative).

On the basis of anticipated market demand and the limiting factor of traffic capacity on the highway network proximate to the site, it is anticipated that implementation of the Residential Alternative would result in approximately 1,600 residents and 5,000 workers over a build period of 15 years.

Table S-3

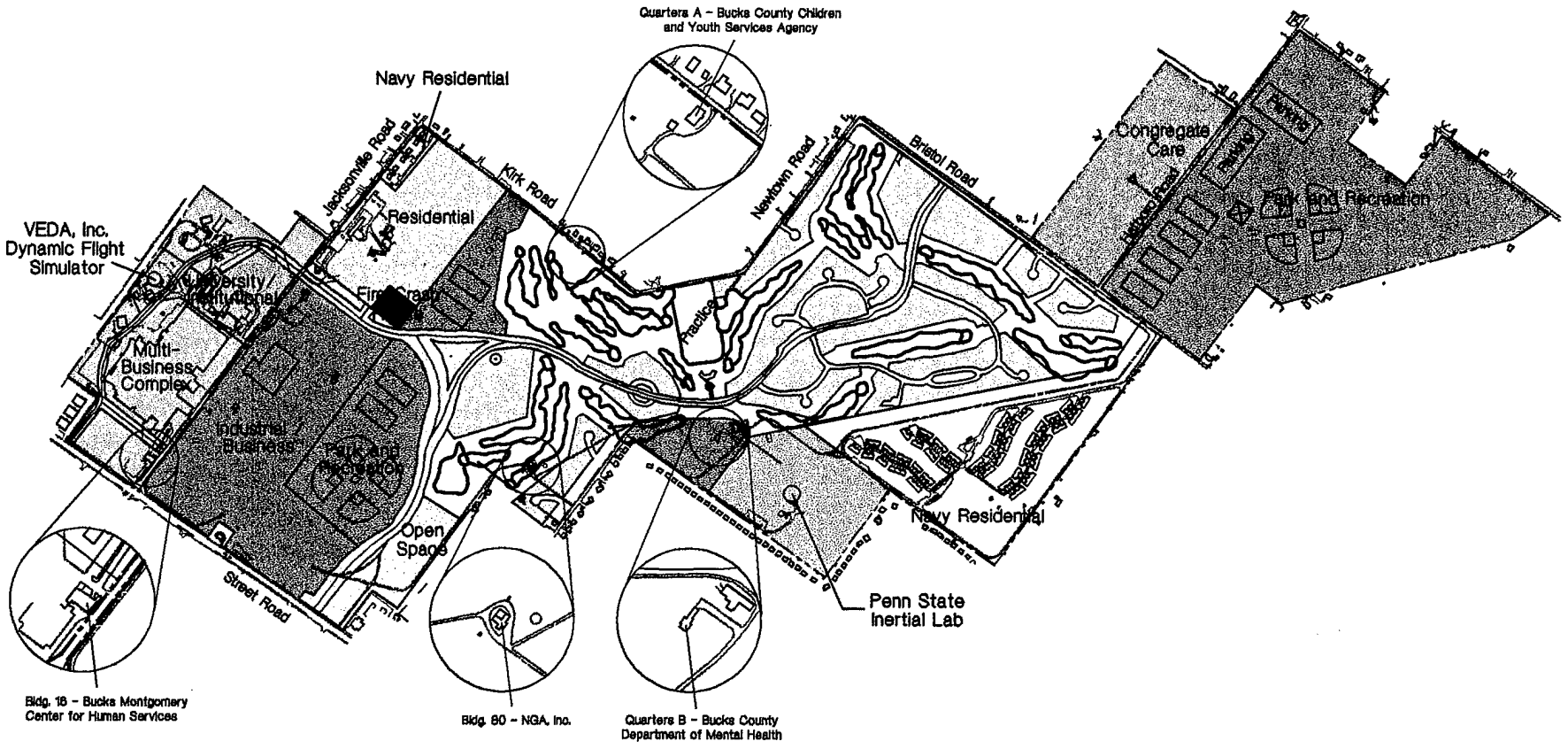
Residential Alternative Land Use Program

Use	Land Acreage			Estimated Sq Ft of Development (Sq M)
	Acres	Hectares	% of Total	
Multi-Business Complex	46	19	6	1,372,000 (128,000)
Dynamic Flight Simulator (VEDA, Inc.)	3	1	<1	72,000 (6,700)
University/Institutional	12	5	1	14,000 (1,300)
Industrial/Business	65	26	8	636,000 (59,000)
Residential				
Navy (retained)	67	27		
New (175 new units)	34	14		
Golf/Residential (400 new units)	250	101		
Subtotal (575 new units)	351	142	43	n/a
Congregate Care	38	15	5	250,000 (23,000)
Inertial Lab (Penn State)	31	13	4	25,000 (2,300)
Park and Recreation	210	85	25	n/a
ROW-Open Space	68	28	8	n/a
Total	824	333	100	n/a

Homeless Providers (Approved by the Department of Housing and Urban Development)
Bucks County Children and Youth Services Agency - Quarters A
Bucks County Department of Mental Health - Quarters B
Needlework Guild of America (NGA) - Bldg 80
Bucks Montgomery Center for Human Services - Bldg 16

Notes: Land use acreage and amount of development are approximate based on estimates made for a long-term development plan that is subject to change. Numbers may not total exactly due to rounding and metric conversions.
n/a = square feet not appropriate measure of development.
Refer to Figure S-3
Source: Based on Reuse Plan, Naval Air Warfare Center, Bucks County, PA, March 1995

Residential Alternative



- Park and Recreation
- Congregate Care
- University/Institutional
- Navy Residential
- Inertial Lab & Dynamic Flight Simulator
- Industrial/Business
- Residential
- Fire Crash House
- Multi-Business Complex
- ROW-Open Space
- Golf Course
- Proposed Road
- Property Boundary

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Figure S-3

S.2.4 Aviation Alternative

An analysis was performed to determine the feasibility of civilian aviation reuse of NAWCAD. Both available data and interviews indicated that good commercial air passenger service is already available in the area; some smaller firms did feel that NAWCAD could provide an attractive alternative to Philadelphia International Airport for air cargo shipment. Additionally, although further research indicated that the eight airports closest to NAWCAD appear capable of providing adequate commercial passenger or scheduled air cargo service, there did appear to be a demand for additional facilities to accommodate general aviation aircraft in the area, particularly in terms of hangar and tie-down space. Based on this research, there is potential for general aviation activity at Warminster and possibly some limited non-scheduled air cargo operations (i.e., aircraft hired to pick up or deliver items on a periodic basis).

Accordingly, a forecast of general aviation (GA) activity with some limited non-scheduled air cargo flights was prepared for the Warminster site using 1994 as the base year, 2000 as the short-term projection, and 2010 as the planning horizon. These forecast levels assume similar operations per based aircraft as those identified for nearby airports of the same Federal Aviation Administration (FAA) classification. The FAA uses a design aircraft as the primary criterion for airport design; for NAWCAD, it was assumed that the largest aircraft (or the airport's critical aircraft) to be accommodated would be a twin-engine piston aircraft like a Cessna 414. Consequently, the airport's design classification would be called Basic Utility, which has the general runway criteria of 3,800 ft (1,160 m) long by 60 ft (18 m) wide.

Some constraints, however, have been identified. During all-weather/Instrument Flight Rules (IFR) conditions there is a good likelihood for airspace conflict with the Northeast Philadelphia and Trenton-Mercer Airports, as a portion (i.e., holding pattern) of the IFR-reserved airspace for these two airports' instrument approaches already overlaps. A third airport would further complicate this situation. Potential airspace conflicts and complexity of integrating operations also involve NAS JRB Willow Grove, located approximately four mi (six km) west of the NAWCAD site.

In all likelihood, these airspace considerations would limit any activity at Warminster to easterly approaches and arrivals only and not make it a candidate for any type of approach in poor visibility conditions.

As stated, the aviation reuse examined under this alternative is for a Basic Utility GA airport. Activities for this airport, with its shortened runway, are projected to require 168 acres (68 hectares), or 20 percent of the 824 acres (333 hectares) at NAWCAD. The remainder of the land is allocated to uses considered compatible with a GA airport (Figure S-4, Aviation Alternative). Data on the airport component and the other land use components that comprise the Aviation Alternative are presented in Table S-4 (the general characteristics of the other land use components have already been described for either the Reuse Plan and/or the University/Institutional Alternative).

Table S-4

Aviation Alternative Land Use Program

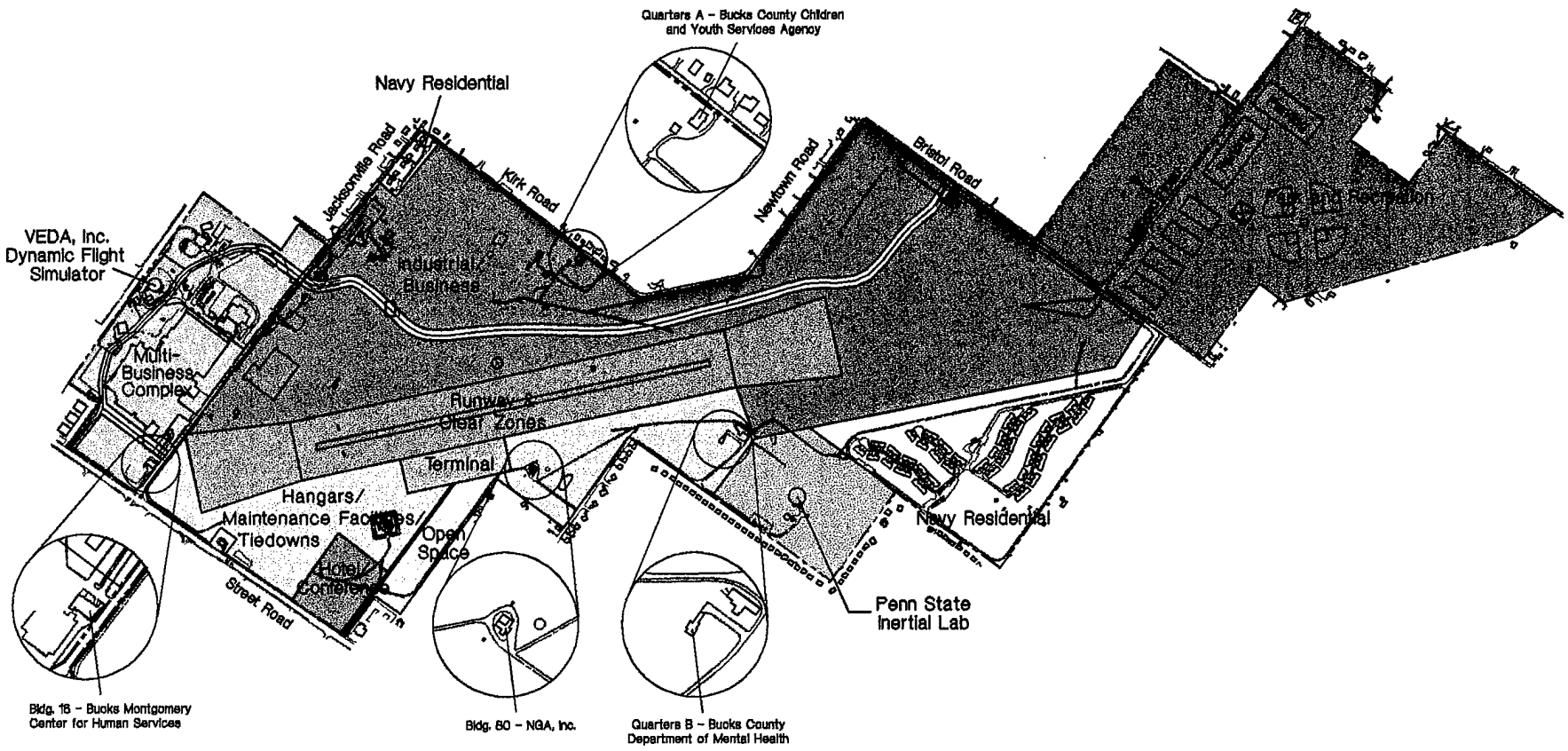
Use	Land Acreage			Estimated Sq Ft of Development (Sq M)
	Acres	Hectares	% of Total	
Multi-Business Complex	46	19	5	1,372,000 (128,000)
Dynamic Flight Simulator (VEDA, Inc.)	3	1	<1	72,000 (6,700)
Industrial/Business	284	115	34	4,900,000 (59,000)
Hotel/Conference	10	4	1	50,000 (5,000)
Aviation				
Runways & Clear Zones	84	34		
Hangars/Maintenance Facilities Tiedowns	77	31		
Terminal	7	3		
Subtotal	168	68	20	n/a
Residential (Existing Navy)	67	27	8	n/a
Inertial Lab (Penn State)	31	13	4	25,000 (2,300)
Park and Recreation	162	66	20	n/a
ROW-Open Space	53	21	6	n/a
Total	824	333	100	

Homeless Providers (Approved by the Department of Housing and Urban Development)
Bucks County Children and Youth Services Agency - Quarters A
Bucks County Department of Mental Health - Quarters B
Needlework Guild of America (NGA) - Bldg 80
Bucks Montgomery Center for Human Services - Bldg 16

Notes: Land Use acreage and amount of development are approximate based on estimates made for a long-term development plan that is subject to change. Numbers may not total exactly due to rounding and metric conversions.
n/a = square feet not appropriate measure of development.
See Figure S-4

Source: Based, in part, on Reuse Plan, Naval Air Warfare Center, Bucks County, PA, March 1995; and incorporating assumptions of BRAC 95 property reuse based on interviews with staff of the FLRA of Bucks County, January 1996.

Aviation Alternative



Park and Recreation	Industrial/Business	——	Proposed Road
Runway/Clear Zones	Navy Residential	----	Property Boundary
Terminal Buildings	Multi-Business Complex		
Hotel/Conference	ROW-Open Space		
Inertial Lab & Dynamic Flight Simulator	Hangars/Maintenance Facilities Tiedowns		

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Scale in Meters

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Figure S-4

The aggregate character of the Aviation Alternative is a more intensive industrial, research, and aviation mix than the other alternatives. Employment at full buildout is projected to be 9,200, compared to 6,850 for the Reuse Plan, 7,600 for the University/Institutional Alternative, and 5,000 for the Residential Alternative.

As stated previously, the proposed action as well as the action alternatives (i.e., the University/Institutional, Residential, and Aviation Alternatives) are presented to represent a reasonable range of alternative reuses, with varying levels of development intensity, for the site.

S.3 Affected Environment, Impacts of Proposed Action and Alternatives, and Mitigation

S.3.1 Land Use and Zoning

The land use pattern at NAWCAD reflects its 54-year history as an aircraft development center. The 824-acre (333-hectare) facility may be broadly categorized into several distinct land uses: operations, administrative, housing, community facilities, maintenance, research, and conservation/buffer. On the NAWCAD property west of Jacksonville Road is a distinct cluster of industrial and research buildings. East of Jacksonville Road, aviation uses occupy the largest portion of the property. South of the runway is a separate facility for inertial guidance research and development. To the east are 199 Navy family housing units for enlisted personnel, eight housing units for officers (six of which are located along Jacksonville Road), and other quarters and support buildings.

The off-site land use pattern in this section of Bucks County is largely the result of suburban outgrowth from the city of Philadelphia. The area to the south, west, and northwest of NAWCAD was mostly developed during the 1960s and 1970s. The northern part of the county is still mostly agricultural and rural residential. The study area location is in the transition zone between suburban Philadelphia and the rural setting of upper Bucks County. Most of this development is medium- to large-lot single-family residential subdivisions in Northampton Township. Much of the vacant and agricultural land in the study area is likely to be absorbed by development as sewer and water services are extended by the township.

The Bucks County Planning Commission provides overall planning guidance in the county, while each locality is responsible for its own land use controls, including review of development plans, zoning and subdivision regulations, and the formulation of comprehensive plans. NAWCAD's approximately 824 acres (333 hectares) lie within three municipalities: 609 acres (247 hectares) are within Warminster Township (74 percent); 46 acres (19 hectares) are within Ivyland Borough (six percent); and 169 acres (68 hectares) are within Northampton Township (20 percent).

No Action Alternative

Under future no action conditions, only the operation of the Navy's 199-unit enlisted family housing complex and the six units of officer housing on Jacksonville Road would continue as part of NAS JRB Willow Grove.

Reuse Plan

Implementation of the Reuse Plan for NAWCAD would result in the continued use and further development of the site as a technologically advanced R&D center, with more general industrial, business, and office uses; housing (both single-family and senior congregate-care); various municipal uses; and park and recreational uses. Use of the existing airport, which accounts for the bulk of the NAWCAD land area, would be discontinued, and parts of the runway utilized as roadway and parking. Figure S-1 shows the allocation of the proposed uses superimposed on a plan of the existing base.

The key land use elements would be accessed from the existing street network of Jacksonville Road, Street Road, Kirk Road, Bristol Road, Hatboro Road, and New Road. A proposed new internal road system would connect to the existing runway to serve the new business campus and the portion of new parkland that would be in the Town of Warminster.

In general terms, the reuse of existing facilities would be consistent with existing land uses. However, development of the new facilities and activities would involve a significant increase in use from the existing airport (and its ancillary facilities) to the various proposed uses.

Zoning and land use policy for NAWCAD reflect its status as a military facility. The largest portion, in Warminster Township, is zoned as a Military Reservation (MR). However, this zoning is under review by the Warminster Board of Supervisors and the Bucks County Planning Commission to accommodate the uses proposed under the Reuse Plan (Rockwell, July 29, 1998).

Potential permitting issues involve the site proposed for the congregate care facility in Northampton Township; the proposed parkland, also in the Northampton portion of NAWCAD; and the proposed firehouse and municipal well. In Ivyland, the 150-200 housing units proposed under the Reuse Plan would require Ivyland Borough to rezone the site, currently zoned to accommodate approximately 100 units, to accommodate the increased density.

University/Institutional Alternative

The University/Institutional Alternative incorporates land use components similar to those of the new Reuse Plan, but with more intensive development and less park and recreation use. The primary difference is inclusion of a major university/institutional element, which would expand on prior uses

of the site as a technologically advanced R&D center. Figure S-2 shows the allocation of the proposed uses superimposed on a plan of the existing base.

As with the Reuse Plan, reuse of existing facilities under the University/Institutional Alternative would be consistent with existing land uses, but development of the new facilities and activities would involve a significant increase in use from the existing airport (and its ancillary facilities) to the various proposed uses. Permitting and zoning issues would be the same as for the Reuse Plan.

Residential Alternative

Although involving a less-intensive level of development than the proposed Reuse Plan, the Residential Alternative shares many of its basic elements, including reuse of the main buildings as a multi-business complex, the congregate care facility, the proposed residential development in Ivyland, and much of the recreational development. The Residential Alternative also incorporates a 250-acre (101-hectare) golf/residential component that adds 400 dwelling units. The residential reuse of much of NAWCAD, as proposed under this alternative, would be in general conformity with the surrounding residential land use in Warminster and Northampton Townships. Permitting and zoning issues would be the same as for the Reuse Plan.

Aviation Alternative

The aviation reuse examined under this alternative is for a Basic Utility GA airport, which would be in conformity with the historical use of the facility as an airport. It would, however, introduce a level of aviation operations substantially greater than that seen at Warminster for many decades. As Warminster and Northampton Townships have grown over recent decades, issues of compatibility with the surrounding residential land use would undoubtedly be raised. The remainder of the land is allocated to uses considered compatible with a GA airport. The aggregate character of the Aviation Alternative is a more intensive industrial, research, and aviation mix than the other alternatives.

S.3.2 Socioeconomics

No Action Alternative

Under this alternative, the Navy would entirely vacate NAWCAD, with the exception of the 199-unit enlisted family housing complex and the six units of officer housing on Jacksonville Road. Of the former employees that would remain in the region, many would join the region's unemployed pool temporarily while seeking alternate employment. There would be no redevelopment at the base and hence neither new income nor new tax revenues would be generated. Finally, no new housing demand would be created; in fact, the net effect would be a small but noticeable depression in the

Philadelphia metropolitan region's housing market, particularly immediately following closure of the base.

Reuse Plan

The proposed Reuse Plan would introduce some 150 to 200 new homes in the Ivyland section of NAWCAD (ERA, 1995), generating an additional population of approximately 400 to 600 people. Resident level at the congregate care facility proposed in Northampton is currently estimated at 500 seniors. The population of Bucks County is projected to increase by 124,578 between 1990 and 2010 (Bucks County Continuum, 1994), and new housing is projected to increase by 51,066 to 83,216 units (low and high projections, respectively) over the same time frame. In light of the foregoing statistics and future projections, the specific demographic consequences of the proposed Reuse Plan may be difficult to define with any precision, but it appears that the anticipated growth at NAWCAD would be well within that already projected to be accommodated by the county through the year 2010.

The characteristics of almost 6,850 new permanent jobs proposed by the Reuse Plan are broadly identified by industry category in the original Reuse Plan (ERA, 1995). The mean earnings associated with these industry categories have been estimated in 1995 dollars based on national data provided by the Bureau of Labor Statistics. The total projected annual earnings of this proposed employment, in 1995 dollars, would be $181 million.

In addition to permanent jobs, temporary jobs associated with construction activity and indirect employment resulting from earnings circulating in the region would be generated. Based on estimated construction costs of $155 million, it is possible to predict that 1,502 direct construction jobs with an estimated $67.6 million in total earnings would be created. Total direct and indirect employment for the alternative is estimated at 14,354 jobs, with indirect employment representing almost 52 percent of this at 7,504 jobs. Total earnings are projected to be over $332 million.

Much of the result of Reuse Plan development would be brought onto the tax rolls for property taxes or provide payments in lieu of taxes (PILOT). The employment would generate new earned-incomes taxes, and the business activity generally would raise new revenues from business taxes and fees. The Bucks County Planning Commission projects an increase in housing units of between 27,366 (low) to 35,466 (high) units over the period 1990 to 2000. Even if all the expected increment of approximately 2,700 new housing units accommodating the 6,850 new workers at NAWCAD were to be located in Bucks County, the anticipated growth of housing in Bucks County could easily absorb this anticipated demand.

University/Institutional Alternative

Significant demographic consequences would result from the development of jobs at the former base under the University/Institutional Alternative. It would generate approximately 7,600 jobs, with

direct earnings of $198.8 million, between the years 1996 and 2010, and there would be some 2,500 students associated with the educational components. The number of jobs associated with this alternative is 10.9 percent greater than under the present Reuse Plan. However, the anticipated growth as a result of implementation of the University/Institutional Alternative would be well within that already projected to be accommodated by the county through the year 2010.

Total construction costs are estimated at $216 million under the University/Institutional Alternative. Total direct and indirect employment is computed at 15,684 jobs, with indirect employment representing almost 52 percent of this at 8,089 jobs. Total earnings are projected to be over $365 million, of which $166.5 million would be generated indirectly.

As with the proposed Reuse Plan, the University/Institutional Alternative would generate substantial fiscal benefits from the development of NAWCAD. At full buildout, the University/Institutional Alternative shows an estimated 4.85 million sq ft (450,565 sq m) of new and reused business and institutional space plus 150 to 200 new residential units. Much of this development would be newly brought onto the tax rolls for property taxes or provide PILOT, the employment would generate new earned-incomes taxes, and the business activity generally would raise new revenues from business taxes and fees.

The employment level under the University/Institutional Alternative is projected to induce demand for some 3,000 new housing units. Even assuming that all this new housing would be in central Bucks County, it represents only about 22 percent of the Bucks County Planning Commission's projected growth in the planning areas over the decade 2000 to 2010.

Residential Alternative

The Residential Alternative would introduce more residents to the site than would the Reuse Plan, but would reduce the number of anticipated jobs. The golf/residential complex and the Ivyland residential parcel together represent some 550 to 600 households, or 1,540 to 1,680 persons; the anticipated congregate-care resident level of approximately 500 seniors should bring that total over 2,000. The estimated housing and population growth is well within projected growth over the period.

Direct employment would be an estimated 5,000 jobs generated, with associated earnings of over $133 million. Total construction costs are estimated at $217 million, from which the estimates of 2,101 construction jobs, 2,913 additional jobs in other industries, and a total of 5,014 direct and indirect jobs from construction are derived. Total earnings from direct construction jobs are estimated at $94.5 million. Total direct and indirect employment is projected at 9,567 jobs, with indirect employment representing 47 percent of this at 4,525 jobs. Total earnings would be almost $243 million.

For Ivyland and Northampton, the Residential Alternative would have essentially the same fiscal consequences as the Reuse Plan, as the proposed activities do not change, but for Warminster there would be a major shift, reducing the multi-office park component and adding the golf/residential element. The fiscal consequence is that earned-income tax revenues would decrease by about half, but this reduction would be somewhat compensated for by increases in real property tax from the golf/residential component.

Aviation Alternative

The Aviation Alternative would introduce no new residents to the site, but would increase the total anticipated direct jobs by nearly 9,200. Housing on the site would reduce to zero, but the surrounding region would see approximately 4,600 new units induced by this alternative. As with the Reuse Plan, the Aviation Alternative is unlikely to present unexpected or problematic growth to Bucks County; however, in this case the estimated-induced housing development would account for about one-third of projected growth in the county over the period.

The estimated total construction costs are $142.3 million. Total direct and indirect employment is computed at 20,873 jobs, with indirect employment representing 56 percent of this, or 11,688 jobs. Total earnings are projected to be almost $462 million, of which $211 million would be generated indirectly.

As with the Reuse Plan, the Aviation Alternative would result in fiscal benefits from the redevelopment of NAWCAD. The estimated number of jobs and associated earnings would be greater than under the Reuse Plan. Thus, associated tax, PILOT, and other revenues would be higher and, in some cases, could be significant; in Warminster, for example, the anticipated annual earned income tax revenue of $2.5 million at full buildout would represent an 80 percent increase over the 1995 budget.

S.3.3 Community Services

Community services fall into two general categories: those directly involving the NAWCAD facility itself, such as the emergency services of police, fire, and ambulance, and other services not necessarily NAWCAD-specific, such as schools, health care, and parks and recreation.

No Action Alternative

There would be no redevelopment at the base under the No Action Alternative; thus, there would be no new demand created for community services.

Reuse Plan

In comparing the projected distributions of the new student population under the Reuse Plan to recent student populations, the increment that these new students would represent is very small: about 320 new students to private schools and 1,290 new students to public schools. Moreover, the time frame for the full buildout scenario extends some 15 to 20 years and these student population increments would not be reached until after year 2010, permitting substantial lead times for school districts to prepare for and incorporate the base reuse impacts and other unrelated demographic changes in the region.

With regard to health care, the redevelopment of NAWCAD under the Reuse Plan would be unlikely to present any particular problems for the county's health care facilities.

With respect to fire protection, until late 1995 the Navy had mutual-aid agreements with local fire services, under which Navy fire crews were typically first-on-the-scene respondents during the daytime. Warminster Township is currently considering full-time fire department employees, particularly for the day shift, due both to local need and the closure of NAWCAD. Also, Ivyland Borough officials indicated the need to expand its fire and police services with the redevelopment of NAWCAD under the Reuse Plan.

The Reuse Plan proposes the development of substantial park facilities totaling approximately 370 acres (150 hectares), of which 250 acres (100 hectares) would be allocated to Warminster Township and 128 acres (52 hectares) would be allocated to Northampton Township.

University/Institutional Alternative

In comparing the projected distributions of the new student population under the University/ Institutional Alternative to recent student populations, the increment that these new students represent is very small: 1,418 new public-school students and 360 new private-school students. Moreover, the time frame for this full buildout scenario extends some 15 to 20 years and these student population increments would not be reached until after year 2010, permitting substantial lead times for school districts to prepare for and incorporate the base reuse impacts and other unrelated demographic changes in the region.

With respect to health care, the redevelopment of NAWCAD under the Reuse Plan would be unlikely to present any particular problems for the county's health care facilities. With respect to fire protection, the discussion above for the Reuse Plan holds true for the University/Institutional Alternative as well. This alternative proposes the development of one-third less parkland than the Reuse Plan, but would still provide a substantial increment (250 acres [100 hectares]) to park facilities in the region.

Residential Alternative

There would be fewer school-age children under the Residential Alternative than the Reuse Plan, despite there being 400 more residential units on site, because anticipated employment (and therefore number of people with families) would be about 26 percent less than with the Reuse Plan; therefore, no adverse impact to schools would be anticipated. Anticipated impacts upon health care service would be less than under the Reuse Plan. With respect to public safety and emergency services, the increase in the local tax base from private redevelopment of NAWCAD and the new wage tax revenues are expected to support the small increases in service capacity that would be needed. The Residential Alternative would provide an increment of 210 acres (85 hectares) of new public park and recreation land; the portion in Northampton Township would remain the same as in the Reuse Plan, but the portion in Warminster Township would be reduced to 86 acres (35 hectares).

Aviation Alternative

The Aviation Alternative would generate 60 percent more students than the Reuse Plan. However, absorption of these students into the school districts is not expected to create major problems over the 15-year development period. Existing health care and emergency services would accommodate implementation of the Aviation Alternative with little impact. The Aviation Alternative would provide an increment of 162 acres (66 hectares) of new public park and recreation land to the community, all of which would be in Northampton Township.

S.3.4 Transportation

In order to compare historical traffic volumes associated with NAWCAD to projected traffic volumes resulting from the three action alternatives, the number of trips generated at the time of the decision to close NAWCAD (April 1991) was computed. Table S-4 reflects trips generated during am and pm peak periods and total daily trips for NAWCAD in April 1991 and for each action alternative.

Table S-4

Generated Vehicle Trips

Time Period	NAWCAD (April 1991)[1]	Reuse Plan	University/ Institutional Alternative	Residential Alternative	Aviation Alternative
AM	1,844	2,826	3,721	2,188	4,001
PM	1,844	2,886	3,826	2,367	4,030
Daily Trips	10,310	15,370	26,410	18,051	27,044

Note: [1] Decision to close NAWCAD

No Action Alternative

Future traffic volumes under the No Action Alternative were estimated based on historical traffic conditions and changes in the study area as well as future changes in traffic generators (residential and employment centers likely to be constructed, expanded, or closed by the build year of 2010). An annual growth rate of one percent per year was chosen to account for general traffic growth in the area. The street network was assumed to remain similar to existing conditions except for minor signalization improvements. Findings indicated that despite the closure of NAWCAD, background traffic growth and other nearby developments would cause further degradations in Level of Service (LOS) at the intersections studied. Poor operation (LOS E or worse) would be expected at all study area intersections.

Reuse Plan

The proposed site development would result in the continued use and further development of the site for R&D, general industrial and office development, housing (single-family and congregate), and recreation. Trips that would be generated by the proposed Reuse Plan were distributed throughout the roadway network, based on trip generation rates from *Trip Generation, 5th Edition* (Institute of Transportation Engineers, 1991). data for existing employees at NAWCAD. Distribution of these trips also accounted for the new access points proposed in the Reuse Plan.

Implementation of the Reuse Plan would generate an estimated 15,370 additional daily trips to the site, creating considerable traffic delays at all study area intersections, since the existing street network offers limited residual capacity. All intersections except two would operate at unacceptable levels (LOS F) during the peak hours, with extensive delays to be expected at all study area intersections. Bristol Road and Hatboro Road (Location 2) and Street Road and Second Street Pike (Location 5) would both operate at LOS E in the am peak.

Several potential mitigation measures have been investigated, including signal modifications, geometric improvements, and regulatory measures. The feasibility of introducing mitigation measures at each intersection impacted was evaluated. The configuration of certain intersections would preclude further widening (i.e., existing left-turn lanes), while others support adjacent development that would be substantially impacted if geometric improvements were undertaken.

Despite the above-listed potential improvements, several intersections would continue to operate at undesirable levels. Also, other intersections for which mitigation is not feasible would continue to operate poorly. Therefore, other mitigation measures such as staggered work hours and ride-sharing could be enacted, but have not been evaluated here.

University/Institutional Alternative

The University/Institutional Alternative incorporates land use components similar to those of the new Reuse Plan, but it features more intensive development and less park and recreation use. The University/Institutional Alternative would generate more vehicles than the Reuse Plan; therefore, impacts of this alternative would be greater. Capacity analyses have been conducted for two locations to demonstrate the impacts, with the result that both locations would operate at LOS F (as with the Reuse Plan) during peak hours, with extensive delays expected. Mitigation measures would be as described for the Reuse Plan.

Residential Alternative

The Residential Alternative would involve increased residential development but diminished industrial use. Although this alternative generates fewer vehicles than the preferred alternative, local street operations would remain constrained during the am and pm peak hours. Though the impacts lessen slightly, the intersections would remain at poor LOS. Mitigation measures would be as described for the Reuse Plan.

Aviation Alternative

The Aviation Alternative would generate a higher number of additional trips to the site than the Reuse Plan Alternative. Impacts of this alternative would be more substantial than those described for the Reuse Plan. Mitigation measures would be the same as described for the Reuse Plan.

S.3.5 Air Quality

The purpose of this air quality analysis is to evaluate the impacts of traffic-related carbon monoxide (CO) for the Reuse Plan and alternatives. Average hourly CO concentrations were predicted for the peak am and pm one-hour traffic periods using an air pollutant dispersion model.

No Action Alternative

Analysis indicated no mobile source emission violations of the National Ambient Air Quality Standards (NAAQS) CO one-hour standard of 35 parts per million (ppm) and eight-hour standard of nine ppm for both am and pm peak periods under the No Action Alternative. With respect to stationary source emissions, only the six units of officer family housing on Jacksonville Road and the 199-unit enlisted family housing complex would continued to be occupied, and stationary source emissions would, therefore, decrease substantially.

Reuse Plan

The results of the microscale air quality analysis for the Reuse Plan show no violations of the NAAQS CO one-hour standard of 35 ppm and eight-hour standard of nine ppm. While CO levels would be higher under the Reuse Plan than the No Action Alternative at all locations due to increased traffic, the increases would not be significant.

The long-term impact on air quality that would arise from stationary emission sources, including heating units, would depend upon the nature and extent of the activities conducted on the property. The PA Department of Environmental Protection would have jurisdiction over these emission sources, and it will be necessary for all such sources to comply with agency standards. Certain sources would require appropriate permits from the PA Department of Environmental Protection.

Air quality impacts from construction activity would be from fugitive dust on-site and mobile source emissions from construction vehicles, equipment, and workers' automobiles. The former would be mitigated easily by using water to control the dust during demolition and construction; mobile source emissions are construction activity-specific, not significant, and short-lived.

University/Institutional, Residential, and Aviation Alternatives

The results of the microscale air quality analyses for the University/Institutional, Residential, and Aviation Alternatives show no violations of the NAAQS CO one-hour standard of 35 ppm and eight-hour standard of nine ppm. While CO levels would be higher under these alternatives than the No Action Alternative at all locations due to increased traffic, the increases would not be significant.

As described for the Reuse Plan, any long-term impact on air quality that would arise from stationary emission sources, including heating units, would depend upon the nature and extent of the activities conducted on the property. The PA Department of Environmental Protection would have jurisdiction over these emission sources.

S.3.6 Noise

The methodology for predicting future noise levels is based on the assumption that existing noise levels are dominated by, and are a function of, existing traffic volumes, and that future noise levels can be determined based on the proportional increase in traffic (on a logarithmic basis) associated with a project. Aviation noise levels are analyzed in similar fashion.

No Action Alternative

There would be an increase in noise under no action conditions as there would be general traffic growth in the region (a growth rate of one percent a year is assumed). All increases in noise levels from existing conditions to future No Action Alternative conditions are less than or equal to one decibel.

Reuse Plan

Changes in noise levels due to implementation of this alternative were determined by adding the noise attributable to development-generated traffic to noise levels previously calculated for the No Action Alternative. The hourly L_{eq} analysis shows that, with the exception of a few hours of the day, noise levels would increase less than or equal to one decibel from the No Action Alternative to the Reuse Plan Alternative.

With regard to stationary sources such as exterior mechanical equipment (e.g., fans, compressors), all would be designed to comply with applicable ordinances. There would be no significant impact from these sources. Noise generated by construction activity would be restricted to the daytime, would be finite in nature, and would not be expected to have any significant impact.

University/Institutional Alternative

In general, future mobile source noise impacts associated with the University/Institutional Alternative would be the same as those associated with the Reuse Plan, given the comparable level of trip generation. Stationary source impacts and construction noise impacts under this alternative would also be similar to those previously described for the Reuse Plan.

Residential Alternative

Future mobile source noise impacts associated with the Residential Alternative would be less than those of the Reuse Plan, given the smaller amounts of vehicular trips that would be generated. Stationary source impacts and construction noise impacts under this alternative would be similar to those previously described for the Reuse Plan.

Aviation Alternative

Aircraft noise levels are typically expressed in terms of decibels (dB). A variety of noise metrics have been developed to evaluate aircraft noise levels. Of these, the Day-Night Average Sound Level (DNL) is currently the official accepted metric of the FAA. For this EIS, DNL levels equal to and greater than 65 dB were used for assessing community noise impact.

Potential aircraft operations for the site were developed for analysis purposes based on the potential interest in general aviation activities in the Warminster area. Extensive forecasting and modeling revealed that the noise impact from implementing the general aviation alternative would not be significant due to the type of aircraft and light aircraft traffic predicted. Any land acreage affected by noise levels higher than 65 dB would be within the runway's clear zones; no significant noise impact would be expected from this alternative.

With respect to ground vehicles, the Aviation Alternative would generate higher traffic volumes than the other alternatives. As a result, it would be expected that noise levels generated would also be higher than for the other alternatives. Stationary source impacts and construction noise impacts would be similar to those previously described for the Reuse Plan.

Historic noise levels at NAWCAD were reviewed for comparative purposes. Contours above 60 dB for 1988 operations at the NAWCAD airfield were reported (Harris Miller Miller & Hanson Inc., 1989). The noise impact from the Aviation Alternative would be significantly less than in 1988, a difference that is attributable to the different type of aircraft operations, as the noise level from general aviation aircraft would be low compared with military aircraft such as T-2 and A-7 jets.

S.3.7 Infrastructure

Infrastructure involves such systems as electricity, steam production, potable and non-potable water, wastewater, stormwater, solid waste, and other utilities.

No Action Alternative

Under the No Action Alternative there would be no redevelopment at the base, and thus little or no new demand would be created for utilities. The six units of officer family housing on Jacksonville Road and the 199-unit enlisted family housing complex to be transferred to NAS JRB Willow Grove would continue to be occupied by the Navy. As a condition of the No Action Alternative, it is assumed that local municipalities would continue to provide utility services to this housing.

Reuse Plan, University/Institutional, Residential, and Aviation Alternatives

In the case of infrastructure, existing conditions and projected impacts are similar for each of the four action alternatives.

- **Electricity** - would continue to be provided by PECO Energy; further analysis would be required to address gradual replacement and upgrade of the distribution system based on actual implementation requirements.

- **Steam production** - anticipated to be ample for all alternatives.

- **Water Supply** - currently a combination of purchased supply from Warminster Municipal Authority and water from existing wells on the NAWCAD property. Per capita water usage is estimated at 35 gallons (132 liters) per day. Under all alternatives, daily demand would exceed historic usage. Alternative water supply sources include: incorporation of some of NAWCAD's existing wells into the adjacent municipal authority systems; expansion of Warminster Municipal Authority's distribution system to increase supply; and addition of Northampton Municipal Authority as a supplier. These apply to all action alternatives; all options require further study.

- **Wastewater system** - per capita sanitary flow is estimated at 35 gallons (132 liters) per day for industrial use and 100 gallons (379 liters) per day for residential use, within the amount of available capacity at the Warminster Wastewater Treatment Plant for each alternative. National Pollutant Discharge Elimination System (NPDES) requirements need to be met for all alternatives.

- **Stormwater system** - construction activities associated with the development of each alternative would be subject to the NPDES permit program. Potential increases in impervious surface under each alternative are as follows:

    - Reuse Plan - 236 acres (81 hectares);
    - University/Institutional Alternative - 340 acres (138 hectares);
    - Residential Alternative - 210 acres (85 hectares); and
    - Aviation Alternative - 470 acres (190 hectares).

- **Solid waste** - would be disposed of by private contractor; although generation of solid waste would exceed historic per capita waste generation rates, no significant impact is anticipated for any alternative.

- **Other** - gas would continue to be provided by PECO Energy; existing telephone lines would continue to be available; no problems are anticipated.

S.3.8 Cultural Resources

The cultural resources survey conducted at NAWCAD (TAMS Consultants, Inc. [TAMS] and John Milner Associates [Milner], 1996) identified three buildings that are considered eligible under Criterion I.A of the National Park Service (NPS) regulations (36 CFR 60.4[g]) that provide the criteria for historic significance: the inertial guidance research facility (Bldg 108), the seat ejector

test facility (Structure 361), and the centrifuge (Bldg 70). The centrifuge (Bldg 70) played such an important role in the development of the X-15, as well as the Mercury and Gemini manned space programs, that it is considered eligible under Criterion I.A in the context of Man in Space.

No Action Alternative

Under the No Action Alternative there would be no new construction or alteration in the area of the historic buildings. Closure of designated areas of NAWCAD would follow Naval Facilities Engineering Command (NAVFACENGCOM) standards and procedures for mothballing facilities.

Reuse Plan

The Reuse Plan proposes that the inertial guidance laboratory (Bldg 108) and centrifuge (Bldg 70) continue in their historic usage, and that the ejection tower (Structure 361) remain and be used as an antenna tower. The proposed disposal of NAWCAD by the Navy results in a finding of adverse effect on all three historic structures. To mitigate this effect, the Navy will place restrictive deed covenants on each of the individual buildings prior to property transfer. Mitigation for this adverse effect is specified in the Programmatic Agreement of December 1998 (Appendix G).

University/Institutional, Residential, and Aviation Alternatives

As a result of the similarities in land use in the vicinity of the eligible buildings of the Reuse Plan and the University/Institutional, Residential, and Aviation Alternatives, impacts on the cultural resources at NAWCAD would be the same.

S.3.9 Natural Resources

No Action Alternative

Under the No Action Alternative, existing natural resources would remain unchanged and all identified wetlands in the area would remain intact.

Reuse Plan

The status of and potential impacts to natural resources resulting from implementation of this alternative are as follows:

- **Vegetation** - Existing vegetation on and around NAWCAD is a combination of low-value communities, fallow field, and degraded woodland. Implementation of the Reuse Plan would result in no significant impact.

- **Wildlife** - No significant impact to wildlife or threatened or endangered species is expected.

- **Wetlands** - There is indication of a small acreage of freshwater wetlands (one to five acres [0.4 to two hectares]) on the site. The Reuse Plan, serving as a development design framework, does not contain detailed site plans; therefore, specific impacts of the reuse on wetlands would depend on future specific site plans.

  Analysis for any proposed project under the Reuse Plan that would affect wetlands must consider avoiding impacts to wetlands as described in the *Memorandum of Agreement Between the Environmental Protection Agency and the Department of the Army Concerning the Determination of Mitigation under the Clean Water Act Section 404 (b)(1) Guidelines.* Any disturbances to wetlands would require a permit from the US Army Corps of Engineers (COE) and the PA Department of Environmental Protection.

- **Floodplains** - Because NAWCAD does not lie within the 100-year or 500-year floodplain, there would be no impact on floodplains.

- **Topography, Geology, and Soils** - All persons engaged in the earthmoving activities associated with development would be required to develop and implement soil erosion and sedimentation control measures, set forth in a specific plan, and obtain an earth distribution permit from Pennsylvania's Bureau of Soil and Water Conservation prior to commencement of work.

University/Institutional, Residential, and Aviation Alternatives

The situation, potential activities, potential impacts, and required actions and mitigation for development under the University/Institutional, Residential, and Aviation Alternatives are the same as under the Reuse Plan.

S.3.10 Petroleum and Hazardous Substances

NAWCAD has been designated as a National Priorities List (Superfund) site. Environmental Baseline Survey (EBS) work is underway to support anticipated Findings of Suitability to Transfer (FOST) documentation for all NAWCAD property.

No Action Alternative

Under the No Action Alternative, the Navy would continue to provide for cleanup of contaminated sites as identified in the Federal Facilities Agreement between the Navy and EPA (September 1990). With the closure of NAWCAD in September 1996, use of most hazardous materials has ceased. There may be some use of chemicals in the Pump and Treat Facility constructed as part of the groundwater cleanup program. Environmental compliance activities at NAWCAD would continue for all facilities.

Reuse Plan

The use of hazardous materials by the Navy at NAWCAD has ceased. Environmental compliance activities at NAWCAD would continue for storage tanks, hazardous substances and hazardous waste, polychlorinated biphenyls (PCBs), asbestos, and NPDES permits per the *BRAC Cleanup Plan* (BRAC Cleanup Team and EA Engineering, March 1995).

Operation and maintenance of private industries located in the area of the new industrial/business/ office R & D complex may generate hazardous substances, but amounts cannot be quantified at this time, as the nature of those industries is not known.

With regard to site contamination, the 1995 EBS at NAWCAD determined that releases of hazardous waste or substances to the soil and/or groundwater have occurred within four areas (identified as A, B, C, and D) on the property. In each of these areas, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) requires a Remedial Investigation (RI). In addition, for each area, and for the remaining property targeted for transfer, studies must be conducted to determine if hazardous substances, hazardous wastes, and/or petroleum products have been stored, released, or disposed. If release or disposal of such substances is confirmed, CERCLA and/or RCRA cleanup requirements must be met prior to property transfer.

The BRAC Cleanup Team (BCT) is coordinating with the FLRA in addressing the environmental issues related to transfer parcels scheduled for reuse. In addressing the cleanup levels, the BCT would give consideration to BRAC future land use as identified in the proposed Reuse Plan.

University/Institutional Alternative

As with the Reuse Plan, the use of hazardous materials by the Navy at NAWCAD would cease under the University/Institutional Alternative. Environmental compliance activities at NAWCAD would continue for storage tanks, hazardous substances and hazardous waste, polychlorinated biphenyls (PCBs), asbestos, and NPDES permits per the *BRAC Cleanup Plan* (BRAC Cleanup Team and EA Engineering, March 1995).

Operation and maintenance of private industries located in the area of the new multi-business complex may generate hazardous substances, but amounts cannot be quantified at this time, as the nature of those industries are not known.

Residential Alternative

Under this alternative, reduction of the scale of the multi-business complex would reduce the amount of hazardous substances generated as compared to the Reuse Plan and University/Institutional Alternatives. Site contamination issues would be handled as previously described.

Aviation Alternative

Operation of the airfield under this alternative would generate petroleum and hazardous substances during routine operation and maintenance activities. Also, the scale of the industrial/business/office park would increase, so the potential for increased generation of hazardous substances in this area increases. Appropriate hazardous substance handling, control, and disposal procedures would be needed.

S.3.11 Cumulative Impacts of the Preferred Action

Cumulative impacts to the study area as a result of the redevelopment of NAWCAD would include the phaseout and closure of the base itself. In 1990, base personnel loading totaled 4,605 personnel. This number declined to 1,398 in August 1995 and to 1,129 in May 1996. As of July 1998, there were 20 employees associated with the Caretaker Site Office at NAWCAD. In addition, the FLRA has several interim leases for various facilities at the base. The number of employees associated with these facilities varies between 200 and 300 (Ames, July 24, 1998).

The loss of this employment center and its ancillary functions is a significant feature that is included in No Action Alternative conditions. The determination of impacts potentially generated by a redeveloped NAWCAD have taken into account this anticipated reduction.

Interviews conducted in 1995 and 1996 with Bucks County planners and township officials indicated that no major new projects were planned in the study area. The most significant project identified was the new Wal-Mart store on Street Road at Jacksonville Road that opened January 1996. The Wal-Mart traffic studies submitted to PENNDOT were incorporated into the traffic analysis in Subchapter 4.4. Other proposed projects identified by township officials were:

- A new residential subdivision for approximately 400 units in Warwick Township, beyond the one-mi (1.6-km) study area; and

- A small industrial subdivision of 20 acres (eight hectares) (26 parcels but with no specific projects identified) about one-half mi (one km) northwest of NAWCAD in Warminster.

These other projects are relatively small and are included within the background growth factors used in the traffic analysis or demographic projections for the area.

S.4 Relationship of Proposed Action to Federal, State, and Local Plans, Policies, and Controls

The proposed action is consistent with relevant federal, state, and local plans, policies, and controls, assuming that remaining remediation of site contamination at NAWCAD occurs as planned, asbestos removal and disposal is achieved in accordance with regulations, and cultural resource mitigation is performed in accordance with procedures and agreements with the PA SHPO and the Advisory Council on Historic Preservation.

S.5 Unavoidable Adverse Effects, Relationship Between Local Short-term Uses and Enhancement of Long-term Productivity, and Irreversible and Irretrievable Commitments of Resources

The additional vehicular traffic generated by the Reuse Plan would create considerable traffic delays at all study area intersections in the vicinity of NAWCAD. Potential mitigation measures for these impacts would include signal modifications, geometric improvements, and regulatory measures. Implementation of these measures would be at the discretion of the FLRA. Short-term construction- and demolition-related effects on traffic levels, air quality, and noise would be unavoidable, but impacts could be diminished by implementing measures such as phasing of construction and limiting hours of construction noise.

Implementation of the proposed Reuse Plan could potentially impact freshwater wetlands, with the amount affected dependent upon the ultimate site configuration. Any proposed project that would affect wetlands must consider avoiding impacts to wetlands. Only after wetland impacts have been avoided to the greatest extent practicable could other mitigative measures be considered. There are no other unavoidable adverse effects as a consequence of the proposed reuse of the property.

Some early morning noise level increases may be noticeable; however, existing noise levels are already high and are typical of a suburban neighborhood.

Proposed disposal of NAWCAD would adversely effect cultural resources. These effects would be mitigated by the implementation of the Programmatic Agreement of December 1998 (Appendix G).

Irreversible and irretrievable commitments of resources would be made in terms of added quantities of debris to disposal sites as a result of demolition, the commitment of resources (construction materials and land) to the proposed site uses, and the long-term use of resources, such as energy supply, water, sewage treatment, landfill capacity, and road use. On balance, the proposed Reuse Plan is considered a productive use of the property that does not negatively impact the site's potential for long-term productivity (e.g., in terms of economics, induced population, etc.).

S.6 Summary Statement of Environmental Significance

Implementation of the proposed Reuse Plan for NAWCAD is considered to have significant environmental impacts with respect to traffic conditions. The additional vehicular traffic generated by the preferred alternative would create considerable traffic delays at intersections in the vicinity of NAWCAD. Issues to be resolved include the appropriate mitigation for this impact. A summary impact matrix for the proposed Reuse Plan and its alternatives is presented in Table S-5.

Table S-5

Summary Impact Matrix - Disposal and Reuse Alternatives for NAWCAD

Evaluation Parameter	Reuse Plan	University/Institutional Alternative	Residential Alternative	Aviation Alternative
Land Use	Land uses compatible with existing on-base and surrounding land uses. Proposed residential development in Ivyland is slightly more dense than permitted under zoning. New zoning policy being developed for Warminster.	Land uses compatible with existing on-base and surrounding land uses. Proposed residential development in Ivyland is slightly more dense than permitted under zoning. New zoning policy being developed for Warminster.	Land uses compatible with existing on-base and surrounding land uses. Proposed residential development in Ivyland is slightly more dense than permitted under zoning. New zoning policy being developed for Warminster.	Aviation use is a historic use at the site but the proposed GA airport activity would be greater than experienced for many years and presents potential conflicts with expanded residential development in the surrounding area. Other proposed uses compatible with existing on-base and surrounding uses.
Socioeconomics	- 150-200 new homes, generating an additional population of 400-600 people. - Creation of 6,850 direct jobs and 7,504 indirect jobs. - Total earnings (direct and indirect) are projected to be over $332 million.	- 150-200 new homes, generating an additional population of 400-600 people. - Creation of 7,600 direct jobs and 8,090 indirect jobs. - Total earnings (direct and indirect) are projected to be over $365 million.	- 550-600 new homes generating an additional population of 1,540-1,680 people. - Creation of 5,000 direct jobs and 4,530 indirect jobs. - Total earnings (direct and indirect) are projected to be almost $243 million.	- No new housing on the site, but would induce 4,600 new units in the area. - Creation of 9,200 direct jobs and 11,688 indirect jobs. - Total earnings (direct and indirect) are projected to be almost $462 million.
Community Facilities	No major adverse impacts foreseen in meeting anticipated growth in demand for services. Benefits would be derived in region from increased employment and income.			
Transportation	Additional vehicular trips generated by Reuse Plan would create considerable traffic delays at all intersections. LOS would remain poor at all intersections. Roadway improvements would be required to mitigate these impacts.	Additional vehicular trips generated would be greater than under the Reuse Plan and would create considerable traffic delays at all intersections. LOS would remain poor at all intersections. Roadway improvements would be required to mitigate these impacts.	Additional trips would be generated as compared with the No Action Alternative; fewer vehicular trips than the Reuse Plan. LOS would remain poor at all intersections. Roadway improvements would be required to mitigate these impacts.	Additional trips would be generated as compared with the No Action Alternative; slightly more vehicles than the Reuse Plan. LOS would remain poor at all intersections. Roadway improvements would be required to mitigate these impacts.

Table S-5

Summary Impact Matrix - Disposal and Reuse Alternatives for NAWCAD

Evaluation Parameter	Reuse Plan	University/Institutional Alternative	Residential Alternative	Aviation Alternative
Air Quality	No violations of federal or state standards for one-hour and eight-hour averaging periods. No construction air quality impacts would occur, with fugitive dust controls and adherence to asbestos removal and disposal regulations. Minor stationary source emissions from use of boilers for heating and hot water in buildings would have no significant impact on air quality.			
Noise	Increase in noise during some early morning hours would be noticeable; however, existing noise levels are already high and are typical of a suburban neighborhood. No significant impact is anticipated from aviation-related noise associated with the Aviation Alternative.			
Infrastructure	Demand for potable water would exceed historic usage. Potential sources of additional potable water were identified as the Northampton and Warminster Municipal Authorities. Extension of existing water line in Warminster would be required to provide an adequate potable water source, at an approximate cost of $500,000.			
Cultural Resources	Adverse impacts to the three identified historic structures at NAWCAD (Bldg 108 [Inertial Guidance Laboratory], Bldg 70 [Centrifuge], and Structure 361 [Ejection Tower]) would occur, due to the Navy's act of disposal of NAWCAD.			
Natural Resources	Wetlands could be impacted, depending on the specifics of future development. Any proposed project must consider the avoidance of wetland impacts; only after impacts have been avoided to the greatest extent practicable would other mitigative measures be considered and implemented.			
Petroleum and Hazardous Substances	- Industrial users may generate hazardous materials - amounts cannot be quantified as the nature of those users is unknown. - BRAC Cleanup Team is coordinating with FLRA to address cleanup levels for property transfer. - No impacts related to radon, lead-based paint, or asbestos.	- Industrial users may generate hazardous materials - amounts cannot be quantified as the nature of those users is unknown.	- Reduction in scale of hazardous waste generation. - No impacts related to radon, lead-based paint, or asbestos.	- Generation of petroleum and hazardous substances during routine operations. - Overall increase in hazardous waste generation.
Cumulative Impacts of the Preferred Action	Closure of NAWCAD results in the loss of an employment center and its ancillary functions. Such loss is a significant feature of the baseline conditions. Impacts generated by a redeveloped NAWCAD have taken into account this anticipated reduction. No other new projects are planned in the study area.			

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1 PURPOSE AND NEED

The Naval Air Warfare Center Aircraft Division (NAWCAD) Warminster is located in Bucks County, Pennsylvania, approximately 18 miles (mi) (29 kilometers [km]) north of Center City Philadelphia and 15 mi (six km) west of the New Jersey/Pennsylvania state line (Figure 1-1, Site Location). It covers approximately 824 government-owned acres (333 hectares). An additional 38 acres (15 hectares) of contiguous land is Navy-controlled for avigation easements. NAWCAD also maintains a 15-acre (six-hectare) remote site, the Oreland Open Water Facility which is located about eight mi (13 km) southwest of Warminster in Montgomery County. The closure of Oreland, like the closure of NAWCAD, was a Base Closure and Realignment Act (BRAC) action, but is the subject of a separate environmental analysis document.

NAWCAD's mission has been as the Navy's principal research, development, testing, and evaluation (RDT&E) center for Naval avionics and airborne and antisubmarine warfare systems. The site has approximately 214 buildings containing 1,791,000 square feet (sq ft) (166,400 square meters [sq m]) of space. Activities at NAWCAD are broadly categorized into the following six functions:

- Research and development;
- Airfield operations;
- Industrial;
- Administration;
- Family housing; and
- Personnel support.

1.1 Base Closure and Realignment Act

The Base Closure and Realignment Act (known as the BRAC legislation) was signed into law on October 24, 1988 (Public Law [PL] 100-526) and subsequently amended in November 1990 by PL 101-510 (commonly referred to as the BRAC II legislation). The purpose of the BRAC legislation was to provide a fair process that would result in the timely closure and realignment of military installations within the United States. To achieve this, the legislation established nonpartisan Base Closure and Realignment Commissions to review and evaluate military installation closure or realignment recommendations of the Secretary of Defense and to make closure and realignment recommendations to the Congress and the President.

The BRAC legislation also provides certain requirements for compliance with the National Environmental Policy Act (NEPA) (42 USC 4321), including preparation of environmental documentation for actions associated with base closure and realignment. Although the 1988 BRAC legislation did not specify that environmental documentation be prepared for the disposal of any

excess federal property, the BRAC II legislation provided specific direction regarding the relationship between the property disposal process and NEPA requirements.

The BRAC II legislation set forth procedures for the realignment/closure of US Department of Defense (DoD) installations. It also identified requirements for complying with NEPA, stating that the provisions of NEPA apply:

- During the process of property disposal; and
- During the process of relocating functions from a military installation being closed or realigned to another military installation after the receiving installation has been selected, but before the functions are relocated.

However, in applying the provisions of NEPA to the BRAC legislative process, the Secretary of Defense and secretaries of the military departments concerned do *not* have to consider the following concepts (PL 101-510 – November 5, 1993):

- The need for closing or realigning the military installation recommended for closure or realignment by the Base Closure and Realignment Commission;
- The need for transferring functions to any military installation selected as a receiving installation; and
- Military installation alternatives to those recommended or selected.

In accordance with the BRAC legislation, this Environmental Impact Statement (EIS) has been prepared to address the probable impacts of the disposal and reuse of NAWCAD.

1.1.1 Base Closure and Realignment Commission Decision 1991

In 1991, the Base Closure and Realignment Commission determined that NAWCAD Warminster would be slated for a major realignment. The majority of the aircraft systems RDT&E would be relocated to NAWCAD Patuxent River, Maryland. A few specialized, immovable facilities would remain at Warminster: the dynamic flight simulator and the RDT&E Division would remain, and the Oreland Open Water Facility would remain government property under NAWCAD Patuxent River. Military family housing would be retained. All other tenant commands would be disestablished or relocated off-site.

Site Location

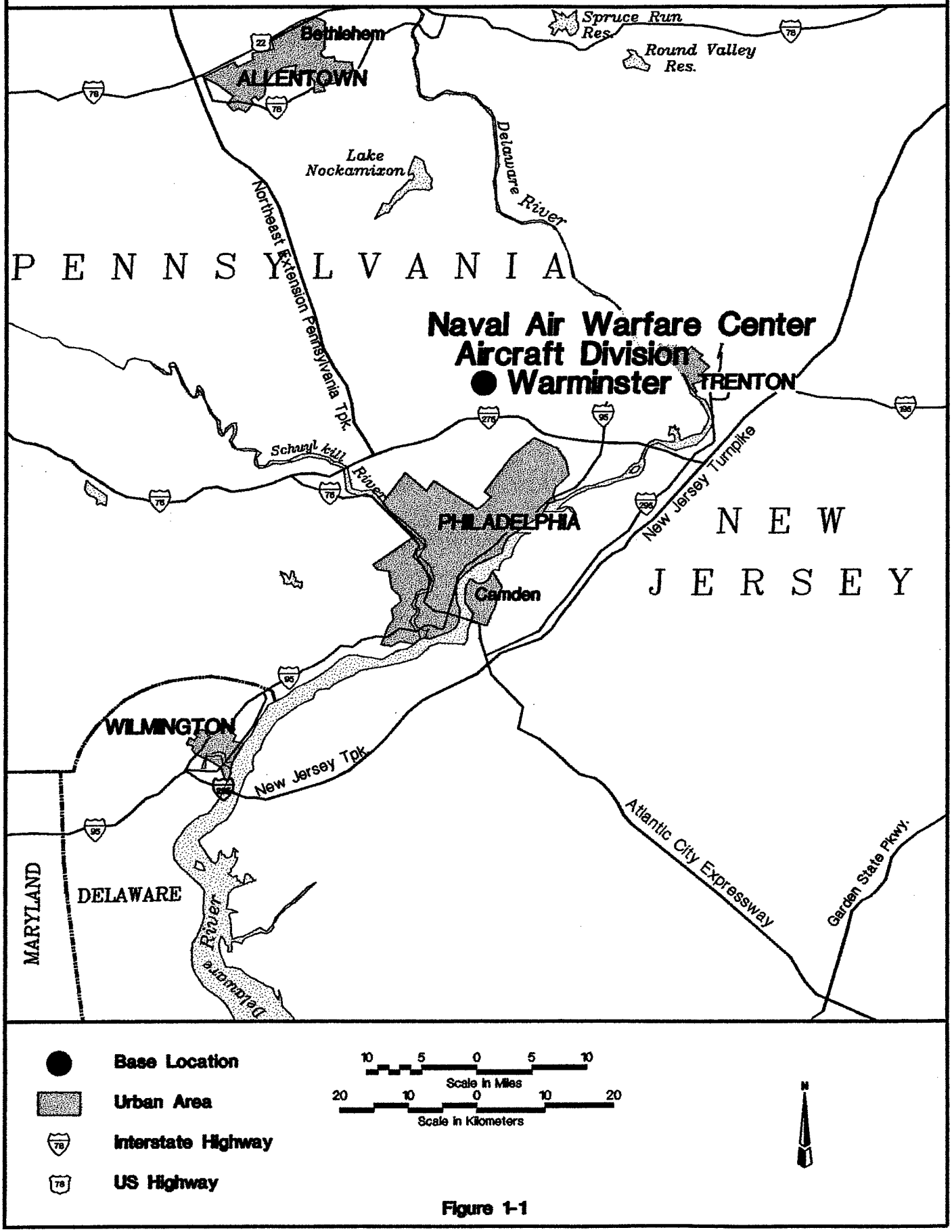


Figure 1-1

1.1.2 Base Closure and Realignment Commission Decision 1995

The future of NAWCAD was further impacted in March 1995, when the Base Closure and Realignment Commission recommended that several facilities at NAWCAD that were to be retained by the Navy under the BRAC 91 realignment be closed. These properties are:

- **Bldg 108** - This building is the inertial laboratory, situated on 31 acres (13 hectares) in the south central section of the base;
- **Bldgs 70 and 72** - These buildings are associated with the dynamic flight simulator and occupy three acres (one hectare) at the extreme west of the base; and
- **Bldgs 125 and 138** - These buildings occupy 12 acres (five hectares) and are essentially extensions of the main complex of Bldgs 1, 2, and 3 west of Jacksonville Road.

The military family housing would be retained by the Navy and transferred to the Naval Air Station Joint Reserve Base (NAS JRB) Willow Grove.

1.2 Disposal Procedures

The federal government has formal procedures for disposing of its property. Under the specific conditions of BRAC, the Navy acts as the disposal agency and follows these procedures or screenings:

- First, the Navy offers the property to other DoD agencies and to the Coast Guard;
- If these agencies have no interest, the Navy offers the property to other federal agencies;
- The property is also advertised for use by agencies serving the homeless, either under the Stewart B. McKinney Assistance Act of 1987 or in accordance with the Base Closure Community Redevelopment and Homeless Assistance Act of 1994 (PL 103-421);
- The property is next offered for sale to state and local governmental bodies and governments of Indian Tribes. There are discounts, often 100 percent, on the cost if the property is to be used for public benefit, such as for education, parks or recreation, or health-related facilities. Alternatively, property can be acquired

through negotiated sale, economic development conveyance, or other authorized disposal methods under the BRAC legislation.

- Should state or local governmental bodies or governments of Indian Tribes not want a property or parts of it, the Navy can offer the unwanted property for sale to the general public by competitive bid or auction.

With respect to the Base Closure Community Redevelopment Act of 1994, the Department of Housing and Urban Development has approved the following proposals (Rockwell, November 12, 1998):

- The Bucks County Department of Mental Health/Mental Retardation has acquired Quarters B for use as a supervised living situation for mentally handicapped persons;

- The Bucks County Children and Youth Services Agency has acquired Quarters A for use as a group home for pregnant and parenting teen mothers;

- Needlework Guild of America, Inc. (NGA), a not-for-profit organization that provides clothing and toiletries to the needy through community agencies, has acquired Bldg 80 for its national headquarters; and

- The Bucks Montgomery Center for Human Services, a non-profit agency that provides food, clothing, counseling, and housing assistance to people in need has acquired Bldg 16 for its operation and share that space with the Bucks County Health Department (the Health Department plans to run a satellite office serving low income or homeless persons in the area).

No additional interest was expressed regarding the NAWCAD properties during the formal screening process. As such, they were considered surplus to the DoD and Bucks County will acquire them. Bucks County established the Federal Lands Reuse Authority (FLRA) in 1995 to formulate a reuse plan for the NAWCAD site (which would incorporate the homeless providers' proposals as described above).

In March 1995, the FLRA adopted a proposed reuse plan titled *Reuse Plan, Naval Air Warfare Center, Bucks County, Pennsylvania.* This plan was the preferred reuse alternative presented in the Draft Environmental Impact Statement (DEIS) that was released by the Navy in December 1996. The FLRA has since revised this plan, and a new preferred plan (hereafter referred to as the Reuse Plan) was adopted on June 10, 1997. The current Reuse Plan incorporates land use components similar to those of the former plan, but it features greater park and recreation use and less intensive development. It is presented as the preferred alternative in this document. The Reuse Plan and its alternatives (with one of the alternatives being the former plan adopted by the FLRA) are described in detail in Chapter 2.

1.3 The NEPA Process

The National Environmental Policy Act provides for consideration of environmental issues in federal agency planning and decision-making. Under NEPA, agencies of the federal government must prepare an EIS for actions that may significantly affect the quality of the human environment. The EIS must provide full disclosure of significant environmental impacts and inform decision-makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment.

The first step in the NEPA process is the preparation of a formal Notice of Intent (NOI) to prepare the EIS (Figure 1-2, NEPA Process). The NOI for this project, which was published in the *Federal Register* on September 25, 1995, broadly described the range of alternatives to be considered and the analyses to be conducted for this EIS. The NOI also invited public comment and announced the time and place for a public scoping meeting, which was held at the Longstreth Elementary School in Warminster, Pennsylvania on October 12, 1995 at 7:00 pm.

Scoping is conducted early in the EIS process to involve parties that may be affected by implementation of the proposed action. The goal of scoping is to define significant issues for consideration in the EIS and to eliminate insignificant issues. Scoping provides the opportunity for both oral and written public comment.

The Draft EIS (DEIS) is subjected to public review during a 45-day public comment period, which typically includes a public hearing. Public comment is sought on a variety of issues including the range of alternatives considered and their associated impacts, the accuracy and completeness of data included, and the conclusions reached in the document. On December 20, 1996, the DEIS, along with a copy of the public hearing notice, was distributed to agencies and officials of federal, state, and local governments, citizen groups, and private citizens. Copies of the DEIS were also on display at the Bucks County Library and Warminster Library.

Public review and comment on the DEIS occurred from December 20, 1996 through February 24, 1997. During that period, a public hearing was held on January 28, 1997 at the Warminster Township Building, Henry and Gibson Streets, Warminster, Pennsylvania.

The Final EIS (FEIS), incorporates, and formally responds to, public comment received on the DEIS. This response can take the form of corrections of data inaccuracies, clarifications of and modifications to analytical approaches, inclusion of additional data or analyses, and modification of the proposed action or alternatives. All substantive comments received are addressed in this FEIS (the specific comments and responses are listed in Chapter 10). The FEIS is then circulated for public review.

Finally, a Record of Decision (ROD) is issued, no less than 30 days after the FEIS has been made available. The ROD selects the alternative to be followed in carrying out the proposed action, describes the public involvement and agency decision-making process, and presents the commitments to mitigation measures. The proposed action can then be implemented.

The NEPA Process

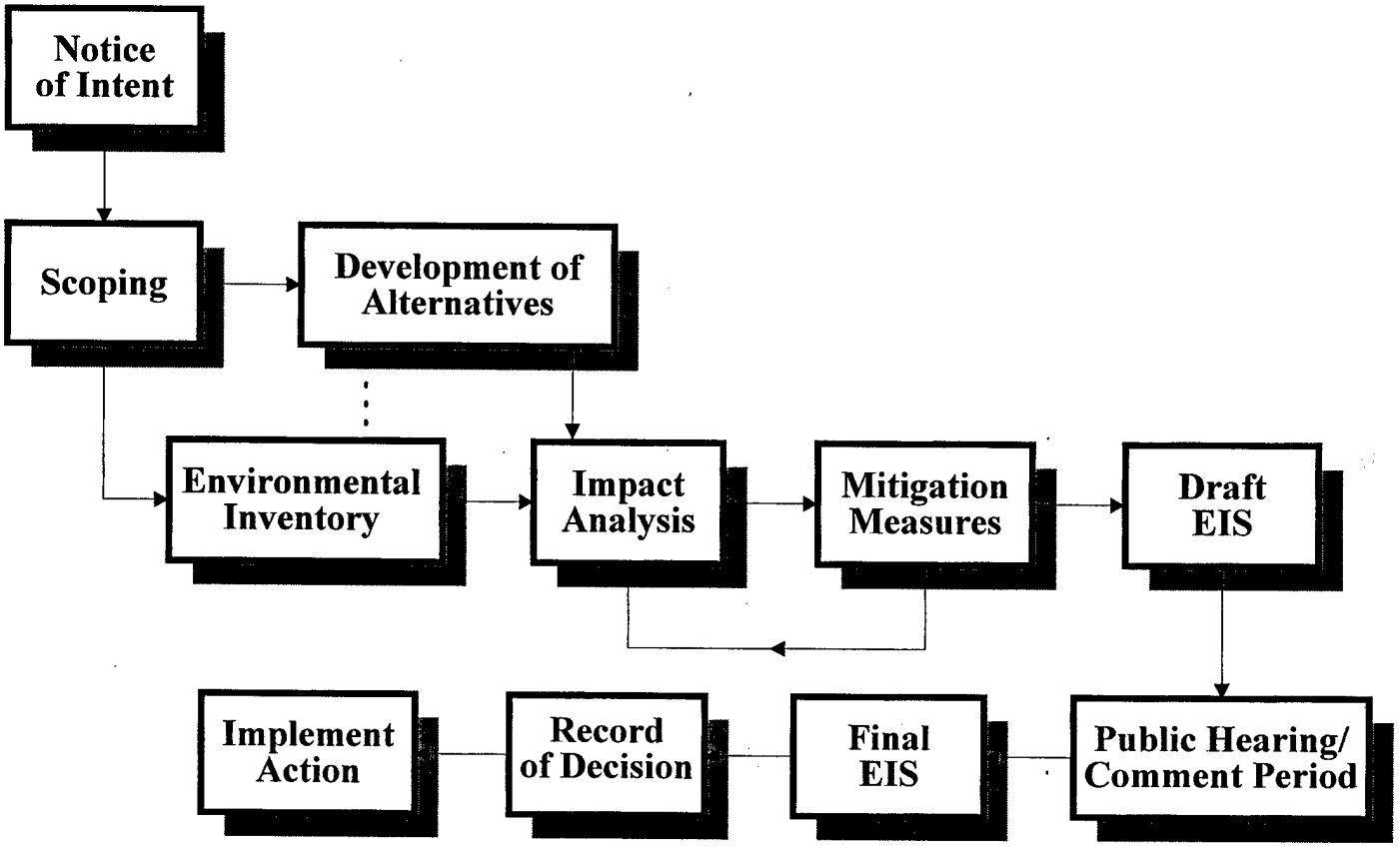


Figure 1-2

2 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

This chapter provides an in-depth description of the proposed action and its alternatives. The regulations of the Council on Environmental Quality (CEQ) place significant importance on the discussion of alternatives to a proposed action. In fact, as defined in CEQ Section 1502.14, the analysis of alternatives is the heart of an EIS, the purpose of which is to provide a decision maker and the public with "sharply defined issues and a clear basis for choice among options." The CEQ regulations also direct that reasonable alternatives to the proposed action must be evaluated in an EIS, even if these alternatives are not within the jurisdiction of the agency.

Chapter 2 presents the following:

- Subchapter 2.1 provides a brief history of the NAWCAD Warminster site, beginning with its initial association with the military in 1941;
- Subchapter 2.2 outlines the community reuse planning process, including county development goals and objectives and how potential reuses were screened; and
- Subchapter 2.3, Proposed Reuse Plan, and Subchapter 2.4, Alternatives to be Considered Under NEPA, present the following alternatives:
  - The proposed action (preferred alternative), which is the disposal and reuse of NAWCAD consistent with the current proposed Reuse Plan that was adopted by the FLRA on June 10, 1997 (described in Subchapter 2.3);
  - The No Action Alternative, described in Subchapter 2.4.1, which is defined as the closure of NAWCAD (except the military family housing) and the relocation of all military activities. Only the operation of the Navy family housing complex with 199 family units for enlisted personnel and six family units for officers would continue and would be transferred to Naval Air Station Joint Reserve Base (NAS JRB) Willow Grove;
  - The University/Institutional Alternative (the FLRA's former Reuse Plan [Economic Research Associates {ERA}, 1995]), which is described in Subchapter 2.4.2;
  - The Residential Alternative, which is described in Subchapter 2.4.3; and
  - The Aviation Alternative, which is described in Subchapter 2.4.4.

The purpose of the alternatives analysis is to represent the full range of alternative development intensities and resulting impacts that might occur with disposal and reuse of the 824-acre (333-hectare) NAWCAD Warminster property. By including these alternatives in the EIS, the Navy is not promoting or endorsing any alternative over the community's proposed Reuse Plan (proposed action); presently, only the Reuse Plan has any sponsor.

2.1 NAWCAD Warminster

NAWCAD served as the principal Navy RDT&E center for both Naval avionics and airborne and anti-submarine warfare systems. The site has a long military association beginning in 1941 when Brewster Aeronautical Corporation purchased 400 acres (162 hectares) to erect an aircraft assembly plant and industrial airport. Once operating, the plant was the largest in Pennsylvania and the sixth largest in the nation, and provided employment for 5,000 workers. Labor unrest and production inefficiencies led to a Navy takeover of the Warminster facility in May 1942. The facility was ultimately purchased by the federal government in 1944. After the war, the facility's mission was shifted from production to research and development, with a continued expansion of activities through the decades of the Cold War. As of July 1998, there were 20 employees associated with the Caretaker Site Office at NAWCAD. In addition, the FLRA has several interim leases for various facilities at the base. The number of employees associated with these facilities varies between 200 and 300 (Ames, July 24, 1998).

The 1991 Master Plan for NAWCAD indicated the following departments and assignments (US Navy, 1991):

- Commander, Naval Air Development Center;
- Technical Director;
- Chief Staff Officer;
- Computer Department;
- Antisubmarine Warfare Systems Department;
- Tactical Air Systems Department;
- Warfare Systems Analysis Department;
- Communication and Navigation Technology Department;
- Mission Avionics Technology Department;
- Air Vehicle and Crew Systems Technology Department;
- Systems and Software Technology Department;
- Engineering Support Group; and
- Test and Evaluation Department.

Also located at NAWCAD were nine tenant activities, not all affiliated with the Navy:

- Navy Publishing and Printing Service Branch Office;
- Officer-In-Charge, NAVFACENGCOM Contracts, East PA;
- Naval Hospital Branch Clinic;
- Personnel Support Detachment;
- Naval Investigative Service;
- NJROTC Area Manager, Area Four;
- Naval Audit Service;
- General Accounting Office; and
- US Small Business Administration.

The pattern of existing land use on the base is shown in Figure 3.1-2 (Land Use at NAWCAD) and presented in Subchapter 3.1. Activities are broadly categorized into six functions, as follows:

- **Research and Development** - This includes the original aircraft factory Bldgs 1 and 2 (now combined into one large building), as well as Bldgs 70 (human centrifuge), 125, 138, 361 (ejection tower), 367, and the airflow facility near Bldg 95;

- **Airfield Operations** - These facilities are located east of Jacksonville Road and include: hangar, air traffic control tower, fire/crash house, several smaller support buildings, and an 8,000-ft (2,440-m) runway with approximately 52,000 square yards (sq y) (43,477 sq m) of concrete-surface apron area;

- **Industrial** - These facilities include Bldg 4, a hangar, and a group of small warehouses and shop buildings;

- **Administration** - Bldg 3 was the original 1942 two-story general office, which was soon supplemented by a three-story planning and drafting wing;

- **Family Housing** - Married officer housing consists of six single-family houses and Quarters "A" and "B," which are very old farmhouses. Enlisted family quarters comprise 39 sets of quarters (Bldgs 401 - 440) accommodating 199 families. Housing assets are used not only by NAWCAD but also by the other units of the Navy's North Philadelphia Complex, the Aviation Supply Office (ASO) and NAS JRB Willow Grove; and

- **Personnel Support** - These facilities include the medical clinic (Bldg 16), unaccompanied enlisted-personnel housing (Bldg 109) and a similar structure for the EM-CPO Club (Bldg 7), a group of recreational facilities (Bldgs 99 and 349), and two Navy Exchange buildings, one near the hangar and the other near the family housing.

2.2 Community Reuse Plan Planning Process

This subchapter describes the dynamic planning process (begun in 1994) that went into the ultimate formulation of the FLRA's current Reuse Plan (the preferred alternative). This process has several principal steps that are outlined in the following subchapters:

- Subchapter 2.2.1 describes the early planning process and the development of county goals and objectives;
- Subchapter 2.2.2 discusses the screening of potential reuses and the formulation of two primary reuse options;
- Subchapter 2.2.3 presents the FLRA's March 1995 Reuse Plan report;
- Subchapter 2.2.4 details how the BRAC 1995 decisions affected several parcels at NAWCAD, which therefore affected the Reuse Plan as presented in the FLRA's March 1995 Reuse Plan report; and
- Subchapter 2.2.5 addresses the adoption of the current preferred Reuse Plan.

2.2.1 County Development Goals and Objectives

Planning Process

Key elements of the planning process included interviews with local leaders, committee meetings, seminars, and a resident survey. In addition, four public meetings were held, two of which were general presentations and two on specialized topics (McKinney Act and environmental issues).

A number of concerns were identified through the community involvement process:

- Direct loss of NAWCAD jobs, many of them high-paying;
- Indirect loss of jobs to businesses that depend on serving the base and its employees;
- Lost tax revenues;
- Reduced property values (if many people leave the area, an oversupply of housing will result);
- Loss of military payments to local school districts;
- Loss of emergency management services provided by NAWCAD; and
- Loss of development in nearby towns if reuse of NAWCAD successfully attracts tenants.

Goals and Objectives

Several important goals related to reuse of NAWCAD were identified during the community involvement process. These goals, adopted by the FLRA, are primarily aimed at alleviating potential economic losses upon the closure of NAWCAD:

- Job losses at NAWCAD should be replaced or offset by the creation of new jobs;
- The nature of the NAWCAD workforce (highly-skilled and highly-paid) should be maintained;
- Displaced workers and contractors should be assisted in finding new jobs and sources of business in the Bucks County area;
- The area's economic stability should be maintained;
- Local tax bases should be preserved;
- The rural and middle-class character of the area should be maintained; and
- Adverse impacts (e.g., noise, traffic, and aesthetics) associated with reuse of the property should be minimized.

2.2.2 Screening of Potential Reuses

A wide range of strengths and liabilities were identified for NAWCAD during the planning process. The more commonly mentioned assets were:

- Location - a major facility with lots of acreage in a growth area recognized as having outstanding quality-of-life factors;
- Airfield and supporting facilities;
- Highly skilled workers who presently work at NAWCAD; and
- Facilities that lend themselves to a campus-style environment.

In contrast, the facility's liabilities, from a market perspective, were identified as:

- Base buildings that are too old and uncompetitive for today's market (e.g., Bldgs 1, 2, and 3 may not lend themselves to being subdivided);
- Poor access: a new intersection, signalization, and road-widening improvements would be required, and the facility is too far away from Interstate 95;
- Cost of removing the existing 8,000-ft (2,440-m) runway is estimated at $6 million;
- Potential environmental problems, or perceptions of them, could scare prospective tenants; and
- The base is located in a residential area, which increases the probability of community opposition to various reuse alternatives.

Ideas for reuse of NAWCAD ranged widely and included:

- University branch/academic consortium;
- Multi-business complex;
- Entertainment production center;
- Corporate campus or distribution center;
- High-tech office park;
- Research park;
- Aviation retrofitting and other aerospace business;
- Theme park or other specialized recreation park;
- Sports complex;
- Correctional facility;
- Recreational facilities (golf course, park, open space, etc.);
- Residential development;
- Hotel/conference center;
- Building trades center; and
- Navigational research center.

Office, industrial, recreational, and residential uses were all identified as potentially appropriate for the reuse of NAWCAD, particularly in the context of growth-oriented central Bucks County. While NAWCAD's airfield facilities were recognized as a potentially marketable asset, local residents indicated that any reuse plan that included heavy usage of the airfield would be likely to generate their vigorous opposition. The most commonly mentioned reuse activity was as a university branch campus; this was also the most favored idea in the community survey. Survey respondents listed most ideas as good or excellent, with the exceptions of airport development and an office park.

The reuse consultant team examined all potential reuse options in terms of the market and economic base, the existing NAWCAD facilities, and site conditions. (Existing environmental conditions in these environmental contexts are described in Chapter 3 of this EIS.) As reuse plan options were reviewed by the Base Reuse Committee and the consultant team, a series of mapped land use scenarios were concurrently developed, including differing approaches to providing access and roads. Rankings were prepared for each alternative with respect to: jobs created, tax revenues, fiscal considerations, open space and recreational opportunities, environmental impacts, potential for early action and successes, infrastructure requirements, and implementation.

As the mapping of scenarios progressed, it became apparent how specific reuse component options posed constraints on other reuse components. For example, the amount of acreage that could be designated for traffic-generating activities would be restricted by Pennsylvania Department of Transportation (PENNDOT) capacity determinations for the surrounding roadway network (between 5,000 and 5,500 trips per day). Additionally, maintaining the airfield with its clear zones, safety areas, and taxiways would conflict with and/or limit the location and operation of other potential uses deemed more suitable for the facility.

Consideration of continued airfield uses at NAWCAD identified several drawbacks that resulted in elimination of this reuse option (ERA, 1995):

- First, adherence to Federal Aviation Administration (FAA) airfield operations requirements would have necessitated additional land for taxiways and potentially the partial demolition of Bldgs 1, 2, and 3 for a clear zone. This would eliminate a significant portion of the facility for other uses;

- Secondly, the costs associated with operating an airport at the site would have required an increase in the number of flight operations per year from 500 to at least 50,000 (ERA, 1995). Because no municipal or county government has indicated a willingness to subsidize any proposed airport, even with this increase in flight operations, the airport could run at an operating deficit; and

- Finally, substantial community opposition to noise and other airport-related impacts was identified.

The use of the site as a major correctional facility was also eliminated on the basis of potential community opposition, despite the potential for creation of a large number of well-paying jobs under this option (ERA, 1995).

The decision to retain the main buildings at NAWCAD was key to ultimate development of the proposed action. This decision was closely tied to strong interest expressed by several universities, a medical school, and potential technology tenants to implement a business incubator within the space. Two scenarios, designated Option I and Option II, were developed by the planning consultants that reflect a mix of the activities proposed by the community, that were responsive to market demand, and that were built on sound planning principles:

- **Option I** - This option would involve a mix of uses, including the designation of the three large buildings (Bldgs 1, 2, and 3) and surrounding land to business incubator, university, and medical school adaptive reuse. A 150-acre (61-hectare) business and industrial park would be another key component. Based on a request from a regional developer, a 50-acre (20-hectare) congregate housing component was included. A corporate office complex, a 125-acre (51-hectare) university campus, and a small site for a hotel and conference activities were also included. About 20 percent of the base was designated for parks and open space.

- **Option II** - Under Option II, Bldgs 1, 2, and 3 were also targeted for business incubator, university, and medical school uses. The business and industrial park is smaller than for Option I at 100 acres (40 hectares), and a golf-residential development covers 250 (30 hectares) acres. The congregate housing component remains the same as Option I. An opportunity project area, potentially a sound stage,

is allocated 75 acres (30 hectares). The parks and opens space component is reduced to 100 acres (40 hectares).

The planning consultants compared the two options using a variety of factors and the interrelationships among them (e.g., the number of jobs per unit of space). Another factor, public benefit conveyances, relates to the conveyance of federal properties to local development authorities at less than market prices if there is a public benefit, thereby having a potential impact on the financial feasibility of the proposed project. The factors identified are summarized below:

- Jobs (number, type, and timing);
- Market demand (products, absorption, and site requirements);
- Fiscal impact (tax base revenues, other tax income, and public investment);
- Property conveyance (public benefit, land sales, lease revenues, and environmental constraints);
- Business management elements (income/revenue stream, maintenance/renovation, management, and caretaker impact);
- Government (public space needs, local incentives, infrastructure costs, Pennsylvania programs, and federal programs); and
- Bottom line (positive impacts vs. costs, and optional decisions).

As a result of the traffic parameters noted earlier, the differences between the two scenarios were not major. Infrastructure costs were the same and, although Option II had a slightly higher potential for property tax generation, the planning consultants and the Base Reuse Subcommittee reached consensus that Option I was slightly better overall. Refinements to Option I had emerged as the county-approved reuse plan that was presented in the FLRA's March 1995 report titled *Reuse Plan, Naval Air Warfare Center, Bucks County, Pennsylvania.*

2.2.3 March 1995 FLRA Reuse Plan

The March 1995 Reuse Plan was adopted by the Bucks County Commissioners, and formally delivered to the Navy on April 14, 1995. Designed to be market-driven, the plan sought to capitalize on the site's assets, while minimizing the impacts of site constraints. More intensive uses were designed to be concentrated in the vicinity of Street and Jacksonville Roads, where the major transportation and other infrastructure exists. Less-intensive land uses were to be located to the east, where concern for existing residential areas and parklands had resulted in the designation of additional parklands and other compatible uses.

The major elements of the March 1995 plan included:

- Multi-business complex and educational use of the Bldgs 1, 2, and 3 complex;

- New industrial/business/office R&D complex on the Jacksonville Road and Street Road frontages;
- Park and recreation uses;
- University/institutional land; and
- Major new spine road linking the site and providing new access points to the site.

In addition to these major elements, the March 1995 plan included the following:

- Senior congregate-care site providing health care and living opportunities;
- Municipal lands for Warminster Township use;
- Residential lands in Ivyland Borough;
- Hotel/conference center site; and
- Additional lands for roadways and easements.

2.2.4 BRAC 1995

The BRAC 95 decisions described in Chapter 1 came after the March 1995 Reuse Plan had been adopted, and affected several parcels at NAWCAD that were to be retained by the Navy under the BRAC 91 realignment. The reuses of the BRAC 95 properties are as follows:

- **Bldg 108 (Inertial Laboratory)** - This facility has been leased to Pennsylvania State University (Penn State).

- **Bldgs 70 and 72 (Dynamic Flight Simulator)** - This facility has been leased to VEDA, Inc. (Woods, August 7, 1996); and

- **Bldgs 125 and 138 (Former Naval research facilities)** - There are no identified reuse plans for these buildings (Rockwell, November 12, 1998).

The Navy has retained and transferred to NAS JRB Willow Grove the 64 acres (26 hectares) accommodating the enlisted-family housing, plus approximately three acres (one hectare) accommodating the six officer family-housing units on Jacksonville Road.

2.2.5 Adoption of the Current Proposed Reuse Plan

The FLRA had received US Office of Economic Adjustment planning grants to address both the BRAC 95 properties and comprehensive base reuse concerns such as traffic, stormwater management, utilities, and recreation. Based upon these studies and other considerations, the former Reuse Plan was modified, and the FLRA adopted the current preferred Reuse Plan on June 10, 1997.

2.3 Proposed Reuse Plan

The FLRA's proposed Reuse Plan is shown in Figure 2-1 (The Reuse Plan). Data on its land use program is provided in Table 2-1. Following is a brief description of each component of the Reuse Plan.

- **Multi-Business Complex** - This land use would encompass roughly 292 acres (118 hectares). It includes use of the existing main complex (Bldgs 1, 2, and 3) west of Jacksonville Road, as well as the areas associated with the existing dynamic flight simulator (Bldgs 70 and 72, which have been leased to VEDA, Inc.), and the inertial laboratory (Building 108), which has been leased to Pennsylvania State (Penn State) for educational purposes.

  New development would occur on the proposed 187-acre (76-hectare) business campus east of Jacksonville Road. A total of 5,995 jobs are anticipated to be associated with the reuse of existing facilities and the construction of approximately 1.5 million sq ft of new business space.

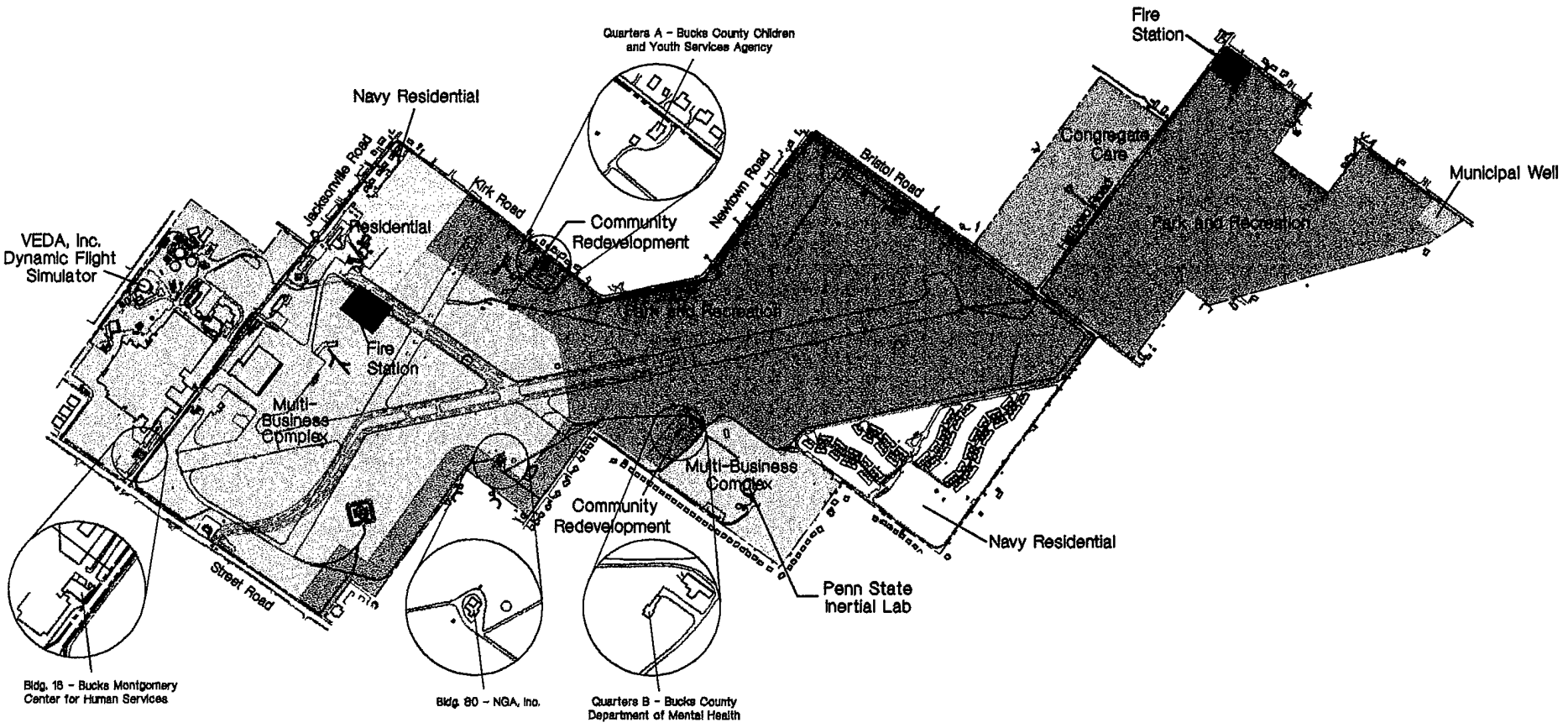
- **Residential** - This would be a new single-family residential complex of 26 acres (11 hectares) in Ivyland Borough. A development of 150 to 200 homes is projected (ERA, 1995). For the purposes of this document 175 units are projected, at densities of approximately six units per acre.

- **Fire Station** - There would be two fire stations under this alternative. One would be the existing facility located on roughly three acres (one hectare) northeast of the hangar in Ivyland Borough, while the other would be a new facility on two acres (one hectare) at the northwest corner of the site along New Road in the Township of Northampton.

- **Congregate Care** - This would be a new facility for senior living, occupying 38 acres (15 hectares) in Northampton, and fronting on Bristol and Hatboro Roads. The number of jobs associated with this facility is 800 (ERA, 1995) and the FLRA indicated that a development of 250,000 sq ft (23,225 sq m) is sought. At this time, there is no specific plan indicating the proposed program of long-term care, assisted living, etc. However, assuming a ratio of 500 gross sq ft (46 sq m) per person implies that there would be 500 residents.

- **Municipal Well** - A new water well and pump that would occupy two acres (one hectare) on New Road at the eastern border of NAWCAD in the Township of Northampton.

The Reuse Plan



Park and Recreation		Community Redevelopment	
Multi-Business Complex		Fire Station	
Congregate Care		ROW-Open Space	
Navy Residential		Municipal Well	
Residential		Property Boundary	

Source: Ernst & Young, LLP, June, 1997.

1600 0 1600
Scale in Feet
400 0 400
Scale in Meters

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Figure 2-1

Table 2-1

Reuse Plan Land Use Program

Use	Land Acreage			Estimated Sq Ft of Development (Sq M)
	Acres	Hectares	% of Total	
Multi-Business Complex[1]	292	118	35	2,855,000 (265,230)
Residential				
Navy (retained)	67	27		
New (150 - 200 units)	26	11		
Total	93	38	11	n/a
Fire Stations	5	2	<1	n/a
Congregate Care	38	15	5	250,000 (23,000)
Municipal Well	2	1	<1	n/a
Community Redevelopment	6	2	<1	n/a
Park and Recreation	370	150	45	n/a
ROW-Open Space	18	7	2	n/a
Total	824	333	100	

Homeless Providers (Approved by the Department of Housing and Urban Development)
Bucks County Children and Youth Services Agency - Quarters A
Bucks County Department of Mental Health - Quarters B
Needlework Guild of America (NGA) - Bldg 80
Bucks Montgomery Center for Human Services - Bldg 16

Notes: Land use acreage and amount of development are approximate based on estimates for a long-term development plan that is subject to change. Numbers may not total exactly due to rounding and metric conversions.
n/a = square feet not appropriate measure of development.
[1]Multi-Business Complex includes the inertial lab, which has been conveyed to Penn State and the dynamic flight simulator, which has been conveyed to VEDA, Inc.
Refer to Figure 2-1

Source: Proposed Reuse Plan prepared for FLRA by Ernst & Young LLP and E&Y Kenneth Leventhal Real Estate Group, June 1997.

- **Community Redevelopment** - There would be two parcels designated for community redevelopment and social services. One parcel would occupy roughly two acres (one hectare) along Kirk Road, while the other parcel would occupy roughly four acres (two hectares) along Street Road.

- **Park and Recreation** - Park and recreation use would be planned for approximately 250 acres (101 hectares) in Warminster and roughly 120 acres (49 hectares) in Northampton for a total of approximately 370 acres (150 hectares). This park and recreation acreage would be assigned to the National Park Service under Section 203(k)(2) of the Federal Property and Administrative Services Act (FPASA) for further conveyance to the FLRA. Roughly 35 jobs are estimated as associated with this land use (ERA, 1995).

- **Right of Way (ROW)** - ROW utilizes portions of existing runway and would provide access to the business campus at Street Road and Jacksonville Road. Approximately 18 acres (7.3 hectares) are allocated to ROW.

The Department of Housing and Urban Development has approved four proposals (as described in Chapter 1) that are incorporated into the Reuse Plan:

- Bucks County Children and Youth Services Agency - Quarters A;
- Bucks County Department of Mental Health - Quarters B;
- Needlework Guild of America (NGA) - Bldg 80; and
- Bucks Montgomery Center for Human Services - Bldg 16.

The existing housing complex of 64 acres (26 hectares) accommodating 199 enlisted-family housing units, together with the six officer family-housing units comprising three acres (one hectare) on Jacksonville Road (total of 67 acres [27 hectares] of Navy housing), would be retained for Navy families serving NAS JRB Willow Grove.

On the basis of anticipated market demand and the limiting factor of traffic capacity on the highway network proximate to the site, the Reuse Plan would generate approximately 6,850 jobs at the site, over a build period of 15 years.

2.3.1 Reuse Plan Implementation

The FLRA is empowered to carry out the business of redeveloping NAWCAD, including management, leasing, property improvements, and future planning. The FLRA's mandate is to execute the conversion process, utilizing all appropriate resources and techniques. These may include: financing through grant applications and private funding; marketing through coordination

with other regional and state programs, as well as targeting and follow-up of opportunities; development through property acquisition, surveys, planning, and construction; and general management. The intent is for the FLRA to achieve its development objectives, transfer all the property to private or municipal ownership, and then phase itself out of existence.

The Reuse Plan identifies a variety of actions that must be taken by the FLRA over the next five years. These actions are broadly characterized as management actions, marketing actions, development actions, and financing actions.

The property at NAWCAD has been conveyed through public benefit conveyances and public bid sale. Public benefit conveyances are as follows:

- Quarters A and B and Bldgs 16 and 80 have been conveyed to agencies serving the homeless as per the Base Closure Community Redevelopment and Homeless Assistance Act of 1994;
- Bldgs 1, 2, and 3 - for a 100 percent economic development conveyance, with the title conveyed when the buildings can generate cash flow or a private owner is found;
- Congregate senior care (Northampton Township) - for economic development (jobs);
- Business park - for economic development with a phased title transfer that coincides with market demand and environmental cleanup (this area would be a top priority for cleanup); and
- Recreation - Warminster and Northampton Townships seek public benefit transfer through the US Department of Interior.

The Ivyland residential site would be either bid or conveyed through a negotiated sale.

2.4 Alternatives to be Considered Under NEPA

The proposed Reuse Plan of June 1997 is the preferred alternative for this EIS. However, pursuant to NEPA and the regulations of the CEQ, an EIS must consider other reasonable alternatives to the preferred alternative and No Action Alternative. Therefore, three alternative plans, the University/ Institutional Alternative, the Residential Alternative, and the Aviation Alternative, are presented herein. The Reuse Plan and its alternatives reflect a range of development intensities and resulting impacts that might occur with disposal and reuse of NAWCAD property.

2.4.1 No Action Alternative

The EIS includes the No Action Alternative, which is defined as follows: NAWCAD is closed, all military activities are relocated, and the land is not disposed of – it remains as federal government land. Continued government ownership of the property would have no benefit to the Navy as the Navy would incur continued liability for an asset with no functional, operational, or strategic value and violate federal property management regulations. Continued federal government ownership would also have no benefit for the local community since such ownership would prevent the possibility of viable and productive use of the land.

In applying the provisions of NEPA to the BRAC legislative process, the Secretary of Defense and secretaries of the military department concerned do *not* have to consider the following concepts (PL 101-510 – November 5, 1993):

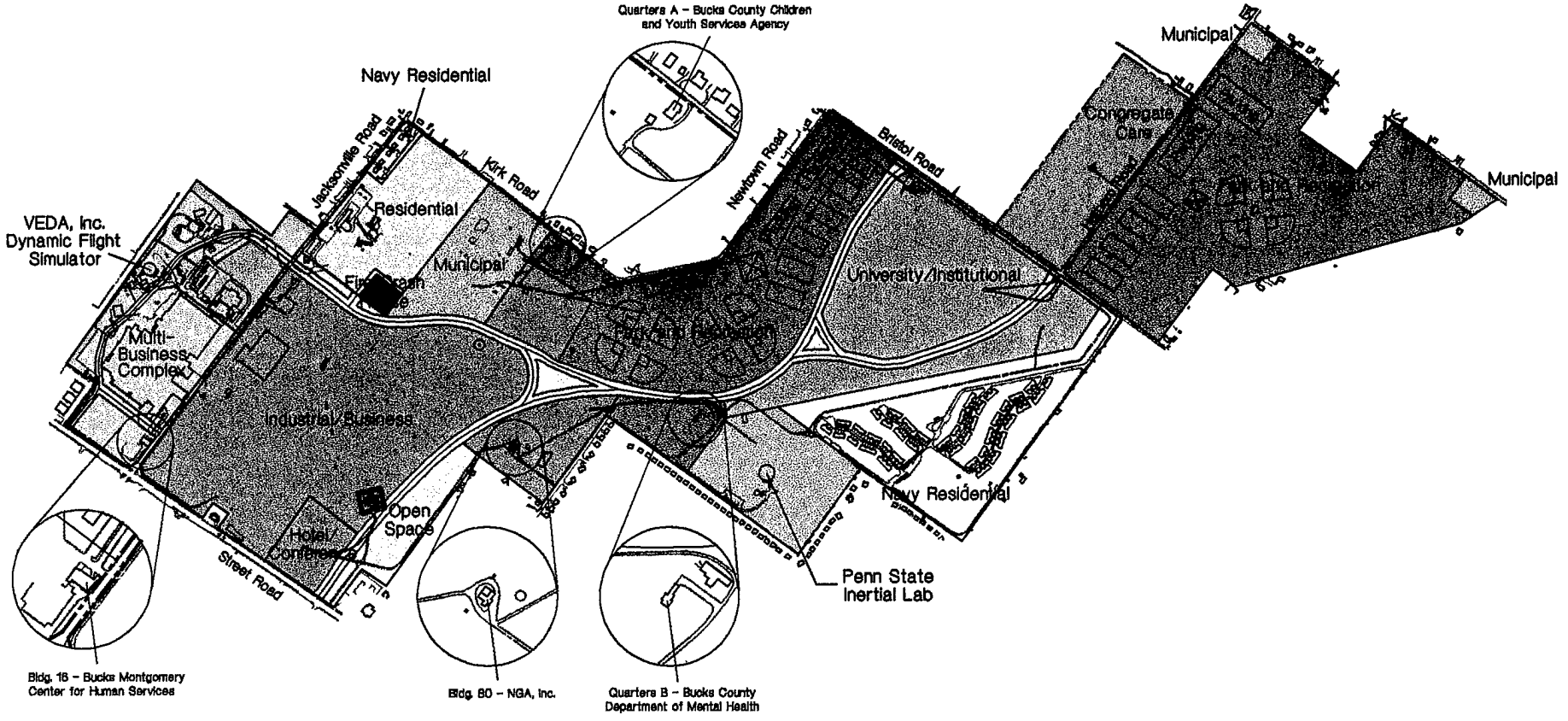
- The need for closing or realigning the military installation recommended for closure or realignment by the Base Closure Commission;
- The need for transferring functions to any military installation which has been selected as the receiving installation; and
- Military installation alternatives to those recommended or selected.

2.4.2 University/Institutional Alternative

The University/Institutional Alternative (the FLRA's former preferred Reuse Plan, which was presented in the DEIS) incorporates land use components similar to those of the new Reuse Plan, but it features more intensive development and less park and recreation use. This alternative is shown in Figure 2-2 (University/Institutional Alternative). Table 2-2 provides data on its land use program. The primary differences between the Reuse Plan and the University/Institutional Alternative are as follows:

- The University/Institutional Alternative features a university/institutional land use that the Reuse Plan does not. This land use would consist mostly of a new complex occupying 84 acres (34 hectares) and supporting projected employment of 400 and an estimated 2,000 students. It would be located toward the east end of the site, with frontage on Bristol Road. Also included under this alternative is the proposed reuse of BRAC 95-relinquished Bldgs 125 and 138, west of Jacksonville Road, occupying 12 acres (34 hectares); these facilities would be occupied by approximately 700 students and faculty. Thus, the combined acreage for the university component of this alternative is 96 acres (39 hectares);

University/Institutional Alternative



Park and Recreation
Congregate Care
University/Institutional
Navy Residential
Inertial Lab & Dynamic Flight Simulator
Industrial/Business
Municipal
Residential
Fire Crash House
Multi-Business Complex
Hotel / Conference
ROW-Open Space
Proposed Road
Property Boundary

1600 0 1600
Scale in Feet
400 0 400
Scale in Meters

N

Figure 2-2

Table 2-2

University/Institutional Land Use Program

Use	Land Acreage			Estimated Sq Ft of Development (Sq M)
	Acres	Hectares	% of Total	
Multi-Business Complex	46	19	6	1,200,000 (111,000)
Dynamic Flight Simulator (VEDA, Inc.)	3	1	<1	72,000 (6,700)
University/Institutional				
West of Jacksonville Road (BRAC 95)	12	5		1,600,000
East of Jacksonville Road	84	34		(15,000)
Subtotal	96	39	12	
Industrial/Business	159	64	19	1,850,000 (172,000)
Hotel/Conference	10	4	1	50,000 (5,000)
Residential				
Navy (retained)	67	27		
New (150 - 200 units)	34	14		
Subtotal	101	41	12	n/a
Fire/Crash House	2	1	<1	n/a
Municipal	30	12	4	n/a
Congregate Care	38	15	5	250,000 (23,000)
Inertial Lab (Penn State)	31	13	4	25,000 (2,300)
Park and Recreation	246	100	30	n/a
ROW-Open Space	62	25	8	n/a
Total	824	333	100	

Homeless Providers (Approved by the Department of Housing and Urban Development)
Bucks County Children and Youth Services Agency - Quarters A
Bucks County Department of Mental Health - Quarters B
Needlework Guild of America (NGA) - Bldg 80
Bucks Montgomery Center for Human Services - Bldg 16

Notes: Land use acreage and amount of development are approximate based on estimates for a long-term development plan that is subject to change. Numbers may not total exactly due to rounding and metric conversions.
n/a = square feet not appropriate measure of development.
Refer to Figure 2-2
Source: Based on Reuse Plan, Naval Air Warfare Center, Bucks County, PA, March 1995.

- The University/Institutional Alternative designates a total of 246 acres (100 hectares) as park and recreational land; as compared to 370 acres (150 hectares) under the Reuse Plan;

- The University/Institutional Alternative would set aside 30 acres (12 hectares) for undesignated municipal uses. The Reuse Plan does not designate a municipal use, although approximately six acres (two hectares) would be set aside for "community redevelopment and social services";

- The University/Institutional Alternative would provide a hotel/conference center occupying ten acres (four hectares) not included in the Reuse Plan; and

- The University/Institutional Alternative provides for an industrial/business use on a new complex of 159 acres (64 hectares) immediately east of Jacksonville Road, with frontage on Street Road. In the Reuse Plan, this area is designated as part of the larger multi-business land use occupying 292 acres (118 hectares), of which the complex east of Jacksonville Road accounts for 187 acres (76 hectares).

The remaining land use components are the same for the two alternatives and include residential, fire station, and congregate-care uses. The dynamic flight simulator and inertial laboratory facilities are identified as distinct land-use activities under the University/Institutional Alternative, while they are included within the multi-business land-use activity (though referenced specifically as research centers) under the Reuse Plan. As with the Reuse Plan, the Navy housing would be retained for Navy families serving NAS JRB Willow Grove.

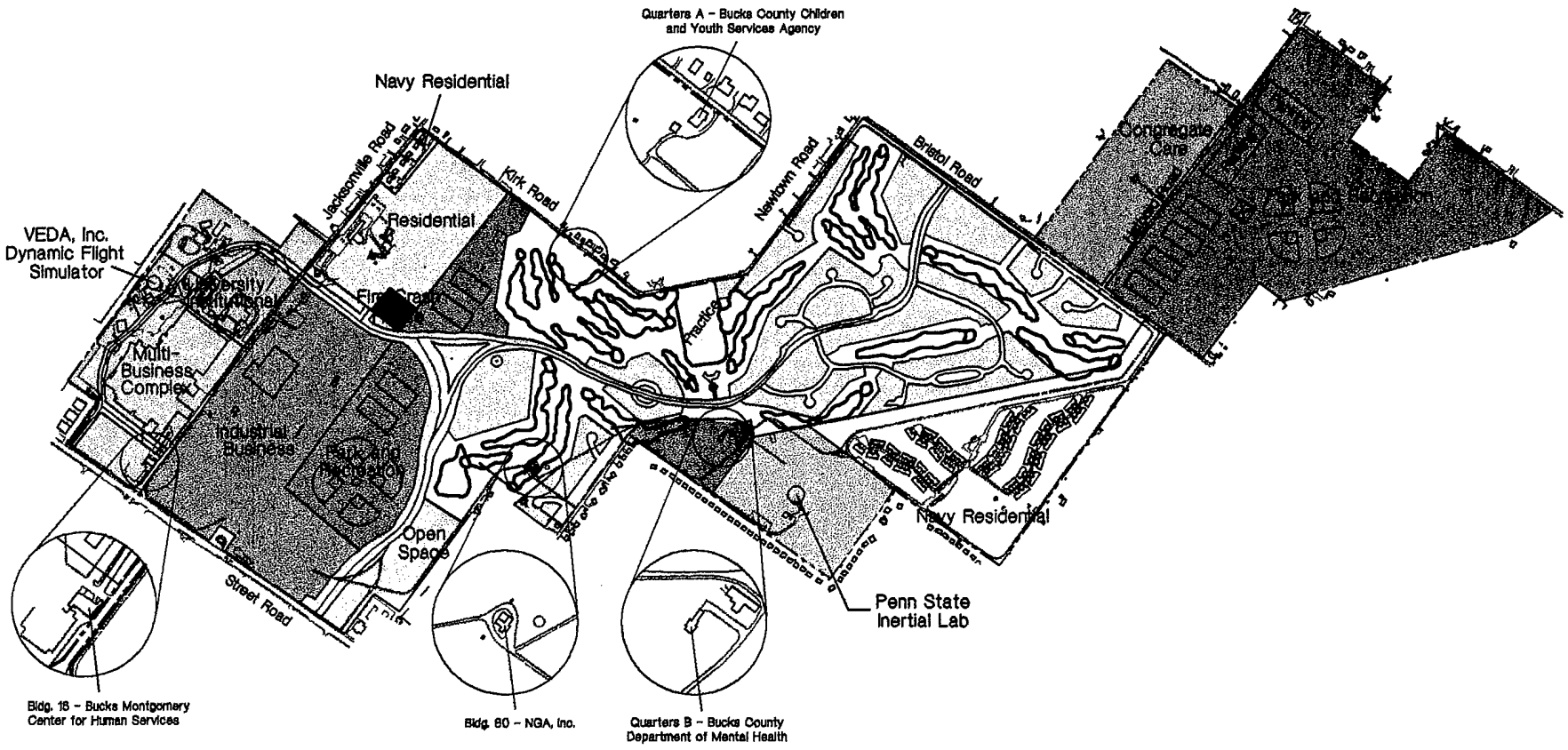
On the basis of anticipated market demand and the limiting factor of traffic capacity on the highway network proximate to the site, it is anticipated that approximately 7,600 jobs can be generated at the NAWCAD site with implementation of the University/Institutional Alternative over a build period of 15 years.

2.4.3 Residential Alternative

Under this alternative, the mostly undeveloped airfield east of Jacksonville Road would be reused, primarily for residential uses plus appropriate local recreational facilities (Figure 2-3, Residential Alternative).

The Residential Alternative differs from the Reuse Plan primarily in that it incorporates a 250-acre (101-hectare) golf/residential component that adds 400 dwelling units. This addition of 400 units to the 150 to 200 units on the Ivyland site (as described for the Reuse Plan) would result in approximately 575 new dwelling units (these would be in addition to the congregate housing, plus any residential social services proposed for existing Quarters A and B). Data on this and the other

Residential Alternative



- Park and Recreation
- Congregate Care
- University/Institutional
- Navy Residential
- Inertial Lab & Dynamic Flight Simulator
- Industrial/Business
- Residential
- Fire Crash House
- Multi-Business Complex
- ROW-Open Space
- Golf Course
- Proposed Road
- Property Boundary

1600 0 1600
Scale in Feet
400 0 400
Scale in Meters

N

Figure 2-3

land use components that comprise the Residential Alternative (as shown in Figure 2-3) are presented in Table 2-3 (the general characteristics of the other land use components have already been described for either the Reuse Plan and/or the University/Institutional Alternative).

On the basis of anticipated market demand and the limiting factor of traffic capacity on the highway network proximate to the site, it is anticipated that implementation of the Residential Alternative would result in approximately 1,600 residents and 5,000 workers over a build period of 15 years.

2.4.4 Aviation Alternative

Feasibility of Civilian Aviation Reuse

An analysis of the potential for civil aviation use of the NAWCAD site was undertaken via a series of interviews and the evaluation of regional aviation factors. An inventory of existing and projected demand and capacity for commercial passenger, freight/cargo activity, and general aviation services in the area surrounding the site was conducted. Baseline conditions were established from data gathered from federal, state, and local governments. Potential users (airlines) of these facilities and fixed-base operators (FBOs) were also contacted. These agencies and companies were interviewed and were asked to verify or supplement the database with demand/capacity information.

Both the available data and interviews indicated that good commercial air passenger service is available. Although similar comments were provided about air cargo service, several of the smaller firms stated that the NAWCAD site could offer an attractive alternative for shipments of their finished goods and/or raw materials in lieu of using Philadelphia International Airport. Aviation services are available to these companies at smaller general aviation airports in the area (i.e., charter passenger service, on-demand or unscheduled shipment of goods/parts, etc.). These services are used to some extent, but not extensively.

A system-oriented view was taken regarding eight airports closest to the NAWCAD site in order to gauge potential demand for activity at Warminster. Because of the existence of adequate facilities at commercial airports in the region, there appears to be little potential demand for commercial passenger or scheduled air cargo service. However, this review did find existing demand for additional facilities for accommodating general aviation aircraft in the area. Interviews with FBOs and airport managers revealed that many pilots are on waiting lists to either hangar or tie down their planes. Two regional air carrier facilities, Northeast Philadelphia and Philadelphia International, are currently operating at 79 percent and 77 percent of their annual service volumes, or capacity levels, respectively.

Table 2-3

Residential Alternative Land Use Program

Use	Land Acreage			Estimated Sq Ft of Development (Sq M)
	Acres	Hectares	% of Total	
Multi-Business Complex	46	19	6	1,372,000 (128,000)
Dynamic Flight Simulator (VEDA, Inc.)	3	1	<1	72,000 (6,700)
University/Institutional	12	5	1	14,000 (1,300)
Industrial/Business	65	26	8	636,000 (59,000)
Residential				
Navy (retained)	67	27		
New (175 new units)	34	14		
Golf/Residential (400 new units)	250	101		
Subtotal (575 new units)	351	142	43	n/a
Congregate Care	38	15	5	250,000 (23,000)
Inertial Lab (Penn State)	31	13	4	25,000 (2,300)
Park and Recreation	210	85	25	n/a
ROW-Open Space	68	28	8	n/a
Total	824	333	100	n/a

Homeless Providers (Approved by the Department of Housing and Urban Development)
Bucks County Children and Youth Services Agency - Quarters A
Bucks County Department of Mental Health - Quarters B
Needlework Guild of America (NGA) - Bldg 80
Bucks Montgomery Center for Human Services - Bldg 16

Notes: Land use acreage and amount of development are approximate based on estimates made for a long-term development plan that is subject to change. Numbers may not total exactly due to rounding and metric conversions.
n/a = square feet not appropriate measure of development.
Refer to Figure 2-3
Source: Based on Reuse Plan, Naval Air Warfare Center, Bucks County, PA, March 1995

There is airspace capacity available at key municipal airports but there are several other important privately-owned, public-use airports in the vicinity that may be closing soon due to development pressures; such closings would affect the capacity of other nearby airports. More important in the short term is the issue of storage capacity (i.e., the availability for tying down or hangaring an aircraft). The eight closest airports are projected to experience a major increase in the number of their based aircraft over the next several years. Pennridge, Buehl Field, and Wings Field are airports that are projected to experience the greatest growth in based aircraft in the region, with increases of approximately 55 percent, 39 percent, and 38 percent, respectively, between 1994 and 2020. The ability of these airports to accommodate this growth will fall far short of the demand for storage space.

Based on this research, there is potential for general aviation activity at Warminster and possibly some limited non-scheduled air cargo operations (i.e., aircraft hired to pickup or deliver items on a periodic basis). Accordingly, a forecast of general aviation (GA) activity with some limited non-scheduled air "cargo" flights was prepared for the Warminster site using 1994 as the base year, 2000 as the short-term projection, and 2010 as the planning horizon. These forecast levels assume operations per based aircraft at levels similar to those identified for nearby airports of the same FAA classification.

A range of forecast-based aircraft and operations per based aircraft was used to determine forecast operations for the year 2000 and the year 2010. Table 2-4 presents the high, mid, and low ranges of the number of based aircraft that could be expected at the Warminster site in the years 2000 and 2010.

In converting based aircraft to aircraft operations, three activity ranges were assumed: medium business use, low business use, and occasional use. Table 2-5 and Table 2-6 present the forecasts for these three operational scenarios for the years 2000 and 2010, respectively.

Another important part of the system-oriented evaluation is the general framework that the Warminster site would fit into. There are several important airspace factors to be noted. If Warminster had any type of instrument approach, there would be a good likelihood for airspace conflict with the Northeast Philadelphia and Trenton-Mercer Airports during all-weather/Instrument Flight Rules (IFR) conditions. The primary reason for this is that a portion (i.e., holding pattern) of the IFR-reserved airspace for these two existing airports' instrument approaches overlap. To introduce a third airport into this airspace, thus likely adding an additional instrument approach, would mean more aircraft in this area. NAS JRB Willow Grove is located approximately four mi (six km) west of the NAWCAD site. This area has major Visual Flight Rules (VFR) activity; reports and interviews verified that concerns exist now regarding VFR aircraft entering NAS JRB Willow Grove's Class D airspace. Airspace conflicts and the complexity of integrating operations at the NAWCAD site could lead to traffic delays at NAS JRB Willow Grove, particularly during IFR operations.

Table 2-4
Range of the Number of Forecast-Based Aircraft in 2000 and 2010

Aircraft Type	Number of Aircraft					
	2000			2010		
	High	Mid	Low	High	Mid	Low
Single-Engine	357	143	86	391	156	94
Multi-Engine	30	12	7	33	13	8
Turboprop	6	0	0	7	0	0
TOTALS	393	155	93	431	169	102

Table 2-5
Year 2000 Forecast General Aviation and Light Air Cargo Operations

AC Type	Medium Business Use			Low Business Use			Occasional Use		
	Total	Day	Night	Total	Day	Night	Total	Day	Night
Single-Engine	178,500	176,700	1,800	39,300	38,900	400	17,200	17,050	150
Multi-Engine	15,000	14,800	200	2,900	2,850	50	1,300	1,300	0
Turboprop	3,000	2,400	600	400	300	100	100	100	0
TOTALS	196,500	193,900	2,600	42,600	42,050	550	18,600	18,450	150

Table 2-6
Year 2010 Forecast General Aviation and Light Air Cargo Operations

AC Type	Medium Business Use			Low Business Use			Occasional Use		
	Total	Day	Night	Total	Day	Night	Total	Day	Night
Single-Engine	195,500	193,500	2,000	42,900	42,450	450	18,800	18,600	200
Multi-Engine	16,500	16,300	200	3,000	2,950	50	1,400	1,400	0
Turboprop	3,500	2,800	700	600	500	100	200	150	50
TOTALS	215,500	212,600	2,900	46,500	45,900	600	20,400	20,150	250

In all likelihood, these airspace considerations would limit any activity at Warminster to easterly approaches and arrivals only and not make it a candidate for any type of approach for use in poor visibility conditions. This constraint would reduce the attractiveness of the airport to a wide variety of activity, which accounts for the based forecasts not including any schedule activity (passenger or air cargo) or the basing of any type of aircraft other than piston-engines.

Another important consideration is the willingness of a local sponsor to own and operate the facility. No apparent willingness to operate Warminster has been expressed by local governments. The fact that the airspace constraints would limit the growth potential of an aviation reuse may prevent any local support from developing.

Therefore, in summary, a demand for general aviation and some non-scheduled light air-cargo activity has been identified. However, several key concerns also have been identified; for example:

- Airspace constraints;
- Lack of potential for providing the capability to operate the airport in less than optimal visual conditions;
- Operations confined to arrivals from and departures to the east; and
- No apparent interest expressed by local municipalities to own and operate airport.

A detailed discussion of the methodology used to evaluate the existing demand and capacity for aviation use of the NAWCAD Warminster site is included in Appendix B.

Other Components of Aviation Alternative

The aviation reuse examined under this alternative is for a Basic Utility GA airport. Activities for this airport, with its shortened runway, are projected to require 168 acres (68 hectares), or 20 percent of the 824 acres (333 hectares) at NAWCAD. The remainder of the land is allocated to uses considered compatible with a GA airport (Figure 2-4, Aviation Alternative). Data on the airport component and the other land use components that comprise the Aviation Alternative are presented in Table 2-7 (the general characteristics of the other land use components have already been described for either the Reuse Plan and/or the University/Institutional Alternative).

The aggregate character of the Aviation Alternative is a more intensive industrial, research, and aviation mix than the other alternatives. Employment at full buildout is projected to be 9,200, compared to 6,850 in the Reuse Plan, 7,600 in the University/Institutional Alternative, and 5,000 in the Residential Alternative.

Table 2-7

Aviation Alternative Land Use Program

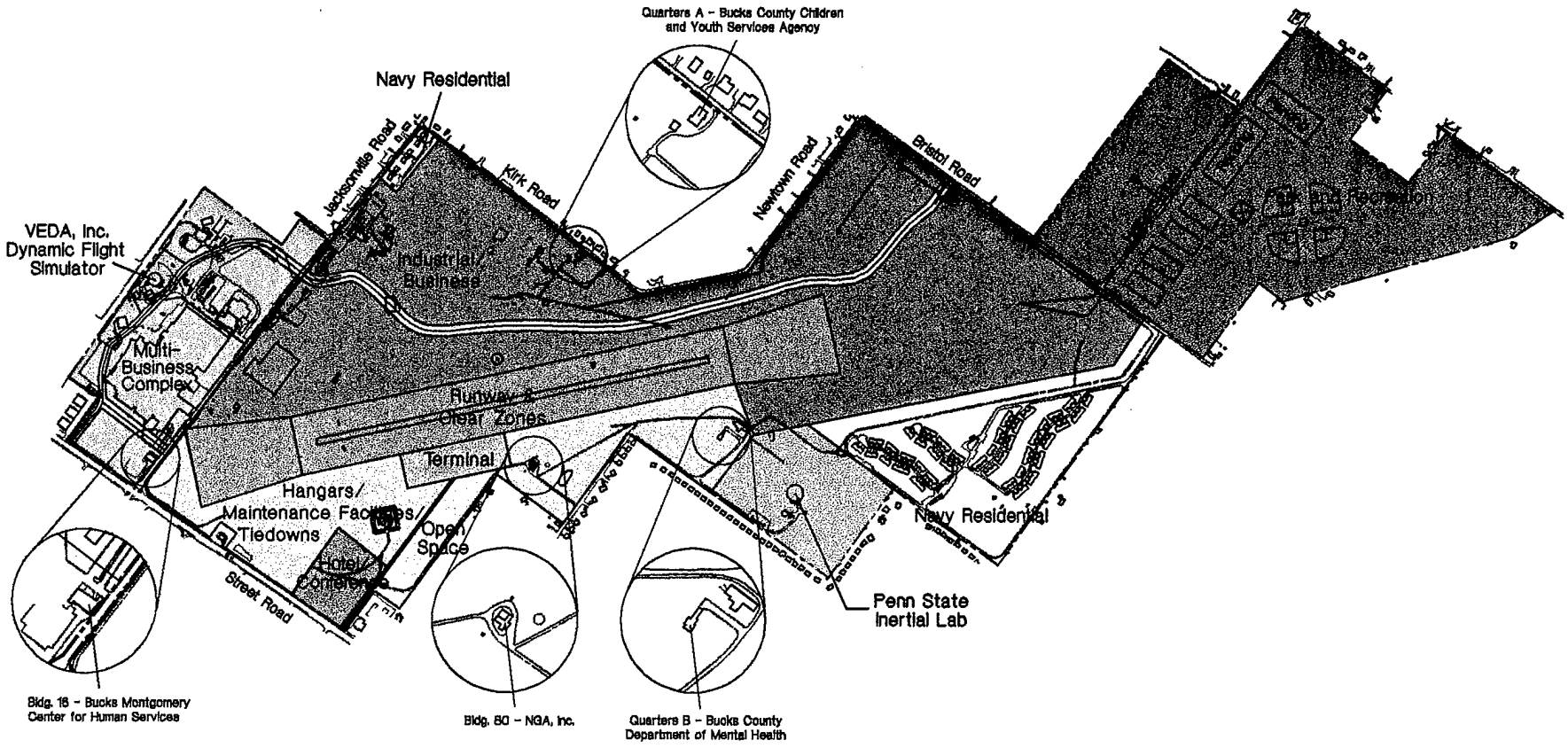
Use	Land Acreage			Estimated Sq Ft of Development (Sq M)
	Acres	Hectares	% of Total	
Multi-Business Complex	46	19	5	1,372,000 (128,000)
Dynamic Flight Simulator (VEDA, Inc.)	3	1	<1	72,000 (6,700)
Industrial/Business	284	115	34	4,900,000 (59,000)
Hotel/Conference	10	4	1	50,000 (5,000)
Aviation				
Runways & Clear Zones	84	34		
Hangars/Maintenance Facilities Tiedowns	77	31		
Terminal	7	3		
Subtotal	168	68	20	n/a
Residential (Existing Navy)	67	27	8	n/a
Inertial Lab (Penn State)	31	13	4	25,000 (2,300)
Park and Recreation	162	66	20	n/a
ROW-Open Space	53	21	6	n/a
Total	824	333	100	

Homeless Providers (Approved by the Department of Housing and Urban Development)
Bucks County Children and Youth Services Agency - Quarters A
Bucks County Department of Mental Health - Quarters B
Needlework Guild of America (NGA) - Bldg 80
Bucks Montgomery Center for Human Services - Bldg 16

Notes: Land Use acreage and amount of development are approximate based on estimates made for a long-term development plan that is subject to change. Numbers may not total exactly due to rounding and metric conversions.
n/a = square feet not appropriate measure of development.
See Figure 2-7

Source: Based, in part, on Reuse Plan, Naval Air Warfare Center, Bucks County, PA, March 1995; and incorporating assumptions of BRAC 95 property reuse based on interviews with staff of the FLRA of Bucks County, January 1996.

Aviation Alternative



Park and Recreation	Industrial/Business	——	Proposed Road
Runway/Clear Zones	Navy Residential	-----	Property Boundary
Terminal Buildings	Multi-Business Complex		
Hotel/Conference	ROW-Open Space		
Inertial Lab & Dynamic Flight Simulator	Hangars/Maintenance Facilities Tiedowns		

1600 0 1600
Scale In Feet
400 0 400
Scale in Meters

N

Figure 2-4

3 AFFECTED ENVIRONMENT

The Council on Environmental Quality's (CEQ's) regulations implementing NEPA (40 CFR Part 1500) state that an "environmental impact statement shall succinctly describe the environment of the area(s) to be affected or created by the alternatives under consideration" and that "impacts shall be discussed in proportion to their significance." Significance, as used in NEPA, requires the dual considerations of context and intensity. With respect to context, "the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality." Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole.

This chapter describes the existing baseline conditions of the area in the vicinity of NAWCAD that may be directly or indirectly affected by the proposed action. The infrastructure, cultural resources, natural resources, and hazardous waste components of this EIS are described for the area within the NAWCAD site boundaries. The study area selected for the land use, socioeconomics, community services, traffic, air quality, and noise components comprises a one-mi (1.6-km) radius of NAWCAD (Figure 3.1-1, Study Area Boundaries).

3.1 Land Use and Zoning

The study area is positioned within the following Bucks County municipalities:

- Ivyland Borough;
- Northampton Township;
- Upper Southampton Township;
- Warminster Township; and
- Warwick Township.

3.1.1 Land Use

On-Site Land Use

The land use pattern at NAWCAD reflects its 54-year history as an aircraft development center. The 824-acre (333-hectare) facility may be broadly categorized into several distinct land uses: operations, administrative, housing, community facilities, maintenance, research, and conservation/buffer. The land uses at NAWCAD are shown in Figure 3.1-2 (Land Use at NAWCAD). Located on the NAWCAD property west of Jacksonville Road is a district cluster of industrial and research

buildings representing the original Brewster Aeronautical Corporation's facilities acquired by the Navy in 1944. These facilities have been altered and expanded since that time.

East of Jacksonville Road, aviation uses occupy the largest portion of the property. In this area is the 8,000-ft (2,400-m) runway and its aircraft parking aprons, hangar, tower, fire/crash house, several smaller support buildings, and avigation easement area at the east end of the runway. South of the runway is a separate facility for inertial guidance research and development. To the east is an area of 199 Navy family housing units for enlisted personnel. There are also eight housing units for officers, six of which are located along Jacksonville Road. Quarters for unaccompanied personnel, recreational facilities, and several other administrative support buildings are located north of the runway and east of Jacksonville Road.

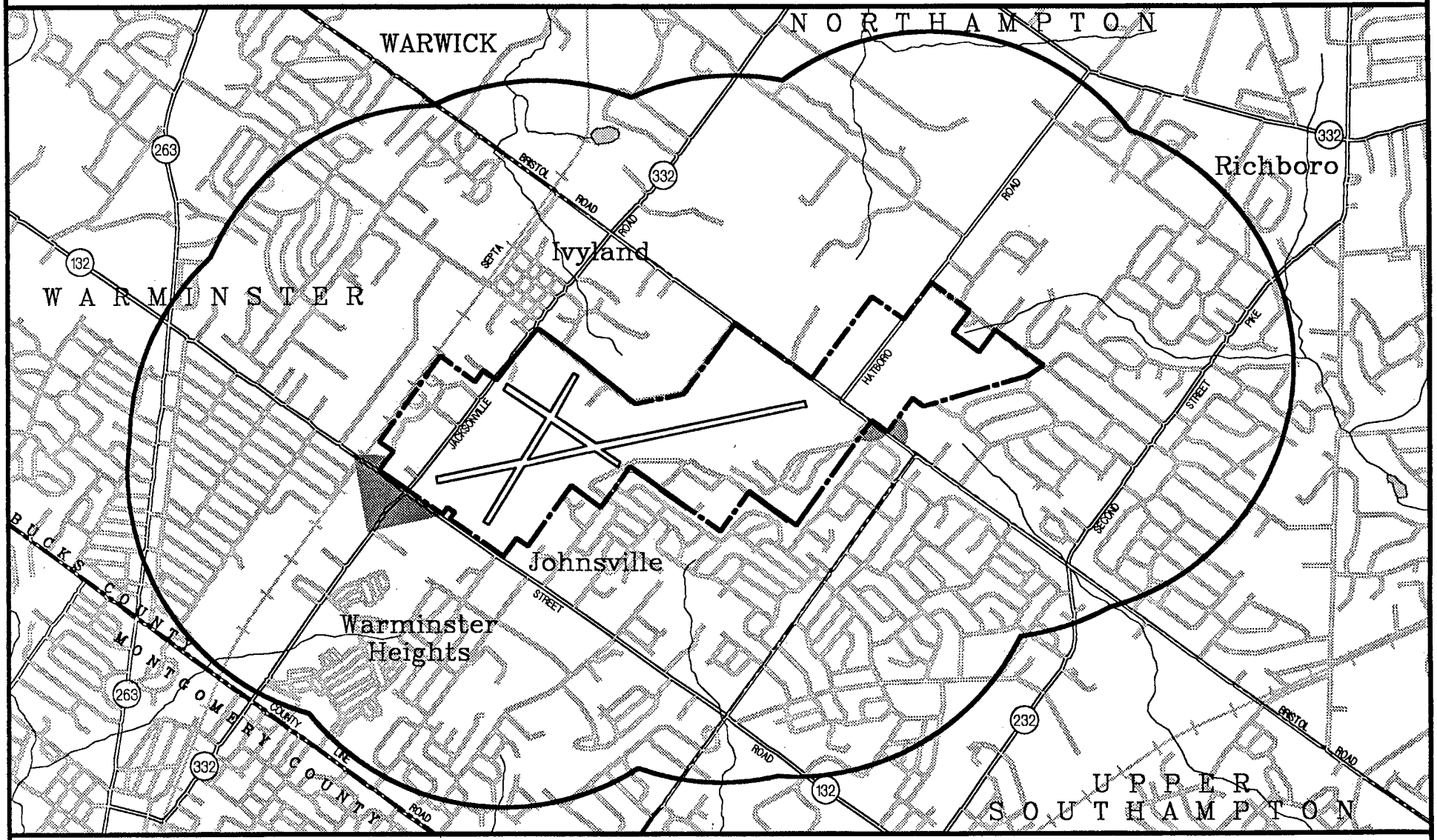
Off-Site Land Use

The land use pattern in this section of Bucks County is largely the result of suburban outgrowth from the city of Philadelphia. The area to the south, west, and northwest of NAWCAD was mostly developed during the 1960s and 1970s. In fact, the developed southern portion of the county has only limited opportunities for further in-fill development. The northern part of the county is still mostly agricultural and rural residential. The study area location is at the transition zone between suburban Philadelphia and the rural setting of upper Bucks County. Consequently, the area northeast of NAWCAD is presently at the cutting edge of suburban growth. Most of this development is medium- to large-lot single-family residential subdivisions in Northampton Township. Much of the vacant and agricultural land in the study area is likely to be absorbed by development, as sewer and water services are extended by the township.

Existing land use patterns for the area immediately surrounding NAWCAD Warminster are shown in Figure 3.1-3 (Land Use Surrounding NAWCAD). This figure is derived from the 1990 existing land use map published by the Bucks County Planning Commission. NAWCAD itself is characterized as a Governmental Institutional use. Additional institutional uses (presented in more detail in Section 3.3, Community Facilities) include the Steve Szymanek Park, located across from NAWCAD on Street Road, and the William Tennent High School and Everett McDonald Elementary School to the southwest of NAWCAD. Near the high school is the Bucks County Hospital, and further west, the St. John Bosco parochial school. To the northwest of NAWCAD, partly within the study area, is another cluster of private schools, including the Archbishop Wood High School and the Nativity School. Longstreth School is a public elementary school a little to the northeast of the parochial school cluster. Two small municipal parks are located adjacent to NAWCAD in the north: Munro Park and Fitch Park.

A strip of commercial, manufacturing, transportation, and utilities uses is located to the west and north of NAWCAD, roughly parallel to the SEPTA railway line. Old York Road and Street Road are the primary commercial thoroughfares in the study area. Numerous small shopping centers, fast-food restaurants, and automobile-oriented businesses characterize these highways.

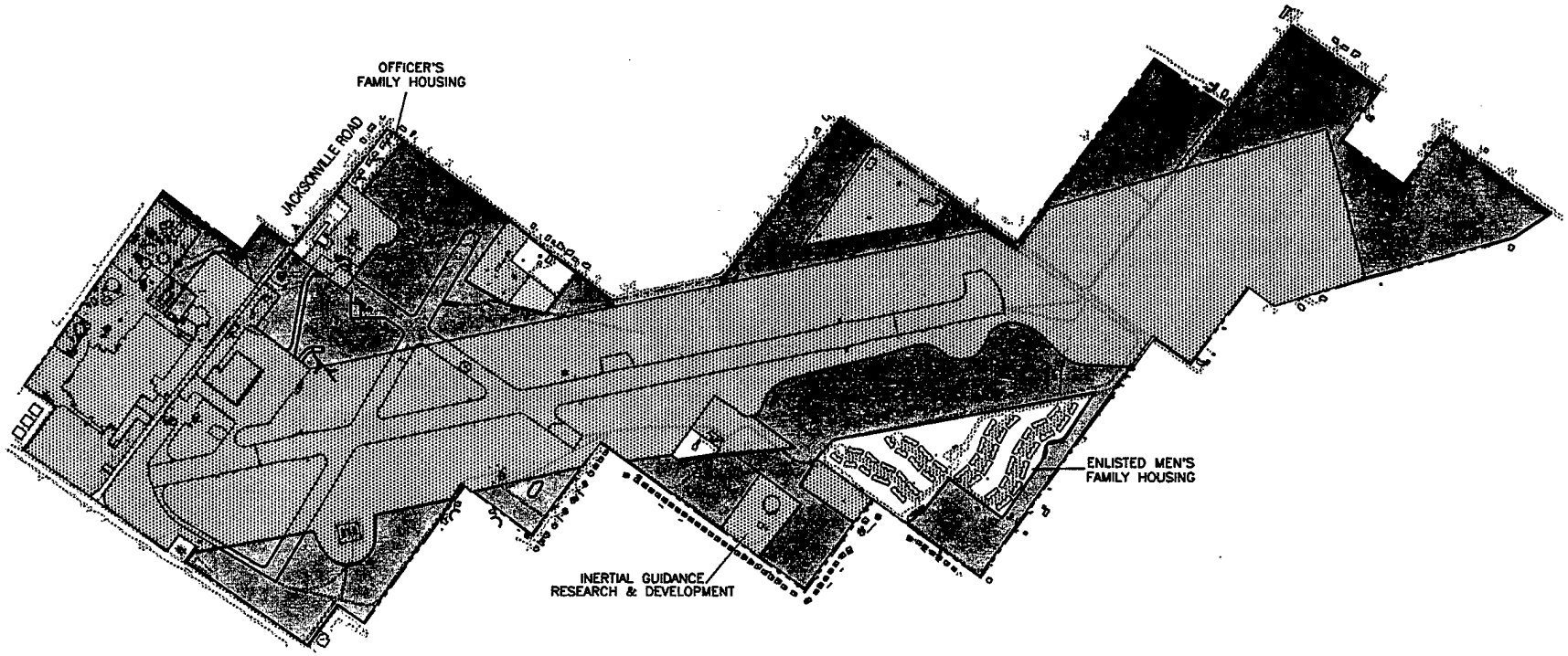
Study Area Boundaries



Source: USGS, 1983.

Figure 3.1-1

Land Use at NAWCAD



---- Property Boundary

Conservation/Buffer

Housing

Operations

Administration

Community Facilities/Medical

Maintenance/Production/Storage/Supply/Utilities

Research

1600 800 0 800 1600
Scale in Feet

400 0 400
Scale in Meters

N

Source: US Navy, 1991

Figure 3.1-2

Land Use Surrounding NAWCAD

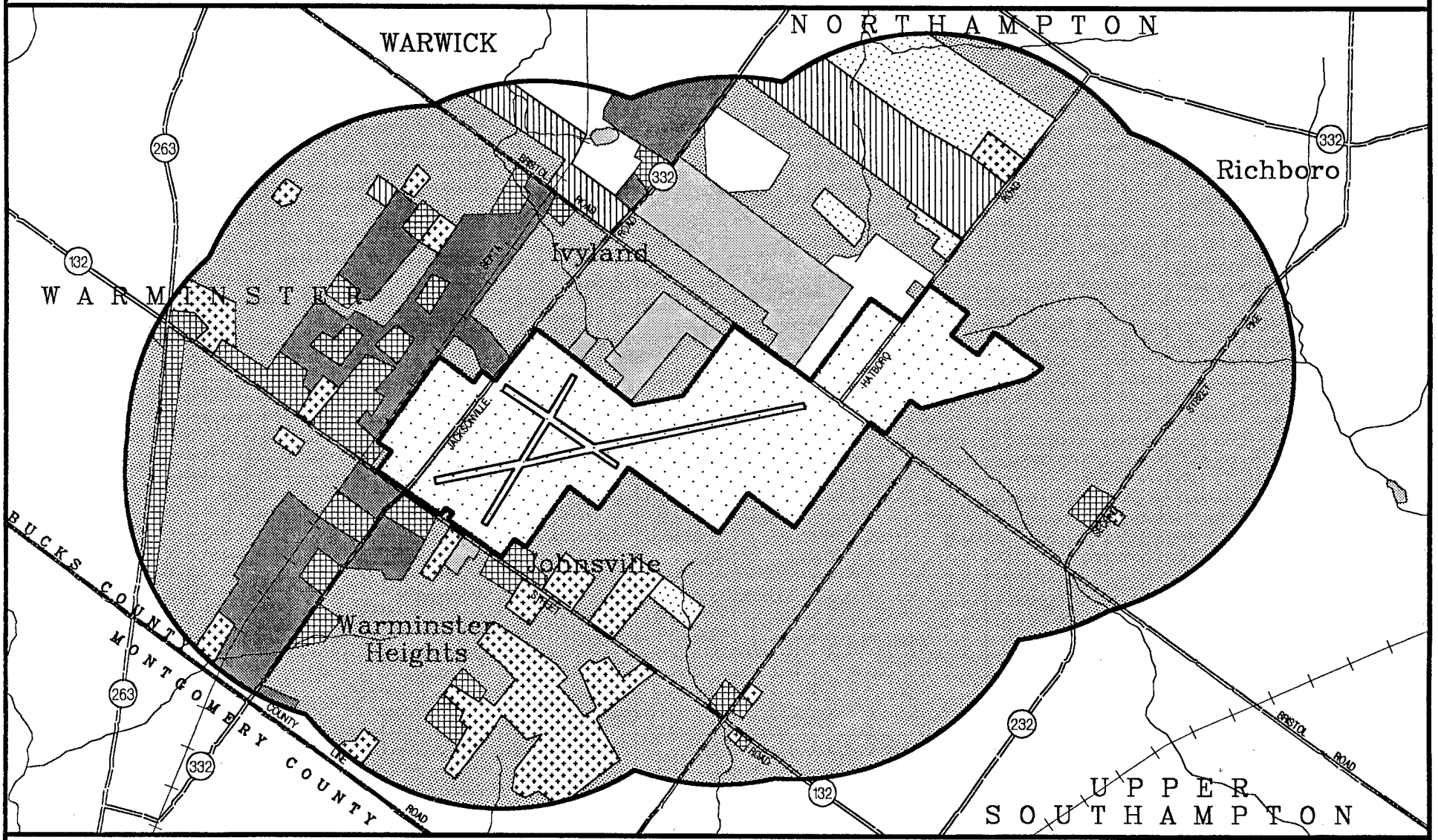


Figure 3.1-3

Elsewhere, the study area is dominated by residential, agricultural, vacant, and recreational uses. Most of the residential area is characterized by single-family detached homes, although some multi-family areas exist, primarily west of Route 132, Street Road. Most of the vacant, agricultural, and rural residential uses occur to the northeast of NAWCAD. A golf course, Spring Mill Country Club, is located immediately to the northeast of NAWCAD. Land use characteristics and development trends are summarized in the data presented in Tables 3.1-1 and 3.1-2.

3.1.2 Zoning and Land Use Policy

The Bucks County Planning Commission provides overall planning guidance in the county, while each locality is responsible for its own land use controls, including review of development plans, zoning and subdivision regulations, and the formulation of comprehensive plans. The breakdown of NAWCAD's approximately 824 acres (333 hectares) within each municipality is as follows:

- 609 acres (247 hectares) are within Warminster Township (74 percent);
- 46 acres (19 hectares) are within Ivyland Borough (five percent); and
- 169 acres (68 hectares) are within Northampton Township (21 percent).

That portion of NAWCAD within Warminster is designated a Military Reservation (MR) zoning district, with the exception of the enlisted men's family housing area to the southeast of NAWCAD, which is designated a multi-family district (MF-1) (Figure 3.1-4, Zoning Districts). Northampton's portion of the base represents a clear zone at the end of Runway 09/27, presently in agricultural use, and is currently zoned Institutional/Public and Agricultural/Residential. The portion of the base in Ivyland Borough west of Jacksonville Road is zoned Industrial/Commercial, and the portion to the east is zoned R-2, which is a single-family residential zone permitting about 1.75 units per acre (4.3 units per hectare).

The Bucks County Planning Commission updated the *Comprehensive Plan for Bucks County* in December 1993. This guidance document expresses goals, policies, objectives, and strategies through the year 2020 on such issues as land use, natural resources, parks and recreation, housing, wastewater facilities, solid waste management, and community facilities.

Table 3.1-1

1990 Land Use Characteristics (in acres)

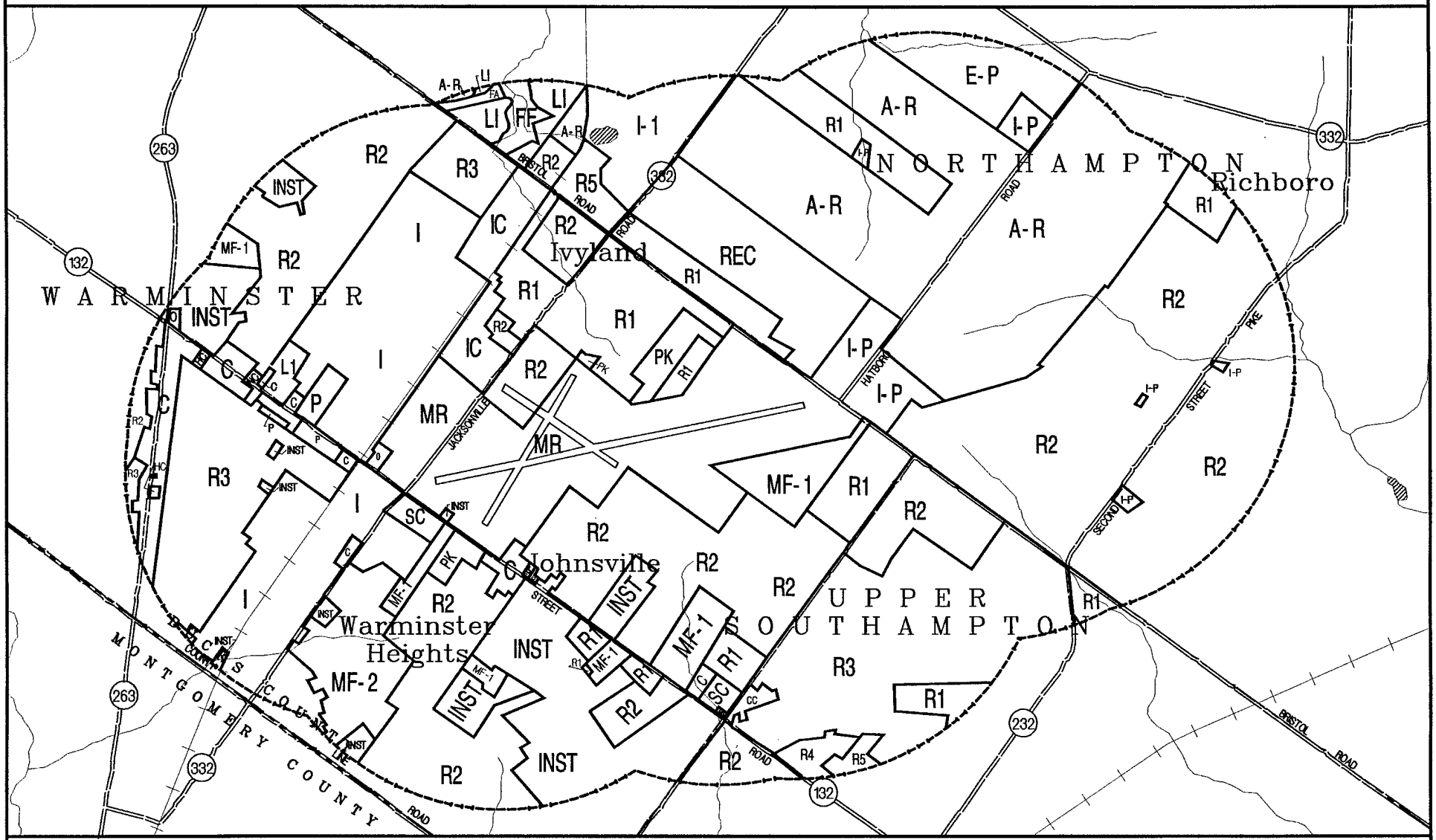
Municipality	Single-Family	Multi-Family	Rural Res.	Agricultural	Mining & Mfg.	Comm-ercial	Trans. & Util.	Govt. & Instit.	Park & Rec.	Vacant	Total
Ivyland	53	2	16	0	37	16	37	42	7	21	231
Northampton	5,662	149	1,461	3,089	181	245	1,481	636	1,978	1,649	16,531
Upper Southampton	2,149	134	292	0	123	220	565	212	251	285	4,231
Warminster	2,677	216	71	264	322	309	887	1,244	265	274	6,529
Warwick	1,025	42	1,063	2,637	103	29	369	257	603	1,003	7,131
Area Total	11,566	543	2,903	5,990	766	819	3,339	2,391	3,104	3,232	34,653
Source: Bucks County Planning Commission, Bucks County Continuum, 1994.											

Table 3.1-2

1970-1990 Land Use Comparisons (percentages)

Municipality	Residential			Agricultural/Vacant			Non-Residential			Park & Recreation		
	1970	1980	1990	1970	1980	1990	1970	1980	1990	1970	1980	1990
Ivyland	37	28	28	28	24	12	31	38	57	4	10	3
Northampton	24	33	40	58	45	33	8	12	15	10	9	12
Upper Southampton	61	59	58	21	18	10	16	20	26	1	3	6
Warminster	54	50	45	22	14	9	22	31	42	2	4	4
Warwick	20	19	22	73	69	59	3	5	11	3	7	8
Area Total	33	36	39	50	41	31	11	15	21	6	7	9
Source: Bucks County Planning Commission, Bucks County Continuum, 1994.												

Zoning Districts



Zoning District Boundary

One Mile Study Area

3000 0 3000
Scale in Feet

1000 0 1000
Scale in Meters

N

Figure 3.1-4

Zoning Districts Legend

MR	Military Reservation *
R1	Residential Conservation (Single Family) District
R2	Low Density (Single Family) Residential
R3	Moderate Density Residential
R4	Moderately High Density Residential
R5	High Density Residential
MF-1	Multi-Family Residential
A-R	Agricultural-Residential
REC	Recreation **
PK	Park District *
E-P	Environmental Protection District **
INST	Institutional *
I-P	Institutional/Public **
HC	Highway Commercial *
SC	Shopping Center *
C	Commercial
CC	Controlled Commercial +
P	Professional *
O	Office *
IC	Industrial-Commercial ***
I	Industrial
LI	Light (Limited) Industrial
I-1	Planned Industrial/Office **
FF	Flood-Fringe District ++
FA	General Flood Plain District ++

* Unique to Warminster Township Zoning Map.
** Unique to Northampton Township Zoning Map
*** Unique to Ivyland Borough Zoning Map.
\+ Unique to Upper Southampton Township Zoning Map.
++ Unique to Warwick Township Zoning Map.

Sources:

Northampton Township Zoning Map, A.W. Martin Associates, Inc., 1977.
Zoning Map, Ivyland Borough, 1975.
Zoning Map, Upper Southampton Township Planning Commission, 1983.
Zoning Map, Warminster Township, 1989.
Zoning Map for Warwick Township, C. Robert Wynn Associates, 1995.

3.2 Socioeconomics

The study area for the review of existing socioeconomic conditions is dependent upon the geographic availability of demographic and economic data. Ivyland and Warwick are entirely within single census tracts; Warminster comprises seven tracts, Northampton six, and Upper Southampton four. While it is possible to obtain population, household, and housing data at the tract level, the tracts do not closely conform to the one-mi (1.6-km) radius used in the land use section. Thus, the broader municipal context is more appropriate when considering socioeconomic characteristics and their relationship to community services and employment pools. For these reasons, data are presented for the five municipalities, Bucks County, and where available, for Montgomery County and Philadelphia.

3.2.1 Demography

The population of the five municipalities surrounding NAWCAD exceeded 90,700 in 1990, an overall increase of 11 percent over the 1980 population level (Table 3.2-1). Among the five municipalities, Warminster and Ivyland experienced declines in population over the period, with Warminster losing more than 2,700 persons, or 7.6 percent. The largest increase in population was in Northampton with a gain of over 8,000, or 29 percent, over the decade. Projections of future population to the year 2000, made by the Bucks County Planning Commission, indicate that Warminster and Ivyland will remain essentially static, that Upper Southampton will experience modest growth, and that Northampton and Warwick will continue to experience rapid population growth.

Population data for the larger contexts of Bucks and Montgomery counties and the city of Philadelphia are shown in Table 3.2-1 for comparative purposes. Bucks County, with a growth rate of 13 percent, was one of the fastest-growing counties in the region during the 1980s and is expected to continue at a similar pace (12 percent) in the 1990s. Montgomery County's growth has been more modest at five percent, reflecting its more fully developed status, and is expected to continue to grow at about this rate in the 1990s. The city of Philadelphia experienced a significant population decline (six percent) in the 1980s, but is expected to reduce this rate of decline by half during the 1990s. For the region as a whole, population increased three percent in the 1980s and is expected to grow almost five percent in the 1990s.

Table 3.2-2 presents the population's age and ethnic characteristics from the 1990 Census. The two municipalities with the highest growth in the 1980s, Northampton and Warwick, also have the highest proportion of their population under age 18, reflecting the usual demographic profile of new suburbs. Ivyland and Upper Southampton have a smaller proportion under age 18 and a higher proportion over age 65, reflecting their more mature status. A similar pattern exists when comparing

Table 3.2-1

Total Population

Municipalities	1980	1990	#Change 1980-90	%Change 1980-90	Estimate 1992	Projection 2000	% Change 1990-2000
Ivyland	581	498	-83	-14.30	507	490	-1.6
Northampton	27,392	35,406	8,014	29.30	37,157	45,500	28.5
Upper Southampton	15,806	16,076	270	1.70	15,967	17,000	5.7
Warminster	35,543	32,832	-2,711	-7.60	32,752	32,900	0.2
Warwick	2,307	5,915	3,608	156.40	6,618	9,070	53.3
Subtotal	81,629	90,727	9,098	11.10	93,001	104,960	15.7
Bucks Co.	479,211	541,174	61,963	12.90	556,279	606,500	12.1
Montgomery Co.	643,621	678,111	34,490	5.40	689,996	715,980	5.6
Philadelphia	1,688,210	1,585,577	-102,633	-6.10	1,552,572	1,562,865	-1.4

Sources: US Census, 1990, CP-1-40 and CPH-3; Bucks Co. Planning Commission, Municipal Demographic Profile, 1994, Bucks County Continuum, 1994; and Delaware Valley Regional Planning Commission, 1993 and 1994.

Table 3.2-2

Age and Ethnic Characteristics 1990

Municipalities	Population				
	% Under 18	% Over 65	Median Age	% Black	% Hispanic
Ivyland	23.3	10.4	34.1	0	0.2
Northampton	35.0	9.3	33.9	0.4	0.7
Upper Southampton	26.8	19.1	37.8	0.8	0.7
Warminster	32.5	11.5	32.8	2.3	3.6
Warwick	43.1	6.2	31.3	0.5	1.2
Subtotal	30.0	10.6	N/A	1.1	1.6
Bucks Co.	33.0	13.2	33.7	2.8	1.6
Montgomery Co.	29.3	18.6	35.8	5.8	1.2
Philadelphia	23.9	15.2	33.1	39.9	5.6

Sources: US Census, 1990, CP-1-40 and CPH-3; Bucks Co. Planning Commission, Municipal Demographic Profile, 1994, and Bucks County Continuum, 1994; and Delaware Valley Regional Planning Commission, 1994.

the age structure of Bucks, Montgomery, and Philadelphia, with Bucks having the highest proportion of persons under age 18 and least over age 65.

The minority populations of the five municipalities are very small, as less than one percent are Black (with the exception of Warminster, where 2.3 percent of the population is Black). These rates compare to a 40 percent Black population in Philadelphia. Similarly, Hispanics, who have varied heritages, are represented in very small numbers in the five municipalities. In this instance, Warminster had 3.6 percent and Warwick 1.2 percent with the other municipalities less than one percent. These rates compare to 5.6 percent Hispanic in Philadelphia.

3.2.2 Income

Household and family incomes in the five municipalities are among the highest in the region. As shown in Table 3.2-3, Northampton, Upper Southampton, and Warwick exceed the median for Bucks County. Warminster is slightly less and Ivyland notably less than the Bucks County median for family and household median incomes. Bucks County, as a whole, has median household incomes slightly lower than Montgomery County, but 76 percent higher than Philadelphia.

Poverty rates from the 1990 Census are presented in Table 3.2-3. With the exception of Warminster, the municipalities have a lower percentage of persons in poverty than Bucks County as a whole. About four percent of persons were in poverty in Bucks County in 1990, compared to 3.6 percent in Montgomery County and 20.3 percent in Philadelphia. The number of families in poverty shows lower percentages but a similar distribution among the municipalities and counties. Warminster recorded 3.3 percent of its families in poverty, compared to 2.9 percent for Bucks County, 2.2 percent for Montgomery County, and 16.1 percent for Philadelphia.

3.2.3 Housing

The great majority of housing in the study area is of a single-family detached character. Although there are some multi-family units, these tend to be low-rise townhouses or garden apartments. During the 1980s, Warwick and Northampton witnessed a dramatic increase in the number of housing units in their jurisdictions. The number of housing units in Warwick increased by almost 150 percent during the decade, and Northampton increased by almost 57 percent (Table 3.2-4). Warminster saw modest growth of five percent and Ivyland actually lost five percent of its housing units over the decade. Bucks County, as a whole, increased its housing by 20.9 percent, compared to 14.3 percent in Montgomery, and a decline of 0.6 percent in Philadelphia. Similar shifts are recorded for the number of households in the respective jurisdictions. Mean household size declined in all jurisdictions except fast-growing Warwick. The average for Bucks County declined from 3.01 persons in 1980 to 2.8 persons in 1990, a decline of seven percent.

Table 3.2-3

1990 Census 1989 Income Data

Municipalities	Median Household Income	Median Family Income	Per Capita Income	Persons In Poverty		Families In Poverty	
				Persons	%	Families	%
Ivyland	41,250	45,625	17,234	6	1.2	0	0
Northampton	59,285	63,019	22,373	544	1.5	99	1
Upper Southampton	47,825	55,015	20,205	530	3.3	116	2.6
Warminster	43,096	48,096	15,795	1,388	4.3	290	3.3
Warwick	56,721	57,997	20,588	64	1.1	13	0.8
Bucks Co.	43,347	48,851	18,292	21,076	4.0	4,232	2.9
Montgomery Co.	43,720	51,353	21,990	23,779	3.6	4,089	2.2
Philadelphia	24,603	30,140	12,091	313,374	20.3	61,253	16.1

Sources: US Census, 1990, CP-1-40 and CPH-3; Bucks Co. Planning Commission, Municipal Demographic Profile, 1994, and Bucks County Continuum, 1994; and Delaware Valley Regional Planning Commission, 1993 and 1994.

Table 3.2-4

Housing and Households

Municipalities	Housing Units			Total Households			Mean Household Size		
	1980	1990	% Change	1980	1990	% Change	1980	1990	% Change
Ivyland	203	192	-5.4	195	186	-4.6	2.98	2.63	-11.7
Northampton	7,333	11,486	56.6	7,171	11,105	54.9	3.77	3.17	-15.9
Upper Southampton	5,062	5,918	16.9	4,963	5,778	16.4	3.17	2.75	-13.2
Warminster	10,655	11,207	5.2	10,209	10,846	6.2	3.43	2.96	-13.7
Warwick	797	1,981	148.6	756	1,914	153.2	3.04	3.09	1.6
Bucks Co.	165,438	199,934	20.9	156,648	190,507	21.6	3.01	2.8	-7.0
Montgomery Co.	232,569	265,856	14.3	223,290	254,995	14.20	2.79	2.58	-7.5
Philadelphia	678,973	674,899	-0.6	619,781	603,075	-2.70	2.66	2.56	-3.8

Sources: US Census, 1990, CP-1-40 and CPH-3; Bucks Co. Planning Commission, Municipal Demographic Profile, 1994, and Bucks County Continuum, 1994; and Delaware Valley Regional Planning Commission, 1993 and 1994.

In 1990, the proportion of housing occupied by owners was highest in Northampton and Warwick and lowest in Warminster (Table 3.2-5). Conversely, the proportion of renters is highest at 26.8 percent in Warminster and lowest at 8.7 percent in Northampton. The percent of renters in Bucks County is 24.3 percent, Montgomery County 27.7 percent, and Philadelphia 38.1 percent. The vacancy rate for housing for sale is very low among the five municipalities; only Northampton, at 1.8 percent, exceeded the Bucks County rate of 1.6 percent. Similarly, only Northampton's rate of ten percent vacant-for-rent exceeded the Buck's County rate of 8.3 percent. By comparison, Montgomery's vacant-for-rent rate was 6.3 percent and Philadelphia's was 9.7 percent.

Median housing values in 1990 ranged from $131,300 in Ivyland to $195,500 in Northampton. The mean for Bucks County was $148,350, compared to $143,400 in Montgomery County and $49,400 in Philadelphia. Median monthly gross rent levels in the study area ranged from $511 in Warminster to $814 in Warminster, compared to $602 for Bucks County and $452 in Philadelphia. Clearly, the study area is best characterized as relatively expensive suburbia, in part characterized by recent rapid growth of single-family detached homes.

3.2.4 Employment

The 1990 census data on the labor force resident in the study area are shown in Table 3.2-6. As can be seen, the five municipalities had a combined labor force of 50,850 with 49,219 employed, providing an unemployment rate of 3.2 percent, lower than the Bucks County rate of 3.9 percent. Among the individual municipalities, unemployment rates ranged from 2.5 percent in Ivyland to 3.7 percent in Upper Southampton. Participation in the labor force was highest in Warwick Township, at 77.5 percent, and lowest in Upper Southampton, at 67.8 percent, which compares to 71.1 percent for Bucks County. Distribution of the employed residents in Bucks, Montgomery, and Philadelphia, by industrial category in 1991, is also shown in Table 3.2-7.

As presented in Table 3.2-7, the major category of employment in all three jurisdictions is in Services, ranging from 27.4 percent in Bucks County to 38.8 percent in Philadelphia. Retail Trade is the second highest category in Bucks County at 21.8 percent, compared to 14.2 percent in Philadelphia. Manufacturing is the next leading category in Bucks County, at 21.4 percent, compared to 12.1 percent in Philadelphia. Although Government is considered separately in the data source, which includes only "covered" employment, Government is a much higher percentage of employment in Philadelphia at 19 percent, compared to 11 percent in Bucks County.

Annual employment and income data is available from the US Bureau of Economic Analysis (BEA), Regional Economic Information System. Bucks County data for 1990-1992 is provided in Table 3.2-8. These data rely on mid-year Census population estimates for 1991 and 1992. Total personal income is seen to rise substantially during 1991 and 1992, with annual growth rates of six

Table 3.2-5

Housing Characteristics

Municipalities	Tenure 1990		Vacancy Rate 1990		1990 Median Housing	
	% Owner	% Renter	% Owner	% Renter	Value $	Rent $
Ivyland	81.7	18.3	0	5.6	131,300	538
Northampton	91.3	8.7	1.8	10	195,500	814
Upper Southampton	83.0	17.0	0.8	6.1	158,100	634
Warminster	73.2	26.8	0.7	8.1	143,700	511
Warwick	89.0	11.0	0.9	3.2	180,700	718
Bucks Co.	75.7	24.3	1.6	8.3	148,350	602
Montgomery Co.	72.3	27.7	1.4	6.3	143,400	593
Philadelphia	61.9	38.1	2.2	9.7	49,400	452

Sources: US Census, 1990, CP-1-40 and CPH-3; Bucks Co. Planning Commission, Municipal Demographic Profile, 1994, and Bucks County Continuum, 1994; and Delaware Valley Regional Planning Commission.

Table 3.2-6

Resident Labor Force and Employment 1990

Jurisdiction	Labor Force	% in Labor Force	Employment	% Unemployed
Ivyland	283	72.8	276	2.5
Northampton	19,388	72.7	18,853	2.8
Upper Southampton	8,860	67.8	8,532	3.7
Warminster	19,070	75.0	18,423	3.4
Warwick	3,249	77.5	3,135	3.5
Subtotal	50,850	96.8	49,219	3.2
Bucks County	296,484	71.1	284,984	3.9

Source: Bucks County Planning Commission, Municipal Demographic Profile, 1994; and Bucks County Continuum, 1994.

Table 3.2-7
Employment Characteristics by Industry

Employment Category	Bucks	Montgomery	Philadelphia	Employment Category	Bucks	Montgomery	Philadelphia
Total Employment	200,150	394,338	637,642	Wholesale Trade	12,952	26,101	33,213
Ag. Forest. Fish	2,373	4,586	n/a	Percent of Co. Total	6.5	6.6	5.2
Percent of Co. Total	1.2	1.2	n/a	No. of Establishments	1,523	2,457	2,103
No. of Establishments	379	503	n/a	Average Annual Wage	$32,302	$36,698	$33,942
Average Annual Wage	$17,848	$22,117	n/a	Retail Trade	43,568	66,769	90,651
Mining	435	183	n/a	Percent of Co. Total	21.8	16.9	14.2
Percent of Co. Total	0.2	0	n/a	No. of Establishments	2,791	4,121	7,196
No. of Establishments	14	9	n/a	Average Annual Wage	$14,685	$14,267	$14,785
Average Annual Wage	$45,304	$38,099	n/a	F.I.R.E.	9,006	34,501	63,489
Construction	10,251	19,934	12,978	Percent of Co. Total	4.5	8.7	10
Percent of Co. Total	5.1	5.1	2	No. of Establishments	875	1,877	2,097
No. of Establishments	1,877	2,285	1,469	Average Annual Wage	$27,827	$30,448	$36,700
Average Annual Wage	$30,352	$33,719	$34,055	Services	54,908	117,138	247,621
Manufacturing	42,823	85,902	76,849	Percent of Co. Total	27.4	29.7	38.8
Percent of Co. Total	21.4	21.8	12.1	No. of Establishments	4,740	8,522	10,967
No. of Establishments	1,194	1,475	1,683	Average Annual Wage	$21,476	$25,689	$27,959
Average Annual Wage	$31,448	$37,305	$33,255	Government	22,305	28,983	134,763
Transport & Utilities	5,448	14,683	32,946				
Percent of Co. Total	2.7	3.7	5.2				
No. of Establishments	463	539	732				
Average Annual Wage	$29,325	$32,887	$36,550				

Source: Bucks County Planning Commission, Socioeconomic Profile of Bucks County and Region, 1994.

Table 3.2-8
Bucks County Income and Employment 1990-92

Economic Category	1990	1991	1992
Population	543,100	550,000	556,300
Total Personal Income ($1,000s)	12,209,793	12,489,462	13,183,145
Annual Growth Rate (%)	2	6	9.37
Per Capita Personal Income ($)	22,483	22,709	23,699
% of National Average	120	119	118
Wage & Salary Disbursements ($1,000s)	5,363,109	5,369,746	5,625,255
Full & Pt.-Time Wage/Salary Employment	226,769	220,655	219,329
Average Wage per Job ($)	23,650	24,335	25,648
Total Gross Earnings Inflow ($1,000s)	4,654,737	4,711,519	4,978,699
Total Gross Earnings Outflow ($1,000s)	1,911,443	1,916,559	2,001,811
Net Residence Adjustment ($1,000s)	2,743,294	2,794,960	2,976,888
Source: US Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System, 1994			

percent and nine percent, respectively. Although Bucks County is substantially above the national average in per capita income, it falls from 120 percent to 118 percent over the period. It can be seen that full and part-time employment declines from over 226,000 to 219,000 over the period, although higher wages per job manage to increase total disbursements despite the decline in employment. The net earnings to residents in the county increased from $2.7 billion to almost $3 billion over the period.

3.3 Community Facilities and Services

3.3.1 Education

Both public and private schools are located within the one-mi (1.6-km) radius of NAWCAD. Three public school districts are partially located within the study area (Figure 3.3-1, Community Facilities): Centennial, which includes Warminster, Ivyland, and Upper Southampton; Council Rock, which includes Northampton; and Central Bucks, which includes Warwick. However, the portions of the study area in Warwick and Northampton Townships have no schools and, for this reason, are omitted from further analysis. The Centennial School District has four schools in the area, three elementary schools, and one high school. District enrollment at the elementary school level has declined slightly over the period 1990-93, from 3,204 to 3,047, a drop of five percent. At the secondary level, enrollment has been essentially constant over the same period. Figure 3.3-1 shows the study area with the school district lines and the location of the various public and private schools. Public and private school enrollment as of 1994-95 is shown in Table 3.3-1.

Institutions of higher education in Bucks County include Bucks County Community College, Delaware Valley College of Science and Agriculture, and the Delaware Valley College of Textiles and Science. The larger Philadelphia region has 58 colleges and universities.

3.3.2 Health Care

While many of the larger and more specialized hospitals in the region are located in the city of Philadelphia, Lower Bucks County contains several well-regarded local hospitals (Table 3.3-2): the Lower Bucks Hospital; Allegheny University Hospital (formerly Warminster General Hospital); Delaware Valley Medical Center; and Saint Mary's Hospital (formerly Centennial Springs Health Care Center) (Figure 3.3-1). These facilities also provide long-term care (nursing homes) for the study area: Majestic Oaks, with 180 approved beds, is close to Warminster General Hospital. Southampton Estates Medical Facility, with 100 beds, is on Street Road at the southern extreme of the study area (Figure 3.3-1).

3.3.3 Public Safety and Emergency Services

Police

Police services in the study area are provided by the respective township and borough police forces. Those for Ivyland, Southampton, and Warminster have their police station within or close to the one-mi (1.6-km) study area. The Northampton police station is in Richboro, approximately 2.5 mi (four

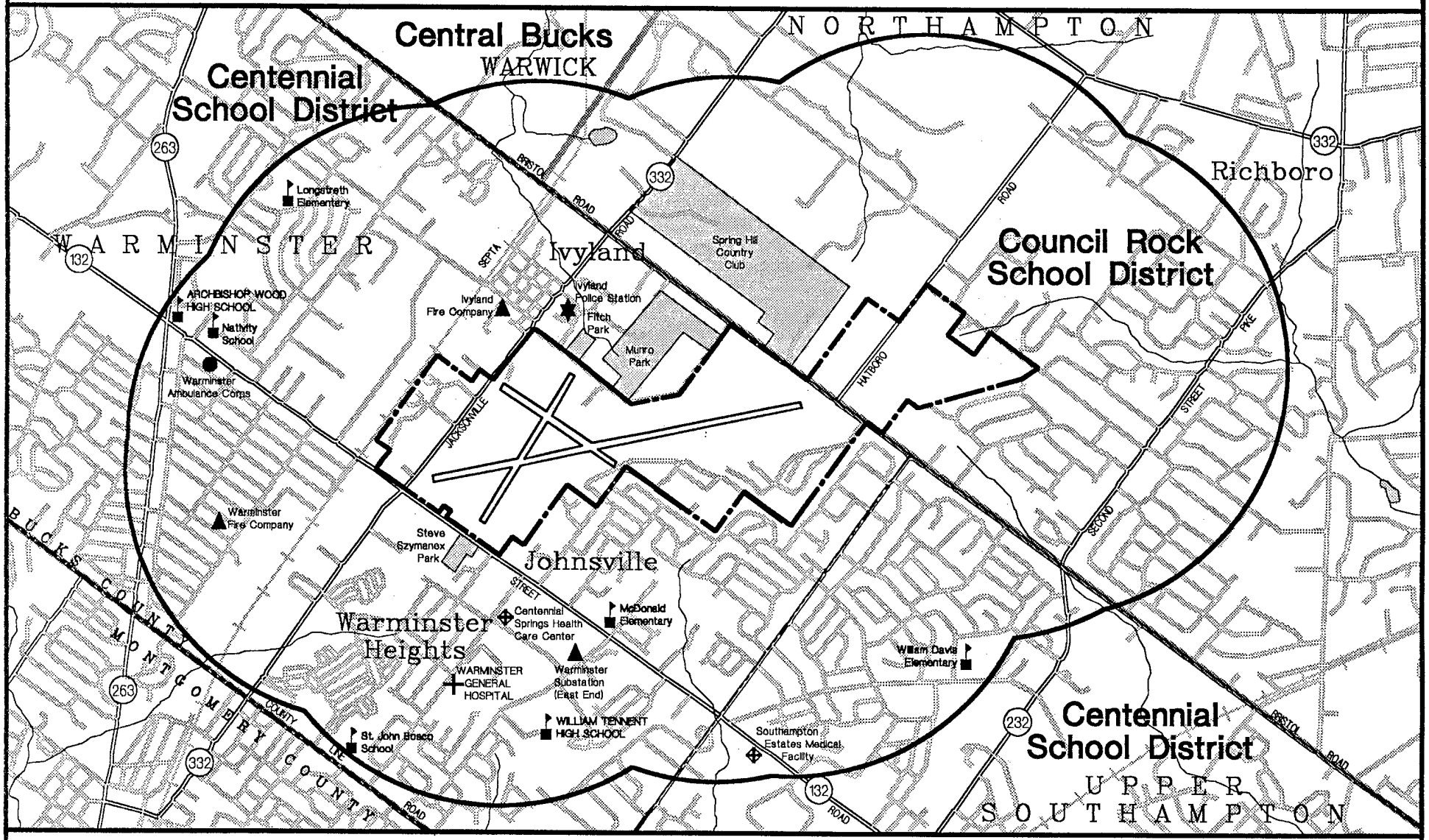
Table 3.3-1
Educational Facilities and Enrollment, 1994-95

Schools	Grades	Enrollment
Public Schools		
William H. Davis	Elementary	365
Longstreth	Elementary	472
Everett A. McDonald	Elementary	750
William Tennant	High School	1,772
Private Schools		
St. John Bosco	K-8	288
Nativity School	K-8	698
Archbishop Wood	High School	1,123
Source: Centennial School District and individual schools.		

Table 3.3.2
Hospitals in Lower Bucks County 1988

Hospital	Licensed Beds	Occupancy Rate
Delaware Valley Medical Center	210	68.7
Lower Bucks Hospital	320	69.6
Saint Mary's Hospital	251	79.3
Allegheny University Hospital	200	66.8
Source: Pennsylvania Department of Health, cited in Bucks County Planning Commission, *Community Facilities: Health Care*, Oct. 1991.		

Community Facilities



One Mile Study Area
NAWCAD
Fire Company
School District Boundary
School
Hospital
Nursing Home
Ambulance
Police Station
Park or Recreation

3000 0 3000
Scale in Feet
1000 0 1000
Scale in Meters

N

Figure 3.3-1

km) east of NAWCAD, and the Warwick police station is approximately 4.5 mi (7.2 km) north of NAWCAD.

Fire

The Bucks County Planning Commission reported five volunteer fire companies and/or substations in close proximity to NAWCAD (*Community Facilities: Emergency Services*, 1990). Four of these are in Warminster and one in Ivyland (Figure 3.3-1):

- Ivyland Fire Company;
- Hartsville Fire Company;
- Warminster Fire Company;
- Warminster Substation (East End); and
- Warminster Substation (West End).

The Bucks County fire marshal's office generally considers the equipment to be in good condition and adequate supply (Bucks County Planning Commission, 1990).

Prior to 1995, NAWCAD had been providing fire protection and other emergency services in accordance with mutual aid agreements with local fire services, where Navy fire crews were typically first-on-the-scene respondents during the daytime.

Ambulance

Ambulance service companies in Bucks County are independently operated, serving defined regions. They may be privately-owned, hospital-based, or aligned with a fire company or other civic organization, but are not municipal services. Ambulance companies are accountable to the Pennsylvania Department of Health, Division of Medical Services. Bucks County maintains a Department of Health Services and a Health Services Council, which provides advice to the regional council.

Warminster and most of Warwick are served by the Warminster Ambulance Corps (Squad 122), an advanced life support (ALS) unit located approximately one mi (1.6 km) northwest of NAWCAD on Street Road. The area in Northampton proximate to NAWCAD is served by Trihampton, Northampton Substation (Squad 115), an ALS unit located in Richboro, approximately two mi (three km) east of NAWCAD. Upper Southampton is served by Trihampton, Southampton Substation (Squad 113), an ALS unit located on Street Road approximately three mi (five km) southeast of NAWCAD. The one-mi (1.6-km) study area around NAWCAD is well within the four-mi (six-km)

radius from the three referenced ALS squads (approximately eight-minute response time that serves as a county standard).

Parks and Recreation

There are no state or county parks in proximity to NAWCAD. The nearest facilities are Tyler State Park, straddling the Northampton and Newtown line, about three mi (five km) east of NAWCAD, and Dark Hollow County Park on the Neshaminy Creek, straddling the Warwick and Buckingham line, about five mi (eight km) north of NAWCAD. Three municipal parks with playgrounds, operated by the Town of Warminster, are directly adjacent to NAWCAD (Figure 3.3-1):

- Steve Szymanek Park, approximately 10.6 acres (4.3 hectares), directly across Street Road at the southwestern edge of NAWCAD;
- Fitch Park, approximately 5.5 acres (2.2 hectares), directly north of NAWCAD; and
- Munro Park, approximately 34 acres (13.8 hectares), directly north of NAWCAD.

A nearby private recreational facility is the Spring Hill Country Club, a golf course of approximately 185 acres (75 hectares) located to the northeast of NAWCAD across Bristol Road in Northampton.

3.4 Transportation

3.4.1 Traffic

Local Street Network

Regional access to NAWCAD is provided by I-276 (the Pennsylvania Turnpike), which runs east-west. Access from Philadelphia is provided by Second Street Pike and Street Road (via Route 1). Local roadway circulation is provided by several arterials that abut office buildings, commercial establishments, residential developments, and NAWCAD itself.

Key study area roadways include:

- Street Road - This is the main roadway in the study area, with a peak hour directional volume of approximately 1,500 vehicles. It is a four-lane arterial roadway with substantial commercial development along its length. Street Road provides access to I-276 at Interchange 28 of the Turnpike. The roadway, joining with Route 1, connects the study area with Philadelphia.

- Jacksonville Road - This roadway is a two-lane connector that provides access to several parking areas for NAWCAD. Peak hour directional volumes adjacent to the site reach 780 vehicles per hour (vph). Jacksonville Road runs through the NAWCAD, separating the research and operations facilities.

- York Road - This four-lane arterial roadway provides access to the study area from the north. Directional hourly volumes reach 1,300 vehicles during peak hours. Dual left turn lanes are provided at Street Road to accommodate base-generated traffic.

- County Line Road - This four-lane arterial roadway forms the boundary between Bucks County and Montgomery County. Peak hour directional volumes reach 1,425 vehicles in the study area.

- Second Street Pike - A four-lane arterial roadway, Second Street Pike provides a link between the study area and northern Philadelphia. Peak hour directional volumes on this roadway reach 800 vph.

Traffic Characteristics

Traffic data were collected at eight locations for this analysis (Figure 3.4-1, Traffic Count Locations). The traffic counts were conducted on April 26th and 27th, 1995 for the am (6:30 to 9:30) and pm (3:30 to 6:30) peak periods. Both turning movement counts and vehicle classifications

were obtained. Turning movement counts establish the existing volumes of traffic moving on the street network. Vehicle classifications identify the types of vehicles (e.g., autos, light trucks, and heavy trucks) using each link in the analysis network. Each of the intersections counted was also inventoried to identify those parameters used to determine the capacity of the intersection and its approaches, as specified by the Transportation Research Board's *Highway Capacity Manual* (HCM), 1994. The HCM is the industry standard for traffic analysis.

Specifically, each traffic signal was inventoried for its cycle length, phasing (green time allocated for each movement), and progression characteristics (to determine the traffic arrival type). Geometric conditions of the intersection, such as street widths, lane widths, and crosswalk widths, were recorded. General operating conditions, such as posted parking regulations, number of parking maneuvers by vehicles during peak periods, impacts on traffic made by local buses making stops, and pedestrian interference with traffic movements, were also observed.

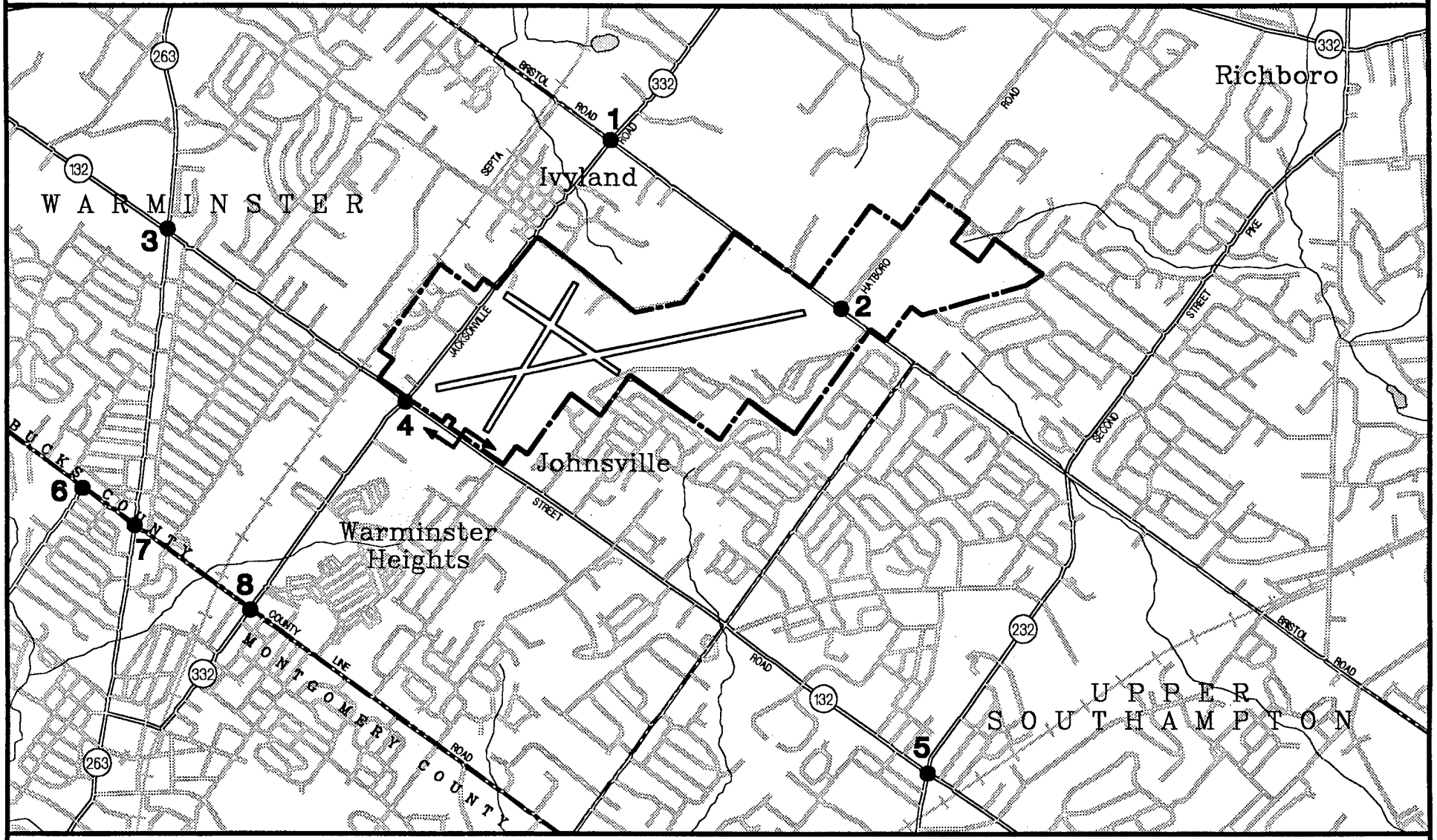
A review of the count data indicates typical am and pm commuter peak periods. The peak hours generally occur between 7:15 to 8:15 am and 4:30 to 5:30 pm. Overall volumes within the study area are moderate to heavy. Although overall progression on the arterial roadways is acceptable, localized delays are experienced at most signalized intersections. Capacity analyses were performed for each intersection inventoried.

Capacity Analysis

The 1994 HCM provides a methodology to determine the capacity and level of service (LOS) of signalized and unsignalized intersections for each approach, as well as the intersection as a whole. The capacity of an intersection is defined as the maximum rate of flow that may pass through the intersection under prevailing traffic and roadway conditions. The quality of traffic flow through an intersection is described by the intersection's LOS. Level of service for signalized intersections is defined by the "average stopped delay" time per vehicle for various movements within the intersection (see Table 3.4-1 for the LOS criteria expressed in terms of average stopped delay). Level of service for a stop-controlled intersection is also based on an average delay per vehicle, which is computed from available gaps in the major roadway traffic stream (see Table 3.4-2).

Capacity analyses were performed at all eight count locations. Figures 3.4-2 (Intersection Diagrams: Locations 1-4) and 3.4-3 (Intersection Diagrams: Locations 5-8) provide a physical inventory of each intersection considered. Generally, the intersections operate at or near capacity (LOS E) with lengthy queues and delays experienced by vehicles. The results of the capacity analyses for existing conditions at the signalized intersections are provided in Table 3.4-3. The table provides intersection approach volumes, volume/capacity ratios, stopped delay, and lane group LOS. Table 3.4-4 provides the results of the analysis at the stop-controlled intersection of Hatboro and Bristol Roads (Location 2). Following are brief descriptions of each intersection and its existing operational characteristics.

Traffic Count Locations



● Traffic Count Location

7 Day Automatic Traffic Recorder

NAWCAD Property Boundary

3000 0 3000
Scale in Feet

1000 0 1000
Scale in Meters

N

Figure 3.4-1

Intersection Diagrams: Locations 1-4

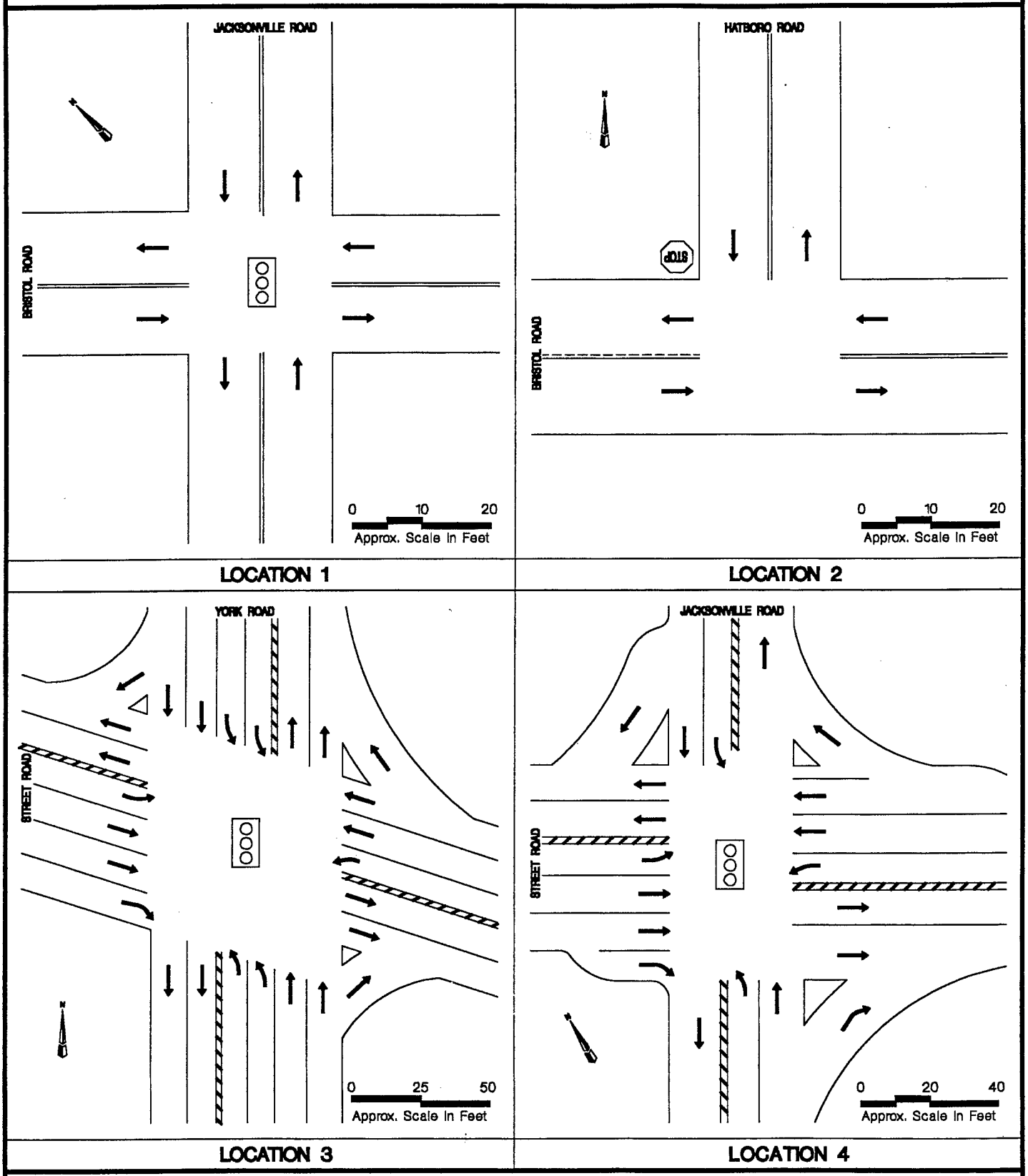
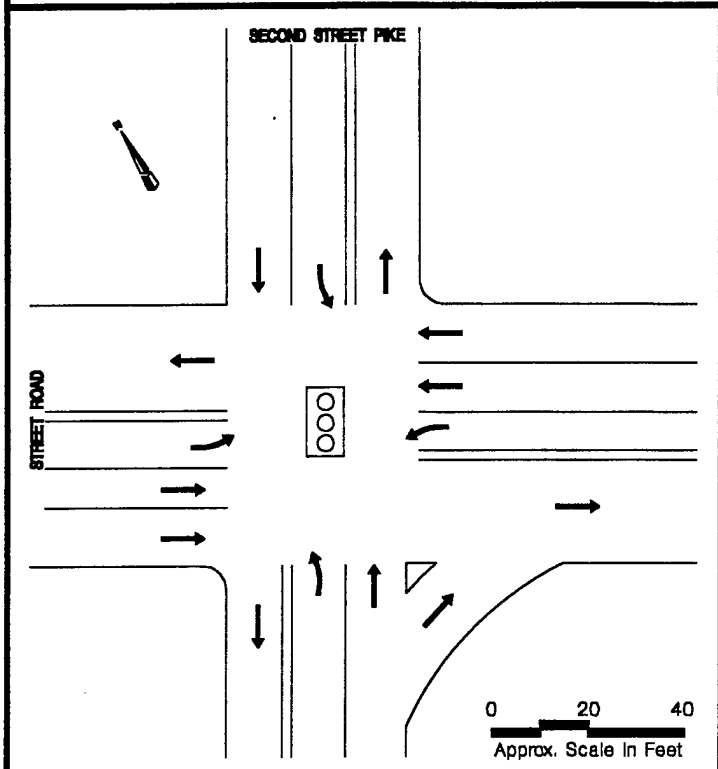
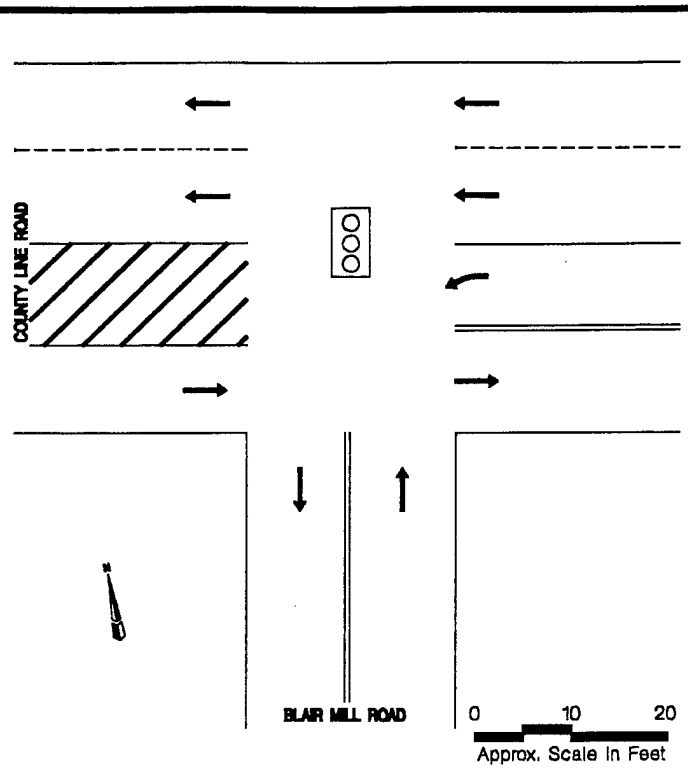


Figure 3.4-2

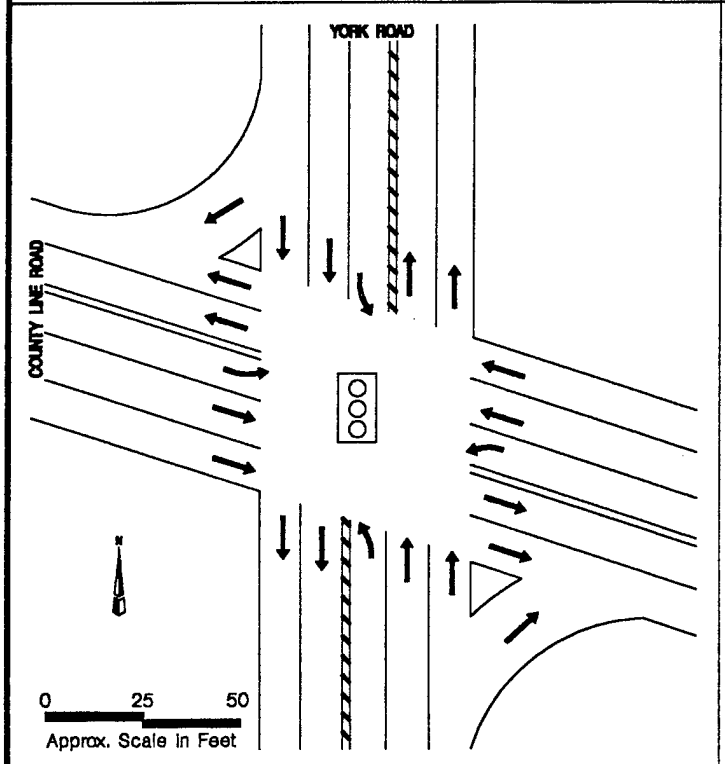
Intersection Diagrams: Locations 5-8



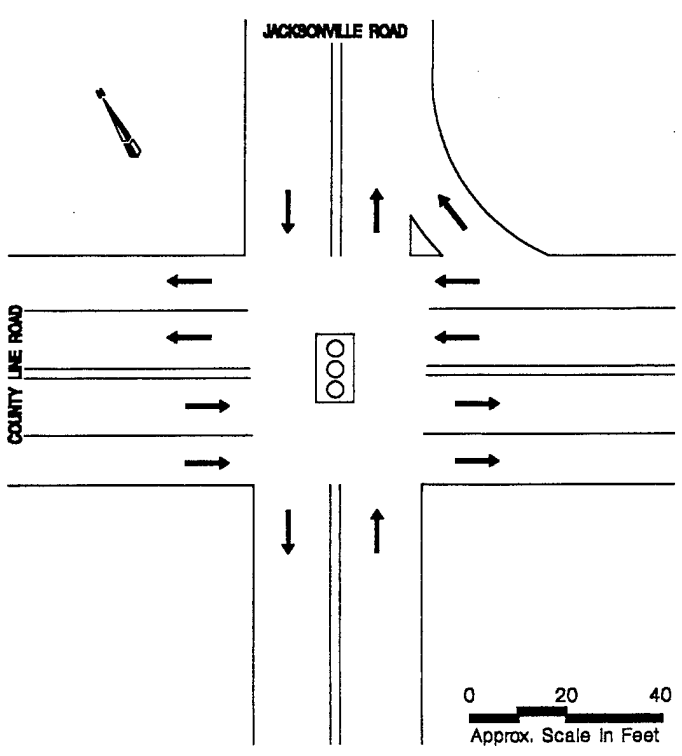
LOCATION 5



LOCATION 6



LOCATION 7



LOCATION 8

Figure 3.4-3

Table 3.4-1

Traffic LOS Definitions for Signalized Intersections

LOS	Description
A	Level A describes operations with very low delay, i.e., less than 5.0 seconds per vehicle. This occurs when progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.
B	Level B describes operations with delay in the range of 5.1 to 15.0 seconds per vehicle. This generally occurs with good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.
C	Level C describes operations with delay in the range of 15.1 to 25.0 seconds per vehicle. These higher delays may result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear in this level, although many still pass through the intersection without stopping.
D	Level D describes operations with delay in the range of 25.1 to 40.0 seconds per vehicle. At Level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high vehicle/cycle ratios. Many vehicles stop and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.
E	Level E describes operations with delay in the range of 40.1 to 60.0 seconds per vehicle. This is considered to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent occurrences.
F	Level F describes operations with delay in excess of 60.0 seconds per vehicle. This is considered to be unacceptable to most drivers. This condition often occurs with over saturation, i.e., when arrival flow rates exceed the capacity of the intersection. It may also occur at high v/c ratios below 1.00, with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.
Source: Transportation Research Board Special Report, 209, Highway Capacity Manual, 1994.	

Table 3.4-2

LOS Criteria for Stop-Controlled Intersections

LOS	Average Total Delay (SEC/VEH)
A	≤ 5
B	> 5 and ≤ 10
C	> 10 and ≤ 20
D	> 20 and ≤ 30
E	> 30 and ≤ 45
F	> 45

Table 3.4-3

Summary of LOS Analysis - Existing Conditions

Intersection	AM Peak Hour				PM Peak Hour			
	Appr. Volume	V/C Ratio	Stopped Delay	LOS	Appr. Volume	V/C Ratio	Stopped Delay	LOS
Bristol Road and Jacksonville Road (Location 1)								
EB	660	0.953	27.3	D	6	0.000	20.0	C
WB	553	2.102	*	F	599	1.656	*	F
NB	441	1.286	*	F	481	1.403	*	F
SB	493	1.135	97.1	F	520	1.210	*	F
Overall:			*	F			*	F
Street Road and York Road (Location 3)								
EB L	226	0.946	67.5	F	642	2.687	*	F
EB T	742	0.817	33.2	D	763	0.818	32.7	D
EB R	39	0.096	23.0	C	118	0.283	24.0	C
WB L	185	0.776	46.0	E	214	0.897	58.7	E
WB T	486	0.536	27.0	D	785	0.842	33.8	D
WB R	291	0.569	28.2	D	287	0.545	27.3	D
NB L	226	0.772	47.3	E	263	0.673	40.4	E
NB T	892	0.863	32.8	D	773	0.852	34.8	D
NB R	190	0.324	22.4	C	30	0.069	22.8	C
SB L	152	0.519	40.1	E	291	0.745	42.6	E
SB TR	676	0.667	26.6	D	612	0.673	29.2	D
Overall:			34.0	D			*	F
Street Road and Jacksonville Road (Location 4)								
EB L	162	0.646	38.0	D	112	0.489	35.7	D
EB T	839	0.931	40.8	E	971	1.077	76.9	F
EB R	323	0.674	30.6	D	150	0.307	24.2	C
WB L	268	1.081	107.0	F	264	1.170	*	F
WB T	926	1.027	59.7	E	765	0.848	34.2	D
WB R	288	0.565	27.8	D	298	0.592	28.4	D
NB L	191	1.046	103.3	F	275	1.342	*	F
NB T	321	0.788	36.8	D	372	0.912	48.1	E
NB R	47	0.129	24.9	C	143	0.414	27.5	D
SB L	140	0.799	52.1	E	287	1.453	*	F
SB T	405	0.986	62.0	F	281	0.684	32.4	D

Table 3.4-3

Summary of LOS Analysis - Existing Conditions

Intersection	AM Peak Hour				PM Peak Hour			
	Appr. Volume	V/C Ratio	Stopped Delay	LOS	Appr. Volume	V/C Ratio	Stopped Delay	LOS
SB R	221	0.501	28.7	D	150	0.406	27.4	D
Overall:			53.0	E			*	F
Street Road and Second Street Pike (Location 5)								
EB L	66	0.408	15.2	C	121	0.636	20.5	C
EB TR	836	0.793	24.8	C	955	0.928	33.2	D
WB L	81	0.483	16.5	C	91	0.467	16.7	C
WB TR	827	0.753	23.7	C	1003	0.952	36.2	D
NB L	121	0.674	19.9	C	202	0.827	30.5	D
NB TR	389	0.704	22.7	C	492	0.994	50.9	E
SB L	185	0.859	34.0	D	160	0.647	19.6	C
SB TR	492	0.761	24.4	C	491	0.831	29.4	D
Overall:			24.0	C			34.8	D
County Line Road and Blair Mill Road (Location 6)								
EB TR	838	0.822	24.1	C	1011	0.995	41.8	E
WB L	425	0.863	27.1	D	365	0.930	39.1	D
WB T	707	0.359	5.4	B	905	0.512	8.5	B
NB	350	0.865	35.8	D	588	1.056	70.7	F
Overall:			20.4	C			35.4	D
County Line Road and York Road (Location 7)								
EB L	62	0.000	22.0	C	1	0.000	23.0	C
EB TR	834	0.948	37.9	D	908	0.973	39.6	D
WB L	278	0.967	58.0	E	398	1.328	*	F
WB TR	863	1.041	58.8	E	1028	1.119	89.2	F
NB L	165	0.809	39.8	D	120	0.596	31.0	D
NB T	470	0.683	24.9	C	450	0.626	25.1	D
NB R	322	0.909	44.7	E	255	0.608	26.1	D
SB L	51	0.254	25.5	D	92	0.463	28.5	D
SB T	386	0.586	23.6	C	696	1.013	54.5	E
SB R	65	0.210	20.6	C	66	0.177	21.6	C
Overall:			40.6	E			*	F
County Line Road and Jacksonville Road (Location 8)								

Table 3.4-3

Summary of LOS Analysis - Existing Conditions

Intersection	AM Peak Hour				PM Peak Hour			
	Appr. Volume	V/C Ratio	Stopped Delay	LOS	Appr. Volume	V/C Ratio	Stopped Delay	LOS
EB	988	1.054	52.4	E	926	1.080	63.6	F
WB LT	789	0.601	11.0	B	953	0.702	13.7	B
WB R	326	0.295	8.5	B	196	0.200	9.1	B
NB	365	0.762	26.3	D	380	0.884	33.2	D
SB	647	0.742	19.9	C	934	0.933	28.8	D
Overall:			27.8	D			34.1	D

Notes: NB-Northbound; SB-Southbound; EB-Eastbound; WB-Westbound
L-Left turn; R-Right turn; T-Through
* Indicates an approach that is expected to operate at a volume/capacity ratio greater than 1:2. In such cases, the stopped delay is not calculated, but LOS is F.

Table 3.4-4

Summary of LOS Analysis - Existing Condition
(Unsignalized)

Lane Group	AM Peak Hour			PM Peak Hour		
	Appr. Volume	Avg. Total Delay	LOS	Appr. Volume	Avg. Total Delay	LOS
Hatboro Road and Bristol Road (Location 2)						
Hatboro Road Left	115	64.2	F	112	231.3	F
Hatboro Road Right	151	6.6	B	68	5.4	B
Bristol Road Left	91	4.7	A	192	5.5	B
Overall		21.1	D		40.2	E

- Bristol Road and Jacksonville Road (Location 1) - This location is controlled by a three-phase traffic signal. The eastbound approach is afforded a leading green indication. Although the existing volumes are moderate (hourly approach volumes range from 441 to 660 vph), the approaches operate at poor LOS, as only one lane is provided for each approach.

- Hatboro Road and Bristol Road (Location 2) - The location is a T-intersection with stop-control on Hatboro Road. Flow along Bristol Road is uninterrupted and operations are acceptable. Traffic turning onto Bristol Road from Hatboro Road experiences delays, as vehicles must await suitable gaps. The delay is greatest for left-turning vehicles, which must clear suitable gaps in both eastbound and westbound Bristol Road traffic. Level of service for the left-turn movement is F during the am and pm peaks.

- Street Road and York Road (Location 3) - The intersection of these four-lane arterials roadways is controlled by a four-phase traffic signal. Protected green arrows are provided for left turns on each approach. Heavy approach volumes (up to 1,300 vph) result in operation at or near capacity during peak periods, with several individual lane groups at LOS F.

- Street Road and Jacksonville Road (Location 4) - This intersection is controlled by a four-phase traffic signal with a protected left turn phase for each approach. This intersection is immediately adjacent to the NAWCAD, and most base-generated traffic passes through this intersection. Volumes are high, with hourly volumes reaching 1,480 vph. Operation during both peaks is poor, with overall LOS E and F for the am and pm peaks respectively. Most lane groups operate at LOS E or worse.

- Street Road and Second Street Pike (Location 5) - This intersection is controlled by a four-phase traffic signal with a protected left turn phase for each approach. Traffic volumes are high (approach volumes reach 1,100 vph), and the intersection reaches constrained operation during both peaks. Overall operations are LOS C/D and LOS D during the am and pm peaks respectively.

- County Line Road and Blair Mill Road (location 6) - This T-intersection is controlled by a three-phase signal with a protected phase provided for the eastbound approach. Operation during the am peak is acceptable (overall LOS C). Constrained operation is experienced during the pm peak, with LOS F for the northbound approach and overall LOS D.

- County Line Road and York Road (Location 7) - This location is controlled by a four-phase signal with a protected left turn phase for each approach. Volumes on all

approaches are moderate to high, with hourly volumes up to 1,425 vph. Overall, the intersection operates at LOS E and F during the am and pm peaks, respectively.

- County Line and Jacksonville Road (Location 8) - This location is controlled by a three-phase signal with a leading protected phase for the southbound roadway. Approach volumes of up to 1,150 vph enter the intersection during peak hours. The intersection experiences constrained operation (LOS D) during both am and pm peaks. The eastbound approach operates poorly during both am and pm peaks (LOS E and F, respectively).

3.4.2 Public Transportation

The project area is served by Southeastern Pennsylvania Transportation Authority (SEPTA) public transportation. Both bus and rail service are available. The bus and rail lines in the study area are presented in Figure 3.4-4 (Public Transportation).

The No. 22 bus line runs adjacent to NAWCAD with a stop on Jacksonville Road outside the main gate to the base. The No. 22 bus runs south from Warminster into central Philadelphia with several transfers available. During the am peak period, six scheduled arrivals to Warminster occur at 6:27, 7:00, 7:16, 7:36, 8:19, and 8:59 am. During the pm peak period, six scheduled departures from Warminster occur at 3:22, 3:44, 4:07, 4:39, 5:22, and 5:52 pm.

The project area is also served by the R2 rail line, which runs between Warminster and Center City Philadelphia. The Warminster Station is approximately 0.5 mi (0.80 km) from the base. During the am peak period, three scheduled arrivals in Warminster occur at 5:55, 7:38, and 8:19 am. During the pm peak period, three scheduled departures from Warminster occur at 3:38, 4:36, and 5:40 pm.

Public Transportation

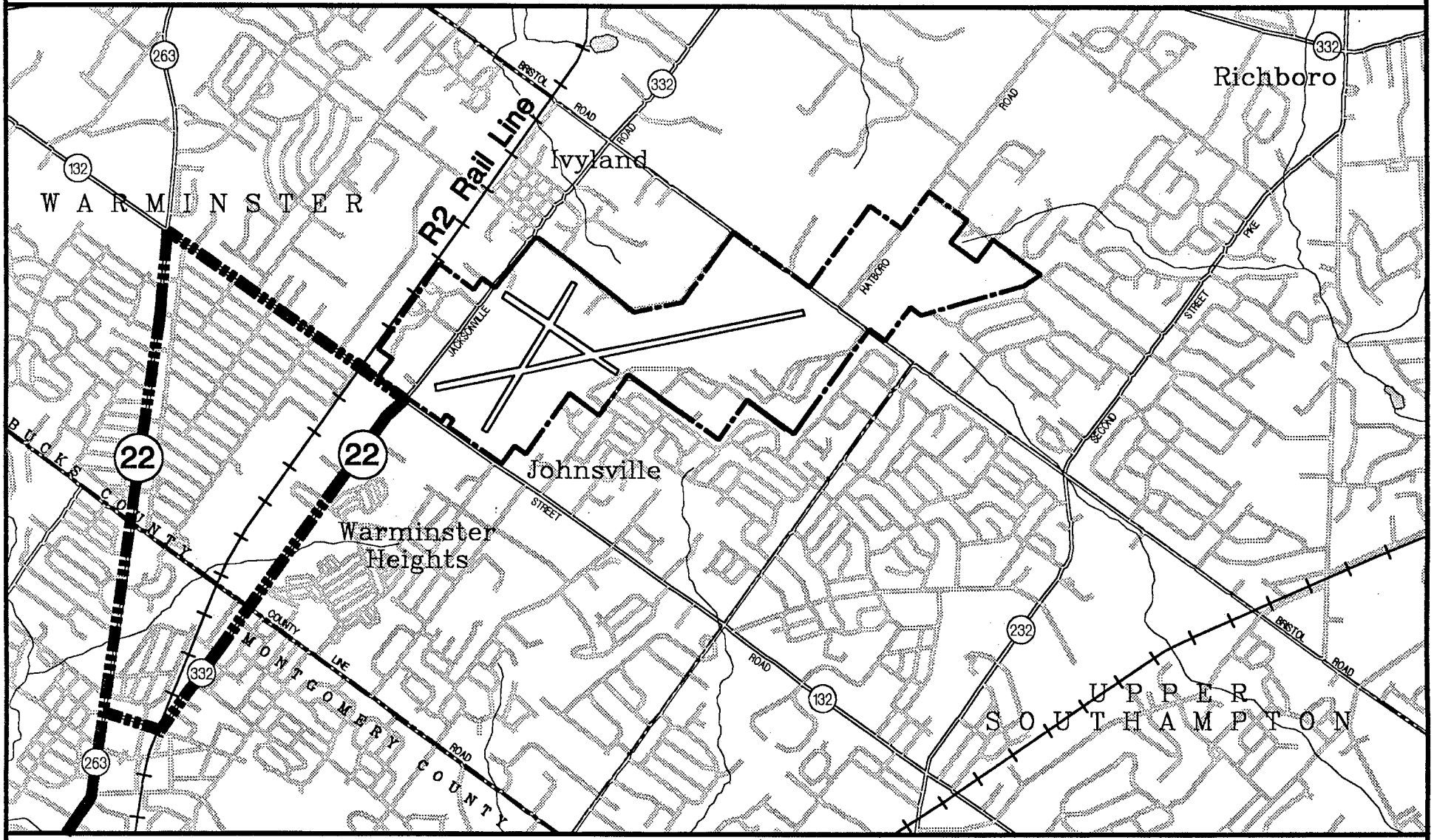


Figure 3.4-4

3.5 Air Quality

3.5.1 National Ambient Air Quality Standards

The US Environmental Protection Agency (USEPA), under the requirements of the 1970 Clean Air Act (CAA) as amended in 1977 and 1990, established primary and secondary standards for six criteria pollutants, known as the National Ambient Air Quality Standards (NAAQS) (Table 3.5-1). The primary standards are intended to protect the public health. The secondary standards are intended to protect the nation's welfare and account for air pollutant effects on soil, water, visibility, materials, vegetation, and other aspects of the general welfare. The NAAQS were established for the following six pollutants:

- Carbon monoxide (CO) is a colorless, odorless gas. The major source of CO in an urban area is the incomplete combustion of fuels used to power vehicles, heat buildings, and process raw materials, and the residence from burning refuse. Carbon monoxide is a site-specific pollutant; major concentrations are found near the source, such as at heavily congested intersections. Carbon monoxide is the most commonly occurring air pollutant. The health effect associated with CO-contaminated air is reduced transport of oxygen by the blood stream, a consequence of CO displacing oxygen in hemoglobin. Exposures to very high levels of CO are lethal, and exposures to high levels for a short duration can cause headaches, drowsiness, or loss of equilibrium.

- Sulfur dioxide (SO_2) is emitted into the atmosphere from the combustion of sulfur-bearing fuels for space heating and motor vehicles. The use of low sulfur fuels for space heating has reduced the amount of sulfur dioxide emitted from these sources. The combustion of gasoline and diesel fuels in motor vehicles accounts for a very small percent of the total sulfur dioxides emitted. Respiratory illness and damage to the respiratory tract are the health effects associated with inhalation of sulfur dioxide emissions.

- Nitrogen dioxide (NO_2) is a yellowish-brown, highly reactive gas, typically present in an urban environment. Major sources of nitric oxide and nitrogen oxide emissions are fuel combustion in boilers associated with electric utilities and industrial facilities. Nitric oxides oxidize in the atmosphere to form nitrogen dioxide. Nitrogen oxides cause irritation to the lungs, bronchitis and pneumonia, and lowered resistance to respiratory infections.

- Ozone (O_3) is a photochemical oxidant and a major constituent of smog. Volatile organic compounds (VOCs) and nitrogen oxides (NO_x) are precursor pollutants to the formation of ozone.

Table 3.5-1

Federal and Pennsylvania Ambient Air Quality Standards

Pollutant	Averaging Period	Pennsylvania Standards	Federal Standards	
			Primary	Secondary
Carbon Monoxide	8-hour 1-hour	9 ppm 35 ppm	10 mg/m^3 40 mg/m^3	10 mg/m^3 40 mg/m^3
Ozone	1-hour	235 ug/m^3	235 ug/m^3	235 ug/m^3
Nitrogen Dioxide	1-year	100 ug/m^3	100 ug/m^3	100 ug/m^3
Lead	3-month	1.5 ug/m^3	1.5 ug/m^3	1.5 ug/m^3
PM10	1-year 24-hour	50 ug/m^3 150 ug/m^3	50 ug/m^3 150 ug/m^3	50 ug/m^3 150 ug/m^3
Sulfur Dioxide	1-year 24-hour 3-hour	80 ug/m^3 365 ug/m^3 1300 ug/m^3	80 ug/m^3 365 ug/m^3	 1300 ug/m^3

VOCs and NO_x react in the presence of sunlight to form a photochemical oxidant. This reaction is time-dependent and usually takes place far downwind from the site where the contaminants were originally emitted. Thus, VOCs and NO_x are reactive contaminants, whose impact generally occurs well beyond the areas immediate to the source. High concentrations of ozone are a major health and environmental concern. For example, ozone is a principal cause of lung and eye irritation in an urban environment.

- Particulate matter in an urban environment typically occurs as a result of incomplete fuel combustion. Particulate matter includes dust, dirt, soot, smoke, and liquid droplets directly emitted into the air by sources such as factories, power plants, cars, construction activity, and fires. Diesel fuel compared to gasoline contributes more particulates to the atmosphere. An inhalable particulate is defined as a particulate that is less than ten micron (PM10) in diameter. The major health effect caused by the inhalation of PM10 is damage to the respiratory organs.

- Lead (Pb) is a bluish-gray metal, usually found in small quantities in the earth's crust. The most significant contributors of lead emissions to the atmosphere are gasoline additives, iron and steel production, and alkyl lead manufacturing. Other sources of lead include combustion of solid waste, windblown dust from weathering of lead-based paint, and cigarette smoke. The use of lead-free gasoline has considerably reduced the lead levels in the urban environment. Exposure to lead is dangerous for the fetus and results in pre-term birth. Other health effects associated with lead exposure are decreased intelligence quotient (IQ) for infants and small children, increased blood pressure in middle-aged men, and brain and kidney damage in adults and children.

The project area is located in Bucks County, Pennsylvania, which is presently designated by USEPA as a severe nonattainment area (i.e., not meeting the NAAQS) for ozone. The county is in attainment for the other criteria pollutants.

3.5.2 Mobile Sources

An analysis of CO concentrations was performed for intersections located near the project site. Although vehicles primarily emit CO, VOCs, and NO_x, only CO emissions were analyzed because CO is a site-specific pollutant with major concentrations generally found immediately adjacent to roadways, and specifically at heavily congested intersections. VOCs and NO_x are not site-specific pollutants and are considered only on a regional basis. Lead (Pb) emissions from automobiles are insignificant as a result of the decreased use of leaded gasoline. Particulate matter and sulfur dioxide

(SO_2) emissions from vehicles are also insignificant when compared to emissions from non-mobile sources.

The CO air quality analysis is based on procedures outlined in the following documents:

- *Guideline for Modeling Carbon Monoxide from Roadway Intersections* (USEPA, November 1992); and
- *Mobile5a User's Guide* (USEPA, March 29, 1993).

Mathematical Models Used

The concentrations of CO due to local roadway traffic are determined through two steps: 1) vehicle exhaust emission factors are calculated using the USEPA Mobile5a computer model; and 2) these emission factors are subsequently used as input for the USEPA CAL3QHC dispersion model to calculate CO concentrations. The models used are described as follows:

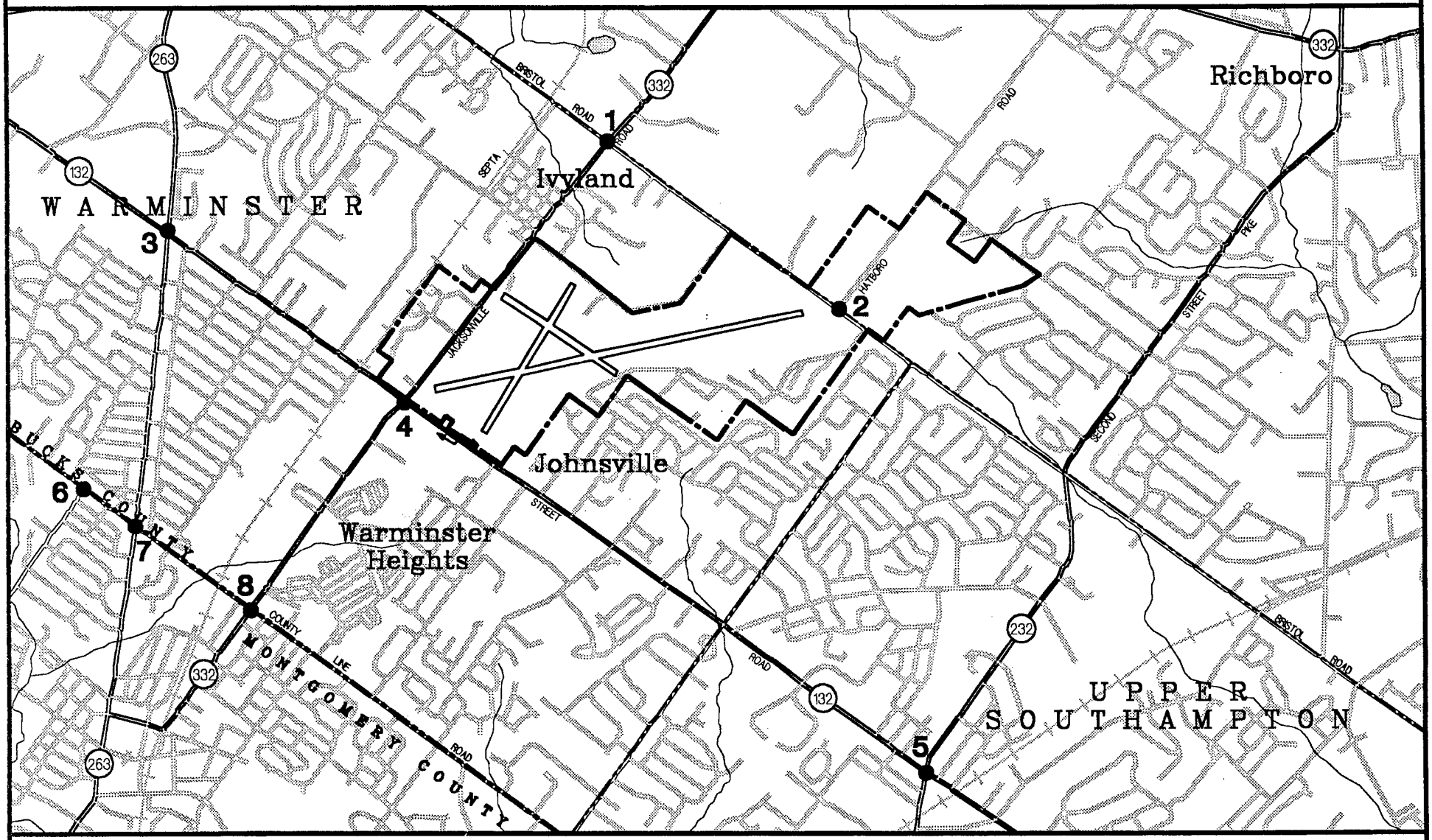
- Mobile5a generates vehicular emission factors based on locality-specific vehicle fleet characteristics including vehicle age, operating mode of vehicles (hot/cold starts), and percentage of oxygenated fuel used. Additionally, Mobile5a can incorporate adopted emission control strategies such as anti-tampering programs and inspection and maintenance (I/M) programs including stringency, compliance rate, waiver rate, and vehicle years covered. Appropriate, area-specific input parameters provided by PA Department of Environmental Protection were used.
- CAL3QHC (Version 2) predicts the one-hour level of CO or other pollutant concentrations from motor vehicles traveling near roadway intersections. The model incorporates input such as roadway geometry, traffic volumes, vehicular emission rates, and meteorological conditions (worst-case meteorological assumptions were used in the analysis).

A conservative USEPA-provided default persistence factor of 0.7 was used to convert the one-hour CO concentrations calculated by CAL3QHC to eight-hour concentrations. In other words, the model-calculated one-hour CO concentrations were multiplied by 0.7 to derive eight-hour concentrations. The persistence factor represents a combination of the variability in both traffic and meteorological conditions.

CO Impact Assessment

The worst-case CO impacts were estimated for receptor locations at eight intersections (Figure 3.5-1, Air Modeling Receptor Locations) that were selected for modeling based upon the detailed traffic analysis described in Subchapter 3.4. Based on the Highway Capacity Manual (HCM) analysis

Air Modeling Receptor Locations



● Air Modeling Receptor Location

—·— NAWCAD Property Boundary

3000 0 3000
Scale in Feet

1000 0 1000
Scale in Meters

N

Figure 3.5-1

performed for the intersections in the project neighborhood, eight signalized intersections that are expected to experience the maximum changes in future traffic patterns due to the project, or that would operate with the overall worst-case traffic conditions, are selected for CO impact analysis. The receptors were placed at reasonable locations, such as sidewalks along roadway edges.

The CO levels due to traffic on local streets were calculated using the computer models described above. However, total ambient CO concentrations near roadways consist of two components: local source contributions (i.e., vehicular emissions near roadways) and the background contribution from other sources, such as stationary sources, in the project area. Thus, a background concentration was determined and added to the modeled concentrations for comparison to the NAAQS. Since no recorded background CO data are available at these modeled intersections (the CO data provided in Table 3.5-2 include levels from both local and other sources), a one-hour CO background level of five ppm and an eight-hour level of 3.3 ppm were used. These values are the background CO levels recommended for CO impact analysis at intersections (PA Department of Environmental Protection, August 24, 1995).

The results of the CO analysis are presented in Table 3.5-2. The concentrations shown are for the pm peak period, which were higher than the am period, except Jacksonville Road/County Line Road where the am was higher. Based on this analysis, no current violations of the one-hour CO standard were found. Exceedances of the eight-hour CO standard were found at the intersections of York Road/Street Road, Jacksonville Road/Street Road, and York Road/County Line Road. However, these exceedances were predicted based on a series of conservative modeling assumptions.

3.5.3 Stationary Sources

Comprehensive air pollutant emission studies of stationary sources were conducted at NAWCAD (Haliburton NUS, December 1994) to quantify actual and potential emissions of all criteria and hazardous air pollutants (HAPS) emitted at NAWCAD during the base year 1992. This information was intended to determine the compliance status of NAWCAD with respect to existing air regulations of the Pennsylvania Department of Environmental Protection, as well as to quantify the potential impact of regulations to be promulgated by the USEPA in response to mandates contained in the 1990 Clean Air Act Amendments (CAAA).

Since most emission sources are used on an intermittent basis, there is wide disparity between actual and potential emissions. Potential emissions are generally based on the use of equipment for an entire year (24 hours per day for 365 days, or 8,760 hours per year), or for some lesser amount of time if enforceable permit restrictions are in place. Since air pollution regulations are generally based on potential emissions, both values were calculated in the survey.

Table 3.5-2

Existing Carbon Monoxide Levels

Receptor	One Hour (ppm)	Eight Hour (ppm)
Jacksonville Road/Bristol Road	9.4	6.4
Hatboro Road/Bristol Road	8.3	5.6
York Road/Street Road	16.5	*11.4
Jacksonville Road/Street Road	14.5	*10.0
Second Street Pike/Street Road	12.1	8.3
Blair Mill Road/County Line Road	12.6	8.6
Old York Road/County Line Road	14.1	*9.7
Jacksonville Road/County Line Road	12.0	8.2

Notes: 1. Levels include 1995 background concentrations of 5.0 ppm (1-hour) and 3.3 ppm (8-hour).
2. Pennsylvania standard is 35 ppm for 1-hour and 9 ppm for 8-hour averaging periods. Federal standard is 40 ppm for 1-hour and 10 ppm for 8-hour averaging periods.
3. * = standards exceedance

The NAWCAD emission inventory revealed a total of 116 discrete point sources and fugitive (i.e., not discharged to the atmosphere in a confined flow stream [dust or particulate matter]) sources of air pollution. Table 3.5-3 provides actual emission rates for the principal pollutant categories. The sources include:

- Boilers, furnaces, and fireplaces;
- Above- and below-ground storage tanks;
- Generators and fire pumps;
- Paint spray booths;
- Abrasive blasting machine;
- Electroplating tanks;
- Vented salt spray tanks;
- Degreasers;
- Woodworking equipment connected to a cyclone;
- Welding equipment used in conjunction with a hood;
- Incinerator and an air stripper;
- The auto repair shop;
- The ejection seat tower;
- The Fire Protection Group corrugated testing shed and burn pit;
- The wastewater treatment plant; and
- The application of pesticides and herbicides.

Actual emissions of VOCs at NAWCAD were estimated to be 15 tons per year (tpy) (13 metric tpy), while actual emissions of NO_x were estimated to be 14 tpy (13 metric tpy). The emission potential of these pollutants, based on year-round operation, are 101 and 451 tpy (92 and 409 metric tpy), respectively. Given the magnitude of these potential emissions, the existing NAWCAD would be considered a major source under Title I of the CAAA.

In addition to criteria pollutants, NAWCAD sources emit 46 HAPs as defined in Title III. These compounds are released through the use of solvent cleaning compounds, welding operations, the combustion of fuel oil and the use of other miscellaneous compounds throughout the facility. The HAPs emitted during the base year 1992 are listed in Table 3.5-4.

Actual total HAP emissions from all sources at the NAWCAD in 1992 were estimated at two tpy (1.8 metric tpy), while potential HAP emissions are estimated at 15 tpy (14 metric tpy). These figures indicate that NAWCAD would not be classified as a major source of HAPs under Title III of the CAAA.

Table 3.5-3

NAWCAD Emissions Summary

Pollutant	Actual Emission (tpy)		Potential Emission (tpy)	
	TPY	MTPY	TPY	MTPY
CFCs	1.38	1.25	not available	not available
HAPs	2.04	1.86	14.66	13.30
CO	7.76	7.04	665.68	603.90
NO_x	13.99	12.69	451.11	409.25
PM10	2.26	2.05	100.56	91.23
SO	5.23	4.74	162.27	147.21
VOC	15.03	13.64	100.50	91.17
Lead	0.03	0.03	0.03	0.03
Source: Haliburton NUS, December 1994				

Table 3.5-4

NAWCAD HAP Emissions

NAWCAD HAP Emissions		
Acetaldehyde Acrolein Antimony Arsenic Benzene Beryllium Biphenyl Bis Phthalate 1,3-Butadiene Cadmium Chlorobenzene Chromium Cumene Dibenzofurans 2,4-Dinitrotoluene 1,4-Diozane	Ethyl Benzene Ethylene Glycol Formaldehyde Glycol Ethers Hexanen Hydrochloric Acid Hydrofluoric Acid Hydroquinone Lead Manganese Mercury Methanol Methyl Ethyl Ketone Methylene Chloride Methyl Naphthalene	Nickel 4-Nitrophenol Phenol Polycyclic Organic Matter Propionaldehyde Selenium Styrano Tetrachloroethylene Toluene 1,1,1-Trichloroethane 2,2,4-Trimethylpentane Xylenes m-Xylenes o-Xylenes p-Xylenes
Source: Haliburton NUS, December 1994		

3.5.4 Clean Air Act Conformity

In Section 176(c) of the CAAA, the term "conformity" is defined as "conformity to the State Implementation Program's (SIP) purpose of eliminating or reducing the severity and number of violations of the NAAQS and achieving expeditious attainment of such standards." Conformity further requires that proposed activities will not:

(1) Cause or contribute to any new violations of any standards;
(2) Increase the frequency or severity of any existing violation of any standards; or
(3) Delay timely attainment of any standard or any required interim emission reductions or other milestones in any area.

The USEPA final rule on general conformity applies to federal actions in areas designated nonattainment for any of the criteria pollutants under the CAA (40 CFR Part 51 Subpart W). The rule provides specific de minimis emission levels by pollutant to determine the applicability of conformity requirements for a proposed project. For a severe ozone nonattainment area, such as the area in which NAWCAD is located, 25 tpy (22.7 metric tpy) of VOC or NO_x is the de minimis criterion.

However, the final rule also defines a series of exemptions under 40 CFR 93.153 (Applicability). In particular, the general conformity rules are not applicable to the proposed Reuse Plan under Exemptions XIV and XIX, which respectively read:

> "Transfers of ownership, interests, and titles in land, facilities, and real and personal properties, regardless of the form and method of the transfer."

> "Actions (or portions thereof) associated with transfers of land, facilities, title, and real properties through an enforceable contract or lease agreement where the delivery of the deed is required to occur promptly after a specific, reasonable condition is met, such as promptly after the land is certified as meeting the requirements of CERCLA, and where the federal agency does not retain continuing authority to control emissions associated with the lands, facilities, title, or real properties."

3.6 Noise

3.6.1 Noise Fundamentals and Methodology

Noise pollution in an urban environment comes from numerous sources. Some noise pollution is caused by activities essential to the health, safety, and welfare of the community's inhabitants, such as emergency vehicle sirens, garbage collection operations, and construction and maintenance equipment. Other sources of noise, such as traffic, stem from the movement of people and goods, activities that are essential to the viability of a community as a place to live and do business. Although these and other noise-producing activities are necessary to modern life, the noise they produce is undesirable and detracts from the quality of the living environment.

Ways to Measure Noise

A number of factors affect sound as it is perceived by the human ear. These include the actual level of the sound (or noise), the frequencies involved, the period of exposure to the noise, and changes or fluctuations in the noise levels during exposure. Levels of noise are measured in units called decibels. Since the human ear cannot perceive all pitches or frequencies equally well, these measures are adjusted or weighted to compensate for the human lack of sensitivity to low-pitched and high- pitched sounds. This adjusted unit is known as the A-weighted decibel, or dBA. The A-weighted network de-emphasizes both very low- and very high-pitched sound, so the measured levels correlate well with the human perception of loudness.

Human response to changes in noise 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 with the individual, as does response to the perceived changes. Generally, changes in noise levels less than three dBA will barely be perceptible to most listeners, whereas a ten dBA change normally is perceived as a doubling (or halving) of noise levels. These guidelines permit direct estimation of an individual's probable perception of changes in noise levels.

Since the dBA noise metric describes a noise level at just one moment, and very few noises are constant, other ways of describing noise over extended periods are needed. One way of describing fluctuating sound is to describe the fluctuating noise heard over a specific time period, as if it had been a steady, unchanging sound. For this condition, a descriptor called the equivalent sound level, L_{eq}, can be computed. The L_{eq} descriptor is the constant sound level that, in a given situation and time period (e.g., one-hour L_{eq}, or 24-hour L_{eq}), conveys the same sound energy as the actual time-varying sound. Statistical sound level descriptors such as L_1, L_{10}, L_{50}, L_{90}, and L_x are also sometimes used to indicate noise levels that are exceeded 1, 10, 50, 90, and x percent of the time, respectively.

Alternatively, it is often useful to account for the difference in response of people in residential areas to noises that occur during sleeping hours as compared to waking hours. A descriptor, the day-night noise level (L_{dn}), defined as the A-weighted average sound level in decibels during a 24-hour period with a ten dB weighting applied to nighttime sound levels, is a widely-used indicator for such evaluations. The ten dB weighting accounts for the fact that noises at night sound louder because there are usually fewer noises occurring at night. The L_{dn} descriptor has been proposed by the US Department of Housing and Urban Development (HUD), USEPA, and other organizations as one of the most appropriate criteria for estimating the degree of nuisance or annoyance that increased noise levels would cause in residential neighborhoods.

The maximum one-hour equivalent sound level (one-hour L_{eq}), the 24-hour equivalent sound level (24-hour L_{eq}), and the day-night noise level (L_{dn}) have been selected as the noise descriptors to be used in the noise impact analysis of this project. Maximum one-hour equivalent sound levels were used to provide an indication of highest expected sound levels.

3.6.2 Noise Standards and Criteria

There are a number of standards and guidelines adopted by federal agencies for assessing noise impacts that are reviewed in this EIS. Although these regulations and standards do not specifically apply to this project, they are useful to review in that they provide both a characterization of the quality of the existing noise environment as well as a measure of project-induced impacts.

Federal Highway Administration (23 CFR 772)

The Federal Highway Administration (FHWA) noise regulations require that a noise analysis be conducted for all highway projects (FHWA, 1974). These standards contain noise abatement criteria that the FHWA considers to be the acceptable limits for noise levels for exterior land uses and outdoor activities and for certain interior uses (Table 3.6-1). The FHWA noise abatement criteria lists developed land use types as Categories A, B, C, or E. In this EIS, Category B, which includes residences, schools, and churches, would represent most of the sensitive receptors that lie in proximity to the proposed project. Future noise levels are predicted to evaluate the extent of impact in relation to the noise abatement criteria. If these criteria are exceeded, or if there is a substantial increase above the existing noise level, abatement measures are considered. Such measures are to be taken for all project alternatives.

HUD Environmental Criteria and Standards

HUD has adopted environmental standards, criteria, and guidelines for determining acceptability of federally-assisted projects, and has proposed mitigation measures to ensure that activities assisted

Table 3.6-1

FHWA Noise Abatement Criteria

Activity Category	$L_{eq}(h)$	$L_{10}(h)$	(Description of Activity Category)
A	57 (exterior)	60 (exterior)	Land for 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	67 (exterior)	70 (exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (exterior)	75 (exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	---	---	Undeveloped lands.
E	52 (interior)	55 (interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

Note: The L_{eq} and L_{10} designations represent hourly A-weighted sound levels expressed in decibels (dBA). Either $L_{10}(h)$ or $L_{eq}(h)$ (but not both) may be used on a project.

Source: US Department of Transportation, FHWA, 1974.

Table 3.6-2

HUD Site Acceptability Standards

Noise Zone	Day/Night Sound Level (L_{dn})
Acceptable	Not exceeding 65 dB
Normally Unacceptable	Above 65 dB but not exceeding 75 dB
Unacceptable	Above 75 dB

Source: 24 CFR Part 51.

by HUD will achieve the goal of a suitable living environment. Although these guideline values are strictly advisory, they represent valid goals for any project.

HUD assistance for the construction of new noise-sensitive land uses is generally prohibited for projects with Unacceptable noise exposure and is discouraged for projects with Normally Unacceptable (as defined in Table 3.6-2) noise exposure with suitable mitigating measures. This policy applies to all HUD programs for residential housing, college housing, mobile home parks, nursing homes, and hospitals. It also applies to HUD projects for land development, new communities, redevelopment, or any other provision of facilities and services that is directed to making land available for housing or noise-sensitive development.

Sites falling within the Normally Unacceptable zone require implementation of additional sound attenuation or reduction or other mitigation measures: five dB if the L_{dn} is greater than 65 dB but does not exceed 70 dB, and ten dB if the Ld_n is greater than 70 dB but does not exceed 75 dB. If the L_{dn} exceeds 75 dB the site is considered Unacceptable for residential use.

HUD encourages noise attenuation features in new construction or in alterations of existing structures. The HUD-mandated or recommended design mitigation measures to eliminate or minimize Unacceptable or Normally Unacceptable levels, respectively, include well-sealed double-glazed windows, forced-air ventilation systems (which permits windows to remain closed in summer), and acoustic shielding and insulation.

3.6.3 Noise Monitoring

A noise measurement survey was conducted in the study area. Receptors were selected based on noise sensitivity, such as residential and open space use. All receptors were adjacent to streets where there could be increases in traffic due to implementation of the proposed project. Receptors along Davisville Road (which intersects the project area) were not included since no project-generated traffic would be added to Davisville Road during the build year. The key receptor locations that could experience noise impacts as a result of traffic increases are those residences along the perimeter roads of the project area.

Six monitoring locations were selected to provide an indication of the existing noise levels (Figure 3.6-1, Noise Monitoring Locations). A sampling measurement program was conducted at Sites 1 through 6 during four time periods on March 29th and August 15th and 16th, 1995. Measurements were taken five ft (1.5 m) from the existing building walls of the receptor locations. Microphone height for all receptors was eight ft (2.4 m) above ground level.

Site 1 — 1430 Second Street, between Street Road and Bristol Road. The receptor is located on the west side of Second Street, just south of Bristol Road. The receptor is on a

Noise Monitoring Locations

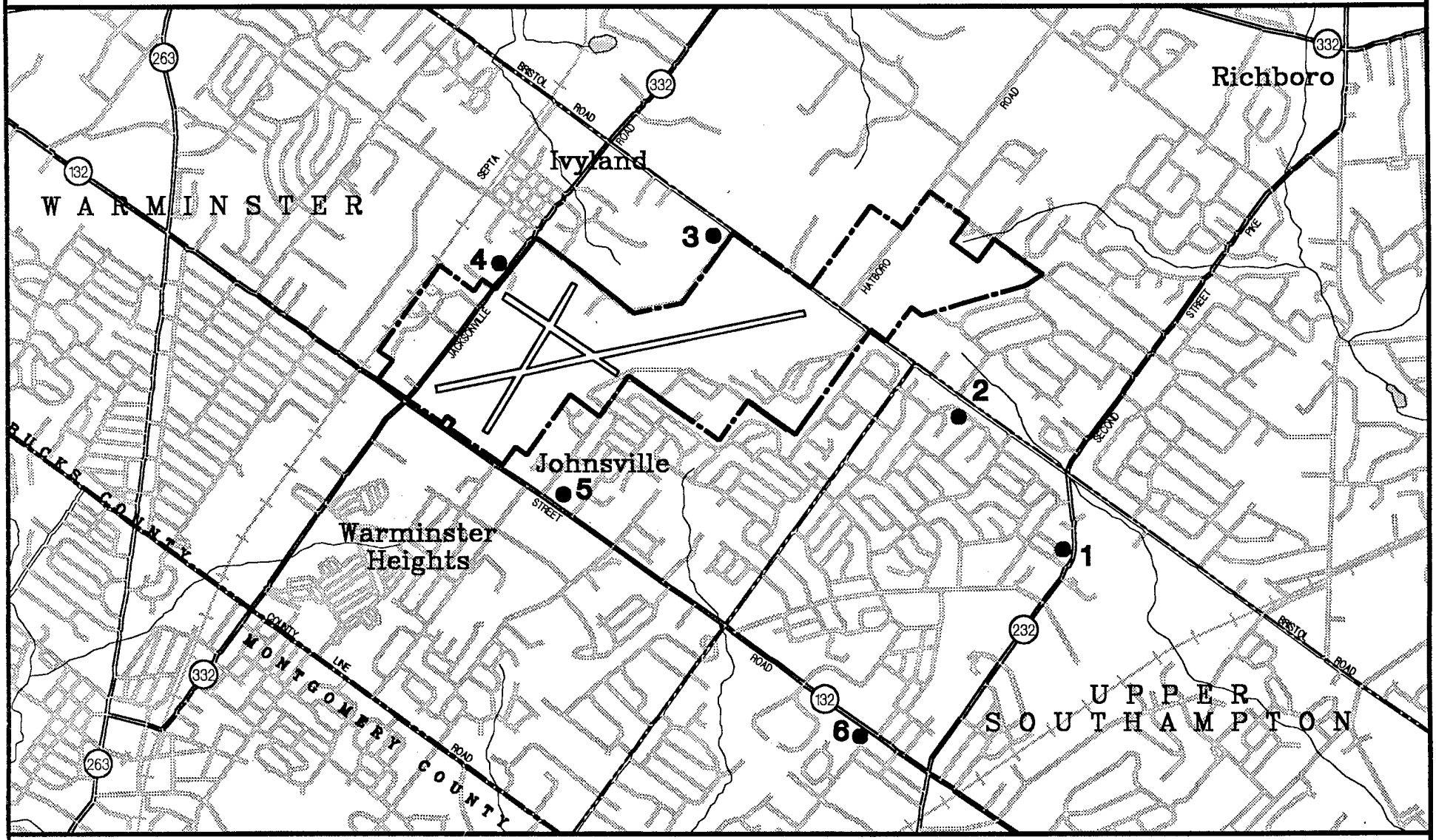


Figure 3.6-1

residential stretch of Second Street, away from the commercial center to the south along Street Road. The microphone was located five ft (1.5 m) from the building wall and approximately 40 ft (12 m) from the centerline of Second Street. Second Street is a two-way street with one lane in each direction and a narrow six-ft (1.8-m) shoulder.

Site 2 — 440 Bristol Road, between Whitney Road and Second Street. The receptor is located on the south side of Bristol Road, just east of Second Street. The microphone was located five ft (1.5 m) from the building wall and approximately 50 ft (15 m) from the centerline of Bristol Road. Bristol Road is a two-way street with one lane in each direction and no shoulder.

Site 3 — 236 Bristol Road, between Hatboro Road and Jacksonville Road. The receptor is located on the south side of Bristol Road, just east of Jacksonville Road. The microphone was located five ft (1.5 m) from the building wall and approximately 50 ft (15 m) from the centerline of Bristol Road. Bristol Road is a two-way street with one lane in each direction and no shoulder.

Site 4 — 1230 Jacksonville Road, between Bristol Road and Street Road. The receptor is located on the west side of Jacksonville Road, just south of Bristol Road. The microphone was located five ft (1.5 m) from the building wall and approximately 50 ft (15 m) from the centerline of Jacksonville Road. Jacksonville Road is a two-way street with one lane in each direction and no shoulder.

Site 5 — 375 Street Road, between Newton Road and Centennial Road. The receptor is located on the north side of Street Road, just east of Newton Road. There are two additional residences adjacent to the receptor, which is on a large commercial segment of Street Road. The microphone was located five ft (1.5 m) from the building wall and approximately 60 ft (18 m) from the centerline of Street Road. Street Road is a two-way street with five lanes of traffic and there is a shoulder on each side of the road.

Site 6 — Residence at intersection of Lowell Road and Street Road (the only residence at the intersection, at the northeast corner). The receptor is located on the south side of Street Road. Street Road is still a commercial road and there is a cluster of residential homes that are adjacent to Lowell Road. The microphone was located five ft (1.5 m) from the building wall and approximately 60 ft (18 m) from the centerline of Street Road. Street Road is a two-way street with five lanes of traffic and there is a shoulder on each side of the road.

The field monitoring program was conducted using the following equipment:

- Bruel & Kjaer Type 2231 Precision Sound Level Meter;
- Bruel & Kjaer Type 2218 Graphic Printer;
- Bruel & Kjaer Type 4230 Sound Level Calibrator;
- Bruel & Kjaer Type 4133 ½ inch microphone; and
- Bruel & Kjaer Type 2614 microphone preamplifier.

Measurements at each sampling location were made on the A-scale (dBA) for a sampling period of 30 minutes. A wind screen was used to minimize wind noise across the face of the microphone. The data were digitally recorded by the noise analyzer and displayed at the end of the measurement period.

3.6.4 Existing Noise Levels

The one-hour equivalent noise levels (one-hour L_{eq}) measured at Sites 1 through 6 are presented in Table 3.6-3. At all measurement locations, the predominant source of noise is vehicular traffic. The measured noise levels are common for residential areas, reflecting the level of vehicular traffic present. While not directly compatible, the HUD and FHWA criteria provide a useful yardstick by which to assess the existing noise environment in the study area:

- The HUD criterion for residential land use is exceeded when the L_{dn} exceeds 65 dBA. Based on existing noise levels the, $L_{dn} = 65$ is exceeded at sites 4, 5, and 6.

- The FHWA criterion for Activity Category B land uses (residential, parkland, hospitals, etc.) is 67 dBA. Existing noise levels exceed the FHWA criteria at Site 5 during 7 to 8 am period and 4 to 6 pm period the am and pm hours and Site 6 during the 7 to 8 am hour Both sites are adjacent to heavily-traveled streets that experience large traffic volumes. At the other four sites, the existing noise levels do not exceed the FHWA criteria; however, the measured ambient levels at all receptors reflect typical levels for suburban areas.

Table 3.6-3

Existing Sound Levels - Sites 1 Through 6

Time Period	One-Hour L_{eq} in dBA					
	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
AM Peak (7 - 9 am)	65	65	64	64	67	67
Midday (10am - 2pm)	64	63	63	63	65	64
PM Peak (5 - 7 pm)	65	64	65	65	68	67
Pre-Midnight (9pm-12 am)	61	58	62	63	64	63
24-Hour L_{eq}	62	62	62	62	65	64
L_{dn}	65	64	65	66	68	67

3.7 Infrastructure

This chapter describes the various utility systems at NAWCAD, and is based on the description of utilities documented in *Proposed Realignment Implementation Plan for the Naval Air Warfare Center Aircraft Division* (US Navy, October 1994).

3.7.1 Electricity

All electricity is purchased from the PECO Energy at 33 kilovolts (kv). NAWCAD is billed in accordance with rate schedule high tension (HT) from PECO Energy. There are 13 emergency generators at NAWCAD, providing a total capacity of 1,525 kilowatts (kw). An alternate 33-kv service from PECO Energy has been installed, which can be used to restore electrical power if the normal service connection fails for an extended period.

The electrical distribution system serving the majority of NAWCAD is a radial system comprised of ten feeders from the main substation. Each feeder serves multiple buildings. Distribution throughout NAWCAD is underground in concrete-encased four-inch (in) (ten-cm) ducts, and is armored cable, tray-overhead inside Bldgs 1 and 2. There is a separate HT service to the family housing and Bldg 108 areas. There are 13 separate secondary power services which go to various out-buildings and utility functions.

3.7.2 Steam Production

Steam is used for space heating, hot water, and auxiliary services. The steam supply consists of one distribution system that is fed from a central plant in Bldg 1. The central steam plant capacity of 97,000 lbs/hr is provided by three boilers that are fired by either oil or natural gas fuels. The NAWCAD has a winter and a summer steam distribution system. Winter supply lines range in size from 12 in (30 cm) to one in (three cm). Summer lines, used for domestic hot water heating and air-conditioning reheat, range in size from eight in (20 cm) to one in (three cm). Bldgs 1, 2, 3, 4, 26, 125, and 138 are supplied via two 12-in (30-cm) lines at 13 pounds per square inch (psi) during the winter. The remainder of the complex is supplied by a five-in (13-cm) line at 25 psi during the winter. Several outlying buildings have their own boilers and are not connected to the steam system. Summer steam is furnished to Bldgs 1, 2, 3, 70, 71, and 72.

3.7.3 Water Supply

NAWCAD purchases potable water from the Warminster Municipal Authority to serve the married enlisted housing area and the Inertial Guidance Facility at Bldg 108. All other water needs are supplied from existing wells on NAWCAD property.

Ten wells provide water to NAWCAD. The main usable wells are 1, 2, 3, 4, and 10. All water from wells 3, 4, and 10 are pumped to a 35,000-gallon (132,475-liter) reservoir in Bldg 3. This ensures adequate chlorine contact time. From the reservoir this water is pumped to a 200,000-gallon (757,000-liter) elevated tank. Water flows through the distribution system from this tank. Wells 1 and 2 are used for fire protection and are pumped to a 200,000-gallon (757,000-liter) ground tank and a 100,000-gallon (378,500-liter) elevated tank (Kurdziel, June 26, 1996).

3.7.4 Sanitary Sewer System

Wastewater collection and treatment at NAWCAD consists of a small, mostly gravity, collection system and a 1.0-million-gallon per day (mgd) (3.8-million-liter) sanitary wastewater treatment facility. Since the majority of NAWCAD wastewater operations are essentially in one interconnected building complex, the wastewater collection system is largely indoor plumbing. The sewer system consists of about 16,000 ft (4,900 m) of gravity pipe ranging in size from six to 12 in (15 to 30 cm).

The sanitary wastewater treatment plant provides primary and secondary treatment. Raw influent is pumped to four primary settling tanks, where it flows by gravity to one of three trickling filters. From the trickling filters, it flows to four settling tanks and then to a chlorine contact chamber. All treated effluent then enters a small unnamed tributary of Little Neshaminy Creek (Kurdziel, June 26, 1996).

NAWCAD has had two National Pollutant Discharge Elimination System (NPDES) permits to discharge treated effluent from the on-site sewage treatment plant. The discharge criteria set forth in the NPDES permits have not been consistently met, particularly for ammonia and nitrogen. A consent decree was entered in the United States District Court of Pennsylvania on May 1, 1992 in which the Navy agreed to send a portion of the sanitary wastewater to the publicly-owned treatment works operated by the Warminster Municipal Authority. As a result, a sewer line was constructed from Bldg 6 along the western boundary of the site, tapping into the township line at Street Road. This tap-in allows approximately 20,000 gallons per day (gpd) (76,000 liters per day) of raw sanitary waste to be sent to Warminster Township's sewage treatment plant (Kurdziel, June 26, 1996), as per a Warminster Township Municipal Authority permit issued to NAWCAD.

3.7.5 Industrial Waste System

Historically, industrial wastes generated by the existing facilities were pretreated in a two-stage treatment system consisting of three batch-operated 45,000-gallon (170,325-liter) holding/treatment tanks. While no industrial pre-treatment is performed, wastewaters from the boilers and cooling towers still flow to this part of the sewage treatment plant. From the batch tanks, this wastewater is directed to the sanitary portion of the plant (Kurdziel, June 26, 1996).

3.7.6 Storm Sewer System

There are two main storm sewers at NAWCAD. One discharges into an underground storage box culvert located at the southwest end of the complex, then into an unnamed tributary of Pennypack Creek. The second system, located at the northeast end of the complex, discharges into an unnamed tributary of Little Neshaminy Creek. There has been no identified reduction in water quality in either unnamed tributary. Both of the storm systems are considered inadequate for a two- year storm event because of the small size of the existing lines. Some flooding has occurred for storms in excess of a two-year event (US Navy, 1991).

Smaller systems are located at the northern end of the complex along Kirk Road and at the southeast end of the site near the Navy family housing area. The system along Kirk Road discharges into a small, unnamed tributary of Little Neshaminy Creek. The other system discharges into a small unnamed creek. Storm sewer lines vary from six to 42 in (15 to 107 cm) in size.

Bucks County has a total of eight major watersheds. NAWCAD is located within the Little Neshaminy watershed. While a stormwater management plan has yet to be prepared for the Little Neshaminy watershed, a plan has been approved by the Pennsylvania Department of Environmental Protection for one other watershed in the county (the Neshaminy Creek watershed). The methodology and standards developed in the Neshaminy Creek plan are anticipated to be used as prototypes for the development of stormwater management plans for the other watersheds in the county (Bucks County Planning Commission, 1993). The plan presents specific hydrological release rates to address the reduction of hydrologic impacts, and includes mandatory water quality criteria.

3.7.7 Solid Waste

NAWCAD is in compliance with the Pennsylvania Department of Environmental Protection solid waste management regulations. Solid waste generated by NAWCAD is currently disposed of offsite by a private contractor, who is required to follow federal, state, and local regulations. Recycling efforts at NAWCAD include precious metals recovery, scrap metal recycling, high-grade (computer) paper recycling, and plain paper recycling.

3.7.8 Natural Gas

Natural gas is purchased from PECO Energy. It is used in the boiler room located between Bldgs 1 and 2, as well as the barracks, the Inertial Guidance Facility, Bldg 108, Shenandoah Woods, and the six Jacksonville Road housing units for officers.

3.7.9 Telephone

The NAWCAD owns all of the telephone lines on the property. It leases equipment from AT&T and has a contract to keep the system operational.

3.8 Cultural Resources

The Navy undertook an intensive-level historic resources survey and a Phase I archaeological survey (TAMS Consultants, Inc., 1995), in compliance with:

- Sections 106 and 110 of the National Historic Preservation Act (NHPA) of 1966, as amended;
- Executive Order 11593, *Protection and Enhancement of the Cultural Environment;* and
- OPNAVINST 5090.1B, *Environmental and Natural Resources Program Manual.*

These laws and regulations require that cultural resources meeting the eligibility criteria of the National Register of Historic Places be identified and evaluated. Consequently, the overall objectives of the intensive-level historic resources survey were to establish the historic context of NAWCAD, and to evaluate each building and structure with respect to National Register criteria. The objectives of the Phase I archaeological survey were to determine the presence or absence of intact archaeological resources and to develop appropriate recommendations for future studies, if necessary.

3.8.1 Overview of Prehistoric, Contact, and Historic Periods

Prehistoric and Contact Period

Prehistoric sites recorded in Bucks County have been associated primarily with Archaic and Woodland Period occupation of the region. Most of the recorded sites are along major river floodplains and low-order streams. In the vicinity of NAWCAD, recorded sites are along the Neshaminy and Little Neshaminy Creeks (Shoemaker, 1944; Custer and Wallace, 1982). These sites typically include lithic scatters (the remains of stone-tool manufacturing, maintenance, or use) found in cultivated fields and on slopes along streambeds. Most of the recovered projectile points (commonly known as *arrowheads*) have been manufactured from quartzite, quartz, argillite, and jasper and, based on the styles and the manufacturing techniques of the points collected, date from the Archaic and Early Woodland Periods.

Early Settlement of Warminster Township

NAWCAD is located in the Warminster Township community known as Johnsville. Settled in the 1680s, Johnsville was originally called Upper Corner. It was renamed Johnsville in 1814 by James

Craven. Major landowners in the Johnsville area whose holdings included substantial portions of the present-day NAWCAD property were the Hart and Longstreth families. Descendants of these families distinguished themselves in the early history of Bucks County.

One Hart descendent, Colonel Joseph Hart, was the Sheriff of Bucks County. Colonel Hart's homestead played a small role in the Revolutionary War, as Continental soldiers camped on the Hart farm and the Battle of the Crooked Billet crossed through Hart's land. This battle is notable as it represents the first and only independent campaign assigned to the Pennsylvania Militia (Bailey, 1976).

In 1817, another Hart heir, John Hart III, built a farmhouse on property south of what is now Bristol Road, between Jacksonville and Newtown Roads. This house presently serves as the commander's quarters at NAWCAD: Quarters A (Bldg 100). The initials of John Hart and his wife are still visible on the house's northeast wall and it has an unusual arched basement with a stone floor. The structure is located close to the line of retreat taken by American troops in the 1778 Battle of the Crooked Billet, and it has been suggested that a former outbuilding on the property may have been used as a hospital during the Revolutionary War (Casele, 1995).

In 1787 John Longstreth built a stone farmhouse and barn on his property. This structure is known as Bldg 101 (Quarters B) at NAWCAD and includes a barn and a fruit cellar bulkhead in addition to the wood-frame and stone house (Bailey, 1986). A family burial plot was said to be located behind this house, but no evidence of a cemetery was observed on the property in May 1995 (Casele, 1995).

During the 19th and early 20th centuries, the extensive Johnsville land holdings of the Harts and Longstreths were gradually subdivided and sold. However, with a few exceptions (Florrey Brick Company and the Beans Agricultural Implement Factory), the area remained largely undeveloped and in agricultural use until the purchase and subsequent construction of an aircraft assembly plant and an industrial airport in Johnsville by the Brewster Aeronautical Corporation in 1939.

Brewster Aeronautical Corporation

James Work purchased the aircraft division of the Brewster Manufacturing Company in 1932, merging it with Work Engineering Corporation, to form the Brewster Aeronautical Corporation (obituary in files of Delaware Valley Community College). Brewster Aeronautical was successful in developing several Navy aircraft, including a dive bomber (Bermuda/Buccaneer), and the Buffalo, the Navy's first single-wing, all-metal fighter plane.

In 1941, the Brewster Aeronautical Corporation announced plans to construct a new $5 million plant in Bucks County. Using loans guaranteed by the federal Reconstruction Finance Corporation, and later the Defense Plant Corporation, the company purchased 367 acres of land in Warminster

Township, forming the core of the site that is now NAWCAD Warminster. To construct the new plant, all structures were removed from the property except Bldg 100 (Quarters A).

The new factory and hangars were designed by the Philadelphia architectural firm of Silverman and Levy (Doylestown Intelligence, January 23, 1941). The design incorporated some modern features, including subassembly and assembly lines arranged ergonomically for women workers. The six assembly lines at the Johnsville plant were each capable of producing a plane a day. All test flights were to be flown at Johnsville (Doylestown Intelligence, January 23, 1941). Actual aircraft production began in December 1941.

Brewster Aeronautical experienced severe labor problems throughout World War II and, in 1942, its operations were briefly taken over by the Navy. Despite the removal of James Work as president in 1942 and the subsequent election of western industrialist and labor innovator, Henry J. Kaiser, as Chairman of the Board of Brewster in March 1943, labor problems continued. The company was investigated by both the Senate's Truman Committee and the House Naval Affairs subcommittee from 1943 through 1944. In November 1943, the Navy canceled its dive bomber contract with Brewster and the assembly lines were retooled for production of the Chance Vought-designed Corsair. From December 1943 through cancellation of its Navy contract in spring 1944, Brewster was able to meet its production quota for Corsairs.

The Navy Era at Warminster

In July 1944, the Navy took over Brewster's lease with the Defense Plant Corporation, placing it under the command of the Naval Air Material Center. It was redesignated as the Naval Aircraft Modification Unit (NAMU) and given the mission of developing guided missiles and modifying service model airplanes and helicopters, the latter for air-sea rescue (*Air Scoop*, January 1946). In 1944, NAMU was used to test the Gorgon, a ship-to-air missile intended as a defense against Kamikaze planes.

After World War II, NAWCAD underwent a series of reorganizations and expansions. With research responsibilities increasing, NAWCAD purchased land for an extension of the facility's east-west runway in 1951. NAWCAD acquired Bldg 101 (Quarters B) in this land purchase. Other Navy functions were subsequently relocated to Johnsville, including research labs from Mustin Field in Philadelphia (1963), three laboratories from the Naval Air Engineering Center in Philadelphia (1967), and the Naval Strategic Systems Navigation Facility from Brooklyn, New York (1973). Significant facilities developed or installed at NAWCAD as part of its research missions include the Typhoon computer system, the centrifuge, the inertial guidance testing facility, and the ejection tower. Each of these facilities is described below.

The Typhoon Computer System

In July 1950, NAWCAD acquired the world's largest analog computer, the Typhoon, designed by RCA Laboratories in Princeton, New Jersey. This computer was placed in the Aeronautical Computer Laboratory (*NAWCAD Reflector*, April 1976). The Typhoon had the ability to handle a three-dimensional guided missile flight problem with a rate of accuracy surpassing any other computer at the time. Although most of its actual use was cloaked in Cold War secrecy, it was apparently a critical element in the design and development of the US military's first rockets and may have been involved in the development of the Polaris missile. The Typhoon remained in constant use until 1962 (*Naval Aviation News*, 1955; *Avionics*, 1950, *Annals of the History of Computing*, 1993).

The Centrifuge and the US Space Program

The Aviation Medical Acceleration Laboratory (AMAL), established in 1949, was responsible for testing the effects of flight-encountered G forces, acceleration, and deceleration on humans, using a huge centrifuge. Driven by a 4,000-horsepower DC motor, the centrifuge (Bldg 70) could simulate near-space altitudes of 125,000 ft (38,000 m) by accelerating loads of up to 400 pounds (lbs) (181 kilograms [kg]) to 40 Gs in 6.5 seconds. It consisted of a gondola mounted on power-driven gimbals attached to a 50-ft (15-m) arm. The gondola was oblong in shape and ten ft (three m) in diameter. At the time of its construction, the centrifuge was the largest in the world (*Naval Aviation News*, November 1955). It was also considered unique because it could simulate the multiple stresses (heat, altitude, sound, and light) to which a pilot was subject when in space or in a high-performance aircraft (*Approach*, 1974).

Use of the centrifuge was critical in the development of the US space program in the 1950s and 1960s. The first such project involved a simulator for the X-15. NAWCAD's successful experience with the X-15 program led to work under Project Mercury. Acceleration tests using the centrifuge were instrumental in the design of the contour couch used in the Mercury spacecraft. In August 1959, each of the seven Mercury astronauts spent two weeks at Johnsville practicing simulated liftoff and reentry. The centrifuge was used by the astronauts again in 1960.

In 1964, the centrifuge was modified for Project Gemini testing by installing a new arm and a larger gondola capable of carrying up to three people. New gimbals were also added to allow for the acceleration of 1,000 lbs (454 kg) up to 40 G in just under seven seconds (*Reflector*, April 1964). NAWCAD's centrifuge was used to test instrument displays and controls for the Gemini spacecraft and to train four Project Gemini astronauts (Trimble, 1990).

Inertial Guidance Test Facility

In 1964, an inertial guidance testing facility (Bldg 108) was constructed at NAWCAD as part of the Aeronautical Instruments Laboratory (AIL). Researchers at the facility worked on navigational systems for both aircraft and submarines (*Reflector*, February 1963), making the AIL a key facility in developing and testing navigation systems for Cold War weapons systems such as advanced aircraft and ballistic and cruise missiles.

The Ejection Tower

In 1976, a 150-ft (46-m) tall red-and-white tripod tower was moved to NAWCAD from the Philadelphia Naval Shipyard (Structure 361). This test tower was used to evaluate the effectiveness of aircrew equipment, principally ejection seats, during simulated aircraft crashes. The vertical section of the structure, the deceleration tower, was added in the 1960s and used to simulate crash forces (*Naval Aviation News*, July 1976).

3.8.2 Intensive-Level Historic Resources Survey

A program of documentary research was conducted on the history of NAWCAD and the general history of military aviation and military housing to place the facility in an appropriate historic context. Sources used in the preparation of the historic period overview and historic context included local histories, contemporary periodicals, administrative records of NAWCAD Warminster, and historic maps. Repositories consulted included the following:

- Engineering Societies' Library, NY;
- New York Public Library, NY;
- Sterling Memorial Library, Yale University, New Haven, CT;
- Avery Memorial Architectural Library, Columbia University, NY;
- Bucks County Historical Society, Bucks County Conservancy, Bucks County Courthouse, Doylestown, PA;
- Naval Historical Center, Washington Navy Yard;
- National Archives Main Branch, Washington, DC;
- Public Affairs Office and Technical Library, NAWCAD Warminster;
- Delaware Valley Community College Library Archives;
- Pennsylvania Bureau of Historic Preservation, Harrisburg, PA; and
- NAAR Regional Archives, Van Pelt Library, University of Pennsylvania, Philadelphia PA.

A review of the National Register files at the Pennsylvania Bureau of Historic Preservation in May 1995 showed that no architectural or archaeological cultural resources within the NAWCAD property boundaries were listed on the National Register. The files did reveal that in July 1984, National Register Nomination Forms were submitted to the Advisory Council on Historic Preservation by the Navy (Petrone, 1984) for Bldg 100 (Quarters A) and Bldg 101 (Quarters B). A month later the Navy requested a determination of eligibility for these buildings. At that time, the files on Bldgs 100 and 101 were sent to the Pennsylvania State Historic Preservation Officer (SHPO). The SHPO responded that insufficient information was available to determine the structures' eligibility and requested further research.

Upon completion of the documentary research for the current intensive-level historic resources survey, a vehicular and pedestrian field examination was conducted to obtain a visual assessment of the project area in the context of the background research. Each building or structure that appeared to potentially meet the Secretary of the Interior's Criteria for Historic Significance (36 CFR 60.4), as shown in Table 3.8-1, was recorded on a Cultural Resource Survey Form K. The research and field examinations indicated that certain structures and buildings at NAWCAD would be considered important under three areas of significance used by the National Register of Historic Places: Military, Architecture, and Engineering. Accordingly, the recommended historic contexts for the properties are:

- Development of Naval Aviation;
- Naval Missile Design;
- Inertial Guidance Systems;
- Anti-Submarine Warfare, all from World War II to the Cold War (1942-1989); and
- Man in Space (1959-1965).

Each building or structure at NAWCAD was then evaluated on the basis of whether it possessed: (1) physical or associative characteristics significantly related to the historic contexts (above); and (2) a sufficient degree of historic integrity as defined by the National Park Service guidelines (Table 3.8-2) to be a good representative of its property type. Buildings that met these criteria were recommended eligible for the National Register. Buildings or structures that did not meet these requirements were recommended not eligible.

Several NAWCAD buildings appeared initially to individually possess the required historic or architectural importance necessary to be eligible for listing in the National Register under Criterion I.C: Bldg 100 (Quarters A), Bldg 101 (Quarters B), and Bldg 87 (Quarters B barn). However, the Pennsylvania Historical and Museum Commission has determined that these buildings do not have sufficient integrity to convey their individual significance for listing (Barrett, May 6, 1998).

National Park Service regulations (36 CFR 60.4[g]) preclude consideration of resources less than 50 years old for the National Register unless such resources are of "exceptional importance." The

Table 3.8-1

Criteria for Historic Significance

36 CFR 60.4, Part I
The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and: A. that are associated with events that have made a significant contribution to the broad patterns of our history; or B. that are associated with the lives of persons significant in our past; or C. that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or D. that have yielded, or may be likely to yield, information important in prehistory or history.
36 CFR 60.4, Part II
Ordinarily cemeteries, birthplaces, or graves of historical figures, properties owned by religious institutions or used for religious purposes, structures that have been moved from their original locations, reconstructed historic buildings, properties primarily commemorative in nature, and properties that have achieved significance within the past 50 years shall not be considered eligible for the National Register. However, such properties will qualify if they are integral parts of districts that do meet the criteria or if they fall within the following categories: A. a religious property deriving primary significance from architectural or artistic distinction or historical importance; or B. a building or structure removed from its original location but which is significant primarily for architectural value, or which is the surviving structure most importantly associated with a historic person or event; or C. a birthplace or grave of a historical figure of outstanding importance if there is no appropriate site or building directly associated with his productive life; or D. a cemetery which derives its primary significance from graves or persons of transcendent importance, from age, from distinctive design features, or from association with historic events; or E. a reconstructed building when accurately executed in a suitable environment and presented in a dignified manner as part of a restoration master plan, and when no other building or structure with the same association has survived; or F. a property primarily commemorative in intent if design, age, tradition, or symbolic value has invested it with its own exceptional significance; or G. a property achieving significance within the past 50 years if it is of exceptional importance.

Table 3.8-2

Integrity Types Defined

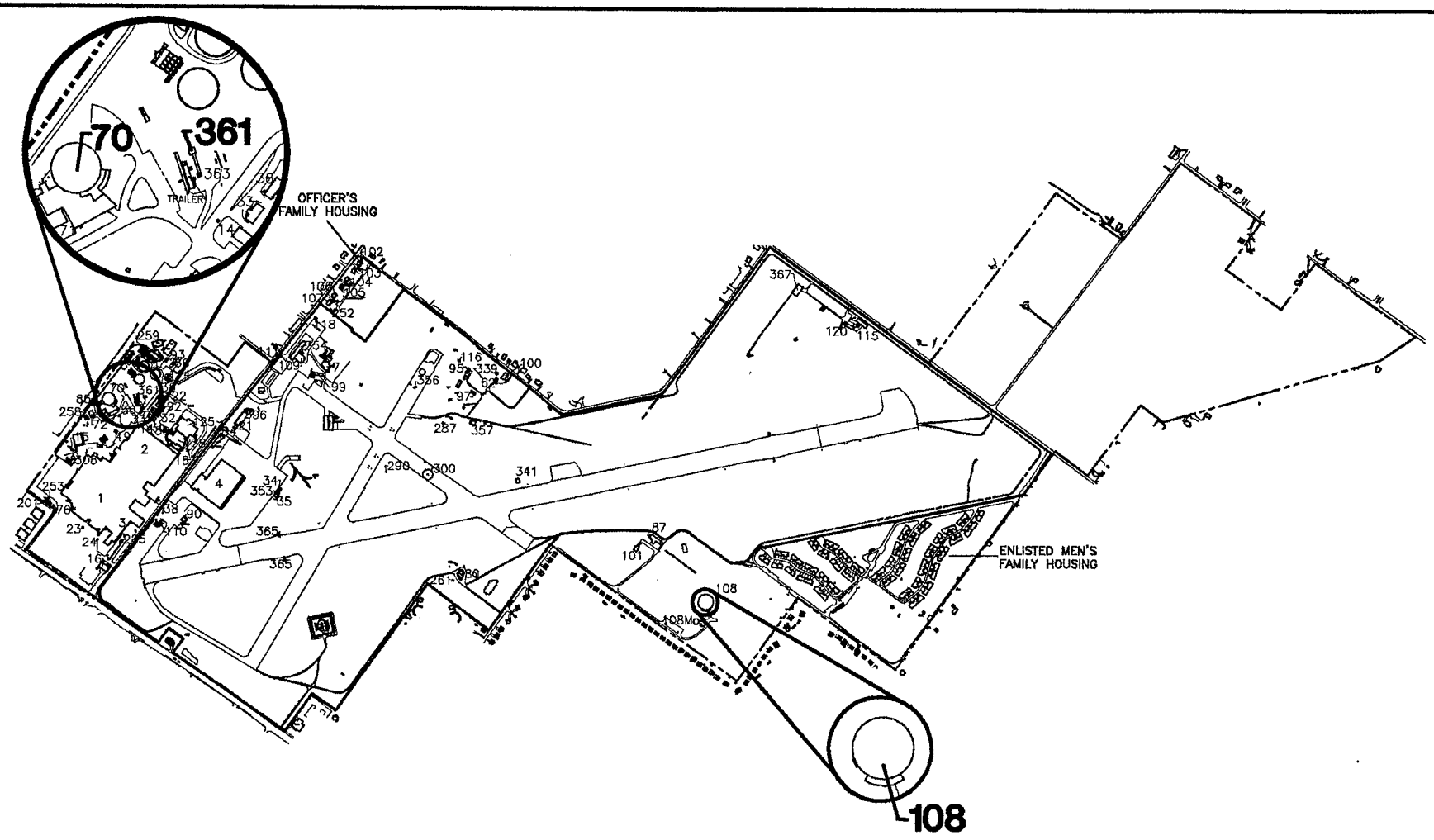
Type of Integrity	Property Must Have the Following Attributes:
Location	the property must not have been moved.
Design	must retain historic elements that create the form, plan, space, structure, and style of the property.
Setting	the setting of the property must retain its historic character.
Workmanship	methods of construction from its time of significance must be evident.
Materials	must retain the key exterior materials dating from the period of its historic significance.
Feeling	the physical features of the property must convey its historic character.
Association	property must be the actual place where a historic event or activity occurred and must be sufficiently intact to convey that relationship to an observer.
Source: US Department of the Interior, 1991.	

background research showed that several of the structures at NAWCAD were crucial in the development of Naval aviation technology during the Cold War and should be considered eligible for the National Register under the historical significance Criteria I.A and I.C, despite their being less than 50 years of age.

Three buildings are considered eligible under Criterion I.A: inertial guidance research facility (Bldg 108), seat ejector test facility (Structure 361), and centrifuge (Bldg 70) (Figure 3.8-1, National Register Eligible Properties at NAWCAD). The centrifuge (Bldg 70) played such an important role in the development of the X-15, as well as the Mercury and Gemini manned space programs, that it is considered eligible under Criterion I.A in the context of Man in Space (Barrett, May 6, 1998).

Following the evaluation of individual building eligibility, an assessment was made regarding the potential for an historic district at NAWCAD. According to National Park Service guidelines, an historic district must possess "a significant concentration, linkage, or continuity of sites, buildings, or objects united historically or aesthetically by plan or physical development" (US Department of the Interior, 1991). As noted in the historic overview, many buildings at NAWCAD were constructed during World War II when the facility served as an aircraft manufacturing plant. These buildings are thus united historically by plan and physical development. Given NAWCAD's

National Register Eligible Properties at NAWCAD



Note: Inset scale is 1"= 400'.

D16 **Building and Number**

100 **Eligible Structure**

----- **Property Boundary**

1600 800 0 800 1600
Scale In Feet

400 0 400
Scale In Meters

N

Figure 3.8-1

important role in labor relations and aircraft construction during World War II, the period of significance for a potential historic district would be defined as beginning with the construction of the plant in 1942 and continuing to the end of the war. However, for a district to retain integrity, the majority of its components cannot have been substantially altered since the period of the district's significance (US Department of the Interior, 1991).

The field examination of NAWCAD revealed that due to extensive renovation and remodeling, coupled with an aggressive facade and window replacement program conducted by the Navy in 1991, no additional buildings and structures have survived with any degree of integrity. For example, all of the major structures associated with the Brewster era (Bldgs 1 to 4) have lost their original exterior appearance and most of the accessible interiors have been gutted several times during their occupation. Older warehouses and ancillary buildings, such as Bldgs 15 and 16, have been covered in new facade materials. Furthermore, new buildings have been constructed on the property, creating modern intrusions, so that NAWCAD hardly conveys the sense of a historic environment. A few buildings, mostly warehouse and sewage treatment facilities (Bldgs 6, 14, 32, 33, 36, 92, 204-206, 209-211) have survived largely untouched. However, due to changes in their surroundings, they have lost their context and can no longer convey any sense of the original historic environment. Also, these structures are not sufficiently important examples of their building type to be considered individually eligible.

In summary, all but a handful of buildings have lost their integrity of design, setting, workmanship, materials, and feeling – six of the seven necessary attributes of integrity. Loss of integrity to this degree would generally cause most properties at NAWCAD to be ineligible for listing in the National Register. Consequently, there is no potential historic district at NAWCAD, although Bldg 108, Bldg 70, and Structure 361 are individually eligible under Criterion I.A.

3.8.3 Phase I Archaeological Survey

A review of the Pennsylvania Archaeological Site Survey (PASS) files at the Pennsylvania Historical and Museum Commission revealed no previously recorded prehistoric or historic period archaeological sites within the boundaries of the project area. However, five prehistoric sites have been recorded within a one-mi (1.6-km) radius of the NAWCAD property. In addition, at least ten prehistoric sites have been recorded along the Little Neshaminy Creek basin, located two mi (3.2 km) north of the NAWCAD property. None of these sites have been listed in or determined eligible for the National Register. The records also indicated that three Phase I archaeological surveys have been conducted within three mi (4.8 km) of the project area.

An examination of the records for the identified sites revealed that approximately a dozen Archaic and Woodland Period lithic scatters (the remains of stone-tool manufacturing, maintenance, or use) have been identified near low-order streams within the general vicinity of the NAWCAD property.

The five prehistoric sites within a one-mi (1.6-km) radius of NAWCAD all contained surface scatters of points and waste flakes from the Archaic and Woodland Periods. The location of these sites near streams is consistent with predictive models for the Piedmont that expect post-Middle Archaic sites to be found near ephemeral streams and on or next to stream and river flood plain (Custer and Wallace, 1982). It is likely that low-order creeks in the area were traversed during the prehistoric period, and therefore impart at least low to moderate potential for prehistoric sites.

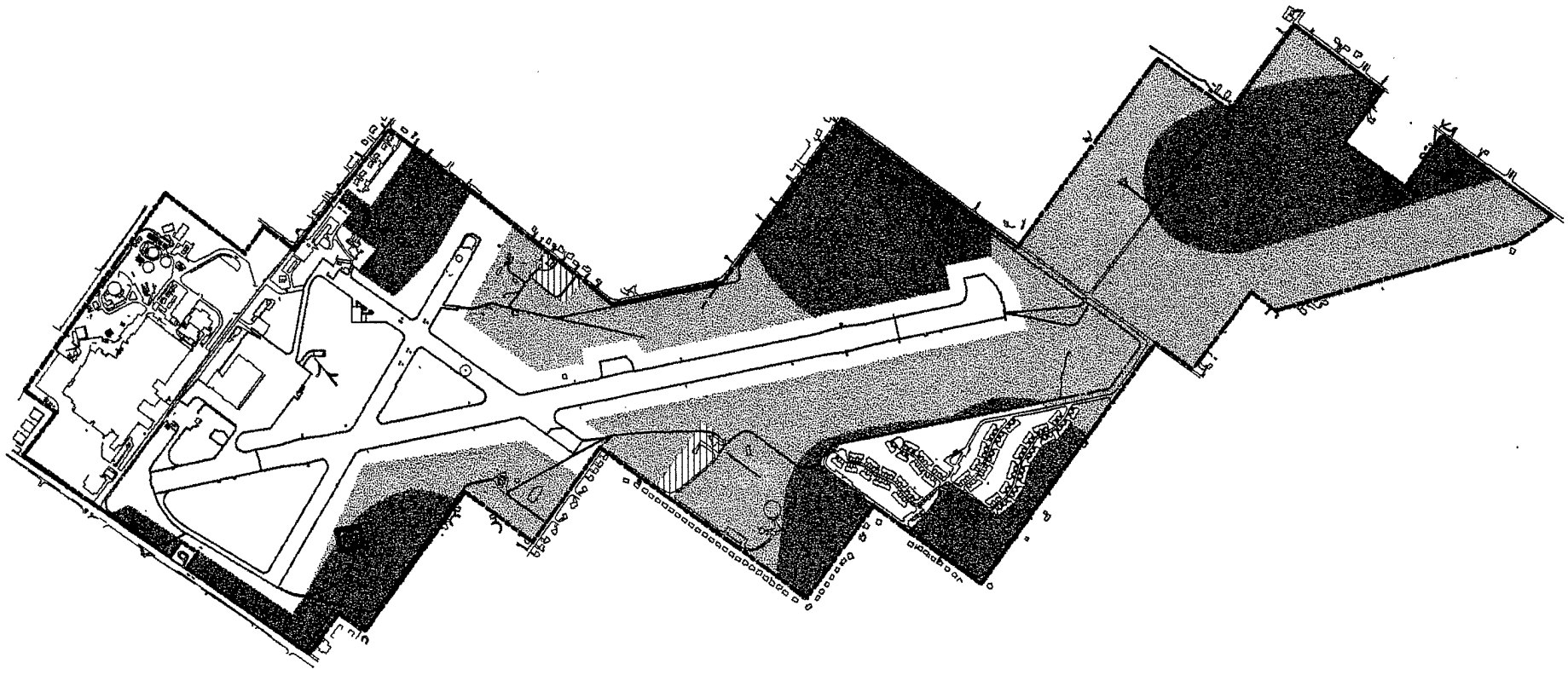
To identify the potential for intact archaeological resources at NAWCAD, a field reconnaissance survey was performed according to the Pennsylvania Bureau for Historic Preservation *Guidelines for Archaeological Investigations* (1991). During this survey, it was observed that soils at NAWCAD were extensively disturbed by the construction of industrial and scientific facilities by the Brewster Aeronautical Corporation after 1939 and the US Navy since 1944; performance of hazardous waste remediation activities; and installation of subsurface utilities. As a result of these disturbances, most original soils west of Jacksonville Road have been relocated with a consequent probable loss of integrity of most archaeological sites potentially located there. This is also true of the runway and runway apron, and other highly developed areas east of Jacksonville Road.

In contrast, the field reconnaissance survey of the areas surrounding Bldgs 100 (Quarters A) and 101 (Quarters B) and portions of the cleared-fields beyond the runway apron, suggested that they have been minimally disturbed by the construction activities that characterize the remainder of the NAWCAD facility. Therefore, if archaeological cultural resources are present in these areas, it is likely that they have been only minimally disturbed.

The yards surrounding Bldgs 100 (Quarters A) and 101 (Quarters B) have a high archaeological sensitivity for historic resources associated with the construction and domestic use of these structures (Figure 3.8-2, NAWCAD Warminster Archaeological Sensitivity). These resources may provide important information about the lives of Bucks County farming families during the late 18th and the entire 19th centuries as well as information regarding use of the properties by industrial staff and Navy personnel both during and after World War II. It is also possible that evidence of a Revolutionary War battle may be present near Quarters A.

Portions of the cleared-fields beyond the runway apron (Figure 3.8-2) are sensitive for prehistoric archaeological resources associated with the prehistoric exploitation of the lands adjacent to the headwaters of low-order streams. Several low-order streams were once present along the northern and southern edges of NAWCAD. Based on the documented exploitation of this type of natural resource during prehistory in the vicinity of NAWCAD, these areas have a moderate archaeological sensitivity for prehistoric resources such as temporary, small-sized sites, which may contain lithic scatters (the remains of stone-tool manufacturing, maintenance, or use). Portions of the cleared-fields located beyond a 656-ft (200-m) radius of these headwaters and extending generally to the apron of the runways were determined to have a moderate to low archaeological sensitivity for historic and prehistoric resources (Figure 3.8-2).

NAWCAD Warminster Archaeological Sensitivity



High Archaeological Sensitivity for Historic Resources

Moderate Archaeological Sensitivity for Prehistoric Resources

Moderate to Low Archaeological Sensitivity for Historic and Prehistoric Resources

Property Boundary

1500 0 1500

Scale in Feet

500 0 500

Scale in Meters

N

Figure 3.8-2

A Phase IB archaeological investigation of portions of NAWCAD Warminster was initiated in November 1998 to address the cultural resource issues raised through the Phase IA research and to assist in implementation of the mitigation specified in the Programmatic Agreement of December 1998 (Appendix G). This Phase IB survey was designed to determine the presence or absence of National Register-eligible resources in a 52-ac (21-ha) study area determined to possess moderate sensitivity for cultural resources. This study area is comprised of:

- Quarters A and B - the 6.1 ac (2.5 ha) consisting of the yards surrounding Buildings 100, and 101;
- The headwater zone - the approximately 28 ac (11.3 ha) located within a 656-foot (200-meter) radius of the headwaters of the project vicinity's low-order streams; and
- The grassland zone - the approximately 18 ac (7.3 ha) beyond the 656-ft (200-m) radius of the headwater zone and extending generally to the apron of the runways.

Archaeological investigations of the World War II-era buildings associated with the Brewster Aeronautical Corporation and US Navy's early laboratories are unlikely to yield new information about the technology or material culture of this era in American history. Extensive subsurface disturbance to these areas also precludes the existence of intact archeological remains. Consequently, these areas possess no potential for the presence of intact, significant archeological resources, and no further investigation of these areas is planned.

3.9 Natural Resources

3.9.1 Biological Resources

Vegetation

The vegetation at NAWCAD was originally characterized by a mixed hardwood forest. The valuable wood was logged in the 1800s and cleared for agriculture. Since that time, the post-World War II suburban growth of metropolitan Philadelphia and continued farming have combined to maintain a very small amount of forested land on and in the area of NAWCAD.

Today, the site is vegetated by large areas of maintained turf grass lawns in the area of the runways and taxiways, ornamental tree and shrub species, opportunistic tree, shrub and herbaceous species, cropland, and by naturally occurring but highly degraded woods. Ornamental tree and shrub species are located primarily in the developed areas along Jacksonville Road, with some incidental plantings along the public roads beyond the runway areas.

The extreme eastern portion of the site (located in Northampton) is currently cleared and generally devoted to agricultural use in corn cropping. The area south of the airfield contains a mixture of ornamental tree plantings including European larch (*Larix decidua*), Norway spruce (*Picea abies*), eastern white pine (*Pinus strobus*) and ornamental cherry (*Prunus* sp.), as well as natives including black cherry (*Prunus serotina*), pin oak (*Quercus palustris*), white ash (*Fraxinus americana*), yellow poplar (*Liriodendron tulipifera*), and sassafras (*Sassafras albidum*). These species were observed on the airfield side of Orion Road.

The other side of Orion Road is the on-site housing for military personnel and their families. Behind the housing facility is a remnant woodland that is highly degraded. The canopy layer is dense and averages approximately 40 to 50 ft (12 to 15 m) in height. The dominant trees in this area are yellow poplar (*Liriodendron tulipifera*), white ash (*Fraxinus americana*), hickory (*Carya* sp.), and red maple (*Acer rubrum*). A portion of the woodland understory has been removed to facilitate a cookout/recreation area. The remaining degraded understory is dominated by poison ivy (*Rhus toxicodendron*) and catbriar (*Smilax* sp.) with a maze of bike and hiking trails located throughout.

Wildlife

Open space and woodland habitats occur on-site. The open space habitats are characterized by maintained turf lawns with ornamental and opportunistic tree and shrub species, and farmland at the extreme eastern portion of the site. Woodland habitat occurs just south of the family housing development.

Threatened and Endangered Species

No federal- or state-listed threatened or endangered species have been identified as existing on or near the NAWCAD facility (Pennsylvania Natural Diversity Inventory, October 1995), nor have any been observed. No critical habitat for threatened and endangered species was observed at the site.

3.9.2 Wetlands

The National Wetlands Inventory (NWI) map for the study area identifies three wetland areas (comprising less than five acres [two hectares]) within the boundary of NAWCAD (Figure 3.9-1, National Wetlands Inventory):

- A palustrine open water, intermittently exposed/permanent (POWZ) wetland;
- A palustrine forested, broad-leaved, deciduous, temporary (PFO1A) wetland; and a
- A portion of a palustrine scrub/shrub, broad-leaved deciduous, temporarily flooded wetland.

According to the Bucks County Soil Survey, two hydric soils occur on-site: Bowmansville (Bo) and Doylestown (DoA) series.

An on-site wetland reconnaissance was performed on August 15 and 16, 1995. Most of the site was found to be dry with the exception of the area identified on the NWI map as the PSS1A wetland, on the extreme eastern portion of the site.

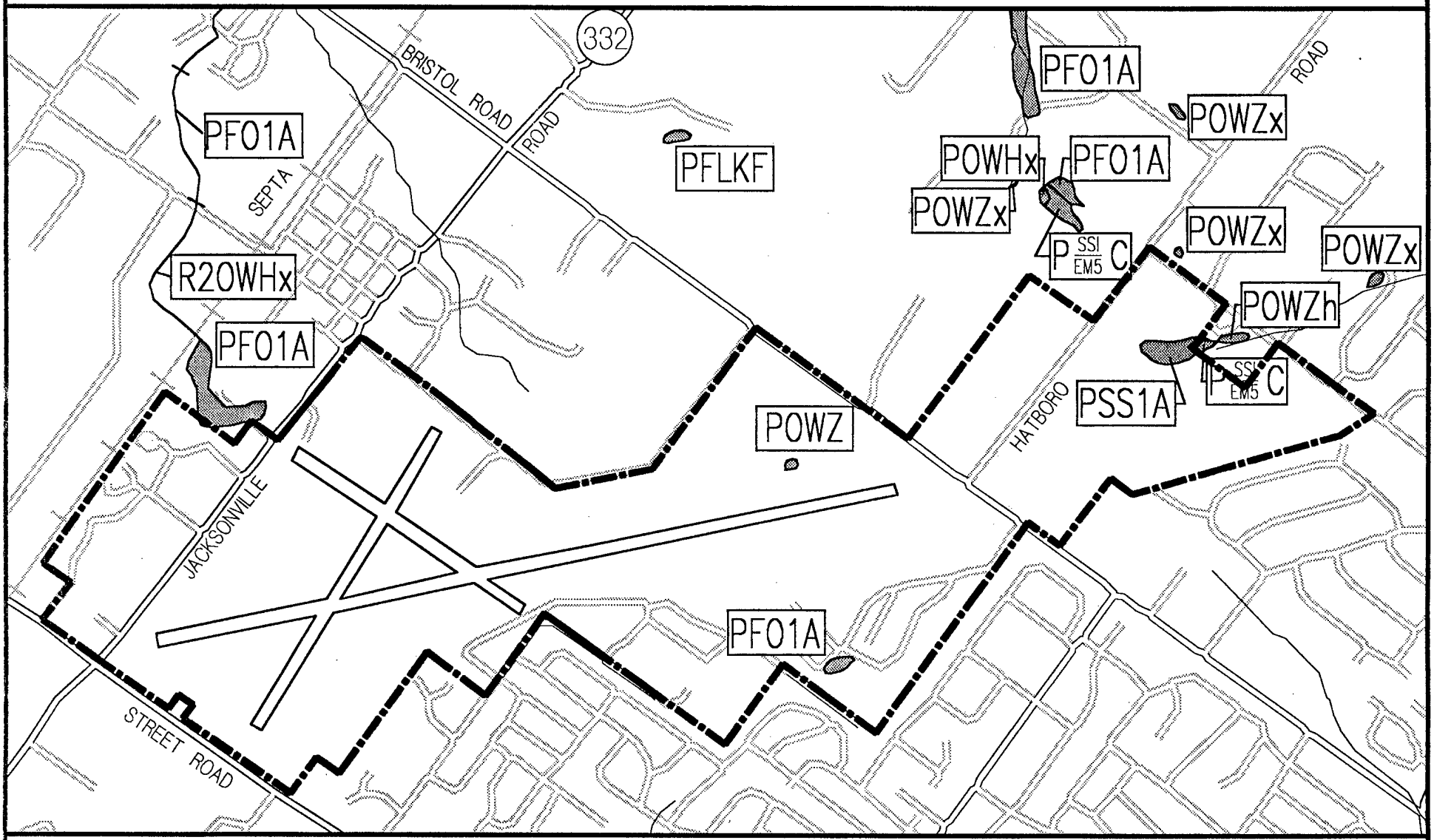
The existing background information, coupled with the field reconnaissance, indicates that a small acreage of wetlands (approximately one to five acres [0.4 to two hectares]) occurs on site. A formal wetland delineation would be required to determine the exact acreage of on-site wetlands.

3.9.3 Floodplains

Much of the natural drainage pattern of the site has been altered by development. Most of the precipitation that falls on the developed areas of the site is collected and discharged by a storm sewer system to an unnamed tributary of Little Neshaminy Creek (US Navy, February 1991). Because NAWCAD is a federal facility, it is not depicted on the National Flood Insurance Program's Flood Insurance Rate Maps (FIRM). Based upon a review of the information presented on the FIRM maps for the surrounding areas, the facility does not lie within the 100-year or 500-year floodplain.

Responding to a major flood in 1955, Bucks County instituted a flood warning system and constructed eight flood control dams in the Neshaminy Creek Basin in the 1960s. Since then, the

National Wetlands Inventory



Source: National Wetlands Inventory, 1981.

Figure 3.9-1

county's approach to flood control and stormwater management has paralleled national trends, with the emphasis changing from major structural flood control measures to more comprehensive stormwater management approaches (Bucks County Planning Commission, 1993). The Little Neshaminy Creek Watershed Stormwater Management Plan (approved by the Pennsylvania Department of Environmental Protection in June 1996) is the official plan for the eastern portion of the NAWCAD site. The western portion of the site lies within the Pennypack Watershed for which there is no official stormwater management plan at this time.

3.9.4 Topography, Geology, and Soils

Topography

The topography of the NAWCAD site is flat, with some moderately rolling hills. The runway divides the site in half, east to west, with elevations dropping to the north and south. The flat-terrain elevation ranges from a low of 297 ft (91 m) above sea level along the northern boundary of the RDT&E complex to the highest elevation on site of 377 ft (115 m), near the eastern end of the runway (US Navy, February 1991). The on-site slope averages two to three percent, with one area (north of the fence of the RDT&E complex between the SEPTA rail line and Jacksonville Road) that has a slope exceeding 15 percent.

Geology

The NAWCAD site lies within the Triassic Lowland section of the Piedmont province. The underlying bedrock is composed of consolidated sedimentary rock, primarily Stockton shales and sandstones deposited on ancient alluvial fans. The Stockton formation is the oldest sedimentary deposit in the Triassic-age Newark Group. Resting upon older rocks and overlain by the Lockatong lithofacies, the Stockton is cut by a well-developed system of joints and is extensively faulted (US Navy, February 1991).

Soils

According to the Bucks County Soil Survey, the NAWCAD site is comprised of the following soil series: Urban Land/Landsdale, Chalfont, Lawrenceville, Penn-Klinesville, Readington, Ducannon, Bowmansville, and Doylestown.

3.10 Petroleum and Hazardous Substances

Since the release of the DEIS in December 1996, the status of the use and remediation of petroleum and hazardous substances at NAWCAD has changed substantially. This is attributable to ongoing remediation measures and the operational closure (and ultimate disposal) of NAWCAD. This subchapter presents the updated status of petroleum and hazardous substances at NAWCAD based upon information provided by the Caretaker Site Office at NAWCAD (Ames, August 17, 1998).

3.10.1 Hazardous Waste/Substance Management

Prior to operational closure of NAWCAD in April 1997, a concerted effort was made to remove all hazardous wastes and hazardous substances from the base. Hazardous wastes were taken off-site. Hazardous substances were either transferred to other activities or disposed of off-site. This effort is now essentially complete.

3.10.2 Hazardous Substance and Petroleum Remediation

Information contained in this section was based upon the *Environmental Baseline Survey* (EA Engineering, 1995), the *Base Realignment and Closure Cleanup Plan* (BRAC Cleanup Team and EA Engineering, 1995), and the Community Environmental Response Facilitation Act (CERFA) report prepared for NAWCAD (US Navy, 1993). These documents summarize the status of the facility's environmental restoration and associated environmental compliance programs and present a comprehensive strategy for implementing response actions necessary to protect human health and the environment and facilitate property transfer. Compliance programs include regulation of:

- Underground storage tanks (USTs) per PA Department of Environmental Protection regulations;
- Polychlorinated Biphenyls (PCBs) by the Toxic Substances Control Act (TSCA) (15 USC 2601 et seq.);
- Air emissions per the Clean Air Act (42 USC Part 7401 et seq.);
- Discharge to surface water per the National Pollutant Discharge Elimination System (NPDES); and
- Asbestos, lead-based paint, and radon per Navy regulations.

Installation Restoration Program

A Preliminary Assessment, the first step in the Navy's Assessment and Controls of Installation Pollutants Program (NACIPP), was conducted in 1980 to identify areas where waste-containing hazardous substances may have been disposed at NAWCAD. (In 1987 the NACIPP became the Installation Restoration Program [IRP].) The areas of concern identified to date at NAWCAD are the eight inactive waste sites listed in Table 3.10-1 and shown on Figure 3.10-1 (Hazardous Waste Areas).

NAWCAD was placed on the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) National Priorities List (NPL) on October 4, 1989. In accordance with applicable federal and Pennsylvania state laws, the Navy completed two phases of Remedial Investigation (RI) work. The Phase I RI included sampling of soil and groundwater at IRP Sites 1 through 8 (SMC, September 1990). The Phase II RI included additional groundwater investigations at all IRP Sites (Haliburton NUS, April 1993).

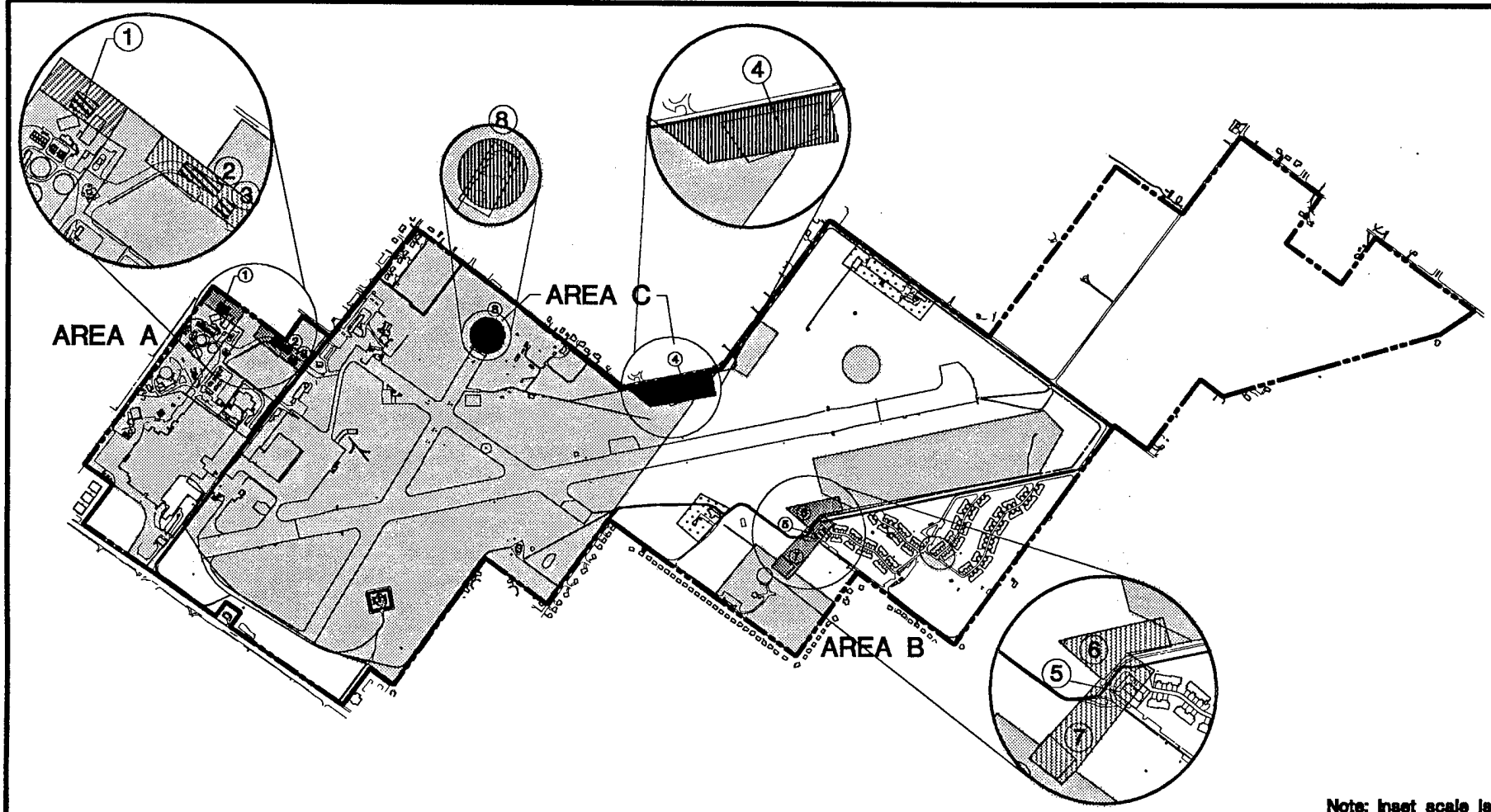
This investigation found that a CERCLA response action was necessary to address, in overburden and shallow bedrock, contaminated groundwater attributable to IRP Sites 1, 2, and 3 (Area A) and IRP Sites 5, 6, and 7 (Area B), collectively referred to as Operable Unit 1 (OU-1). A Feasibility Study (FS) was prepared in April 1993 and a Record of Decision (ROD) was signed with the USEPA in September 1993. The ROD selected an interim remedy that includes pumping and treatment of water to minimize the migration of contaminated groundwater while further RI work is conducted to fully determine the nature and extent of groundwater contamination in Areas A and B.

In April 1993, the Navy initiated sampling of residential, municipal, and commercial wells in the vicinity of NAWCAD, at USEPA's request, to determine if any groundwater used by off-base properties may have been contaminated by past Navy waste disposal activities. The sampling results suggest that Area B and IRP Sites 4 and 8 (Area C) are potential contaminant sources, along with an off-base source. In 1993 and 1994 nearby residences were connected to public water systems to ensure that local residents would not be exposed to contaminated groundwater. The connection of residences to public water systems was identified as OU-2.

Following is a summary of what has occurred with respect to the aforementioned sites since release of the DEIS in December 1996:

- **Area C (OU-3)** - Contaminated shallow groundwater attributable to Area C has been identified as OU-3. The Navy and USEPA have signed the final ROD for OU-3. Extraction wells were drilled and the wells have been connected to the Pump and Treat Facility. The system is currently on-line since and is working as designed;

Hazardous Waste Areas



Note: Inset scale is 1"= 800'.

Building and Number

Property Boundary

① IR Program Site Number

Category 1: Areas where no storage, release, or disposal has occurred

Category 2: Areas where only storage has occurred

Category 5: Areas where storage, release, disposal, and/or migration has occurred and action is underway but not final

Category 6: Areas where storage, release, disposal, and/or migration has occurred but required response actions have not been implemented

Category 7: Unevaluated areas or areas requiring additional evaluation

1600 800 0 800 1600
Scale in Feet

400 0 400
Scale in Meters

N

Source: BRAC Cleanup Team and EA Engineering, 1995

Figure 3.10-1

Table 3.10-1

Installation Restoration Program Site Summary Table

Site No.	Description	Type of Hazardous Materials	Date of Operation	Status
1	Burning Pit	Paints, oils, asphalt, roofing material, unspecified chemicals, firing range wastes	1940-1955	ROD for interim remedial action approved[(a)] Soil removal action scheduled for 1998
2	Disposal Trench	Industrial wastewater sludges	1965-1970	ROD for interim remedial action approved[(a)] Soil removal action scheduled for 1998
3	Burning Pit	Solvents, paints, roofing materials, and unspecified chemicals	1955-1965	ROD for interim remedial action[(a)] Soil removal action scheduled for 1998
4	Disposal Trench	Non-industrial solid wastes, paints, waste oils, waste metals, construction debris, solvents, and sewage treatment sludge	1966-1970	RI report completed[(a)] Removal action for wastes and contaminated soils completed
5	Disposal Trench	Paints, solvents, scrap metal, and 30 drums of asphalt	1955-1970	ROD for interim remedial action approved[(a)]
6	Disposal Trench	Paints, solvents, demolition wastes, waste oils, other flammable wastes, and grease trap wastes	1960-1980	ROD for interim remedial action approved[(a)] Soil removal action completed
7	Disposal Trench	Industrial wastewater sludge	1950-1955	ROD for interim remedial action approved[(a)]
8	Firefighting Training Area	Aviation fuel, lubricants, coolants	1961-1988	RI report completed[(a)]

Notes:
(a) Work Plan Addenda are prepared to address the data gaps identified during the RI.
RI = Remedial Investigation; ROD = Record of Decision; TBD = To be determined.
All sites are regulated under CERCLA.
Source: BRAC Cleanup Team and EA Engineering. March 1995.

- **Site 4** - An Engineering Evaluation Cost Alternative was completed for Site 4. The recommended action was a removal action for the wastes and contaminated soils at Site 4. Work was completed in 1997;

- **Site 6** - Additional RI work at Site 6 resulted in a Navy decision to conduct a soil removal action at Site 6. This removal work was completed in 1997. A follow-up feasibility study for Site 6 will be completed in 1998; and

- **Area A** - Additional RI work in Area A identified contaminated soils that exceed risk-based standards for industrial properties. A removal action is scheduled for 1998.

The area referred to in the DEIS as "the newly identified area, Area 9" is currently identified as Area D. The Navy and USEPA have signed an Interim ROD for OU-4 for groundwater remediation in Area D. The interim remedy includes pumping and treating contaminated groundwater utilizing the current Pump and Treat Facility located in Area A.

Compliance Program Status

Compliance activities at NAWCAD are being conducted along with environmental restoration activities. Since NAWCAD is slated for realignment, compliance activities will be coordinated with final property transfer. Compliance activities address storage tanks, PCBs, asbestos, radon, lead, waste management, and water and air discharges. The status of compliance projects at NAWCAD is presented in Table 3.10-2.

Storage Tanks

In 1988, Pennsylvania received authority from USEPA to regulate underground storage tanks (USTs). Effective August 1993, USTs and aboveground storage tanks (ASTs) were required to conform with 25 PA Code Chapter 245. The most recent NAWCAD Tank Management Plan (January 1996) outlines current tank usage, capacity, regulating authority, location, and recommendations.

UST removal projects at NAWCAD have been completed for the following:

- Three USTs used to store automobile fuel;

- Five USTs used to store jet fuel; and

- Several USTs used to store No. 2 heating oil.

Table 3.10-2

Closure-Related Compliance Projects

Project	Status	Regulatory Program
1. Underground Storage Tanks	UST removal projects have been completed. Existing tanks are in compliance with Pennsylvania and federal laws. Records from 1986 could not account for approximately 900 gallons of fuel oil delivered to the UST at Bldg 16. Evidence of a release could not be found.	Pennsylvania Department of Environmental Protection Regulations (25 PA Code 245, Act 32, 1989)
2. Asbestos Testing/Removal	The 1994 Asbestos Operations and Maintenance Plan is being updated. A re-survey has identified ACM material that is now identified as FAD. This material will be removed by the Navy in 1998.	US policy for base closure and EPA, 29 CFR Subpart M Sections 61.140-61.1454
3. PCB Storage/Removal	All components at NAWCAD that contained greater than 50 ppm of PCBs have been either retrofitted or removed. Hydraulic equipment at NAWCAD was not found to contain PCBs.	Toxic Substance Control Act, USEPA Policy
4. Bldg 130 and Bldg 15, 90-day Accumulation Area	All hazardous substances were either transferred to other activities or disposed of off-site as of April 1998.	RCRA, 40 CFR 262.34, PA Code Title 25 Chapter 262 Subchapter A-D
5. Bldg Decontamination	Bldg 15 was a 90-day Accumulation Area since 1993. All hazardous substances were either transferred to other activities or disposed of off-site as of April 1998. Bldg 15 closure completed 5 February 1993.	RCRA, OPNAVINST 5090.1A 9-6.5, PA Code Title 25 265.110-265.115, 40 CFR 265.110-265.115
6. Radon	Radon Inventory has been completed.	Navy Policy (CNO Hr 11000 Ser N444B/ 5U596033 of 12 Jan 1995 and DOD policies on asbestos, lead paint, and radon at BRAC properties of 31 Oct 1994)
7. Lead	A lead assessment was prepared by the NAWCAD Environmental Programs Office. Three sites are currently considered to be areas of concern for lead.	Navy Policy (CNO Hr 11000 Ser N444B/ 5U596033 of 12 Jan 1995 and DOD policies on asbestos, lead paint, and radon at BRAC properties of 31 Oct 1994)

Table 3.10-2, Continued

Closure-Related Compliance Projects

Project	Status	Regulatory Program
8. Oil/Water Separators	None on site.	None
9. Solid Waste Management Units	None on site.	RCRA
10. NPDES (Discharge to surface water)	Expired on 27 September 1994. WWTP had operated under an administrative extension. Operational closure in April 1997.	PA Department of Environmental Protection, Bureau of Water Quality Management, Title 25 Chapter 92; November 1990
11. Air Permits	Operational closure of NAWCAD in April 1997.	PA Department of Environmental Protection, Air Quality Program PA Code Title 25; March 11, 1995
Source: BRAC Cleanup Team and EA Engineering, March 1995; Ames, August 17, 1998.		

The one UST used to store aviation gasoline was emptied, cleaned, and converted to No. 2 fuel oil storage (exempt from state and federal regulation).

The remaining USTs are in compliance with state and federal laws. No leaks have been detected in any of the USTs. As part of the compliance program, the UST at Bldg 16 was replaced. Records from 1986 could not account for the delivery of approximately 900 gallons (3,400 liters) of fuel to the UST at Bldg 16. A soil and groundwater investigation was conducted to ensure that there was no leakage. No evidence of contamination was observed during that investigation.

Two spills occurred at the main boiler plant (Bldg 1) during oil transfer operations to Tanks 5, 6, and 7 on December 28, 1988 and December 31, 1989. During these two spills, oil entered storm drains and flowed to a small, unnamed tributary of Little Neshaminy Creek. Spill responses included spill control and cleanup according to PA Department of Environmental Protection regulations.

All ASTs that stored jet fuel and kerosene have been removed. Four ASTs that stored No. 2 fuel oil have been removed. In addition, although not required by law, work is currently underway to remove some USTs/ASTs that the BCT and FLRA agreed should be removed to avoid future liability problems. These tanks include UST numbers 35, 45, 46, and 51, which were used to store No. 2 fuel oil, and three UST propane tanks at the Bldg 7 swimming pool. Additionally, AST numbers 31, 33, 34, 36, and 39 and an unnumbered AST, all of which held No. 2 fuel oil, are being removed. Tank sizes range from 275 to 10,000 gallons (1,041 to 37,854 liters).

Polychlorinated Biphenyls (PCBs)

Since 1984, NAWCAD's PCB compliance program has included:

- Testing transformers for PCBs;
- Retrofitting or removing PCB transformers;
- Removing PCB capacitors; and
- Disposing of PCB-contaminated waste through Defense Reutilization and Marketing Office (DRMO) contractors in compliance with the TSCA.

Currently, all components at NAWCAD that contained greater than 50 parts per million (ppm) of PCBs have been either retrofitted or removed. The last two PCB transformers (enlisted housing development and Substation 4A-1) were retrofitted in October 1994. Hydraulic equipment was tested in June 1994 for PCB content. Concentrations of PCBs in all hydraulic fluids tested were below the detection limit of five ppm. Additional investigations have been conducted to confirm that cleanup of past PCB releases at NAWCAD have met TSCA cleanup standards.

Asbestos

Asbestos-containing material (ACM) is regulated by USEPA and the PA Department of Environmental Protection. For several years, NAWCAD's Public Works Department has funded a small crew of Philadelphia Naval Shipyard asbestos workers to work at NAWCAD removing asbestos. A field survey and report of ACM on-base was prepared that indicated that all friable, accessible, and damaged (FAD) asbestos has been removed (Kimball, 1994). An Operations and Maintenance (O&M) Plan had been developed in 1994 for the remaining ACM. The 1994 O&M Plan is currently being updated (Dewberry and Davis, 1998). A re-survey has identified ACM material that is now identified as FAD. This material is being removed by the Navy (expected to be completed by 1999).

Radon

A total of 1,709 alpha-track radon detectors were installed in NAWCAD work areas. Radon levels in excess of the USEPA-recommended action guideline of 4.1 picoCuries per liter of air (Pci/l) were reported from 15 detectors. Buildings with at least one detector indicating elevated levels of radon were Nos. 2, 3, 4, 80, and 108. The existing family housing units at NAWCAD were also tested. Two housing units displayed radon concentrations at or in excess of the USEPA recommended action guideline.

Lead

A lead-based paint (LBP) survey was prepared by the NAWCAD Environmental Programs Office from November 11 to December 3, 1993. Over 200 x-ray fluorescent analysis (XRF) tests were conducted throughout Bldg Nos. 1, 2, 3, 4, 7, and 16 and compared to the HUD guidance levels for lead concentrations (1.0 mg/cm^2). The survey determined that some LBP was present in the buildings at NAWCAD, but insufficient data were available to define the true extent. A more detailed study was recommended, but LBP is not considered to be a hazard unless chipping, peeling, or dusting.

Since April 1988, drinking water from water coolers has been tested for lead. All coolers that reported lead concentrations above the revised Maximum Contaminant Level (MCL) of 0.015 mg/L at the tap were replaced.

Records indicate that there were formerly two aircraft gun ranges and one outdoor small-arms firing range in the vicinity of the main runway. The mounds for the small arms range and one of the aircraft ranges have been demolished. A trench exists at the site of the other aircraft range, allegedly formed by the action of projectiles penetrating the ground. These three sites, due to the nature of their past use, are suspected of containing potentially high levels of lead. They were evaluated further as Phase II EBS review items.

Other Potential Sources Of Contamination/Migration Potential

A search of properties listed on federal and state information systems within a two-mile (3.2-km) radius of NAWCAD was performed. Five sites were found on the CERCLA Information System (CERCLIS), two of which have been placed on the NPL. The two NPL sites, identified as Fisher & Porter and Raymark, and the three other CERCLIS sites are unlikely to have an impact on NAWCAD (EA Engineering, March 1995).

Environmental Baseline Survey (EBS)

The Phase I EBS completed in March 1995 recommended that 53 areas be further studied. In addition, the USEPA recommended that the Wastewater Treatment Plant undergo additional studies.

The additional reviews of all areas of concern are nearing completion. Additional intrusive investigations were separated into three work plans. Site work and laboratory analyses have been completed. Final reports are currently under review.

Summary

Section 120(h) of CERCLA requires identification of parcels or locations, owned by the United States and being readied for the sale or transfer, on which hazardous substances were stored in quantities equal to or greater than the reportable quantity for one year or more, or known to have been released or disposed of on the property. CERFA (Public Law 102-425) requires the identification of all uncontaminated real property, or parcels thereof, at installations undergoing closure or realignment. As defined by CERFA, an uncontaminated property is any real property on which no hazardous substances or petroleum products or their derivatives (including aviation fuel and motor oil) were stored for one year or more, and there are no known releases or disposals associated with the property. The EBS completed for NAWCAD defined seven categories as follows:

- Category 1- Areas where no storage, release, or disposal (including migration) has occurred;
- Category 2 - Areas where only storage has occurred;
- Category 3 - Areas of contamination below action levels;
- Category 4 - Areas where all remedial action has been taken;
- Category 5 - Areas of known contamination with removal and/or remedial action underway;

- Category 6 - Areas of known contamination where required response actions have not yet been implemented; and

- Category 7- Areas that are unevaluated or that require further evaluation.

The EBS report indicates that all NAWCAD property falls into one of five categories (Categories 1, 2, 5, 6, and 7). Efforts are underway to take the actions necessary to ensure that all NAWCAD property falls into Categories 1 through 4, which is required to allow transfer of the property from the federal government to non-federal components.

4 IMPACTS OF THE PROPOSED ACTION AND ALTERNATIVES

This chapter presents a discussion of the potential environmental impacts of the proposed action and its alternatives, including the No Action Alternative, on the affected environments described in Chapter 3. Chapter 4 is organized in a manner similar to Chapter 3. Subchapters 4.1 through 4.10 address environmental impacts at NAWCAD and the surrounding area of Bucks County as related to the implementation of five alternatives: No Action, Reuse Plan, University/Institutional, Residential, and Aviation. Subchapter 4.11 discusses cumulative impacts of the disposal and reuse of NAWCAD, and other pertinent projects.

As a long-range planning tool for the redevelopment of NAWCAD, the proposed Reuse Plan presents overall development goals and objectives, particularly with respect to general types of development (e.g., industrial versus residential) and the acreage and/or floor area allocated to each broad category of land use. However, the specific development remains uncertain and much will depend upon emerging opportunities and market parameters. This situation has necessitated two levels of project impact analysis: quantitative and qualitative.

Quantitative analyses were conducted wherever possible for those aspects of the proposed Reuse Plan that are essentially a function of the number of employees and/or square feet of development. For example, regional employment impacts, intersection analyses of future traffic, motor vehicle-related air and noise impacts, and sanitary wastewater loads are discussed quantitatively.

Qualitative analyses were conducted for those proposed Reuse Plan components that cannot be specified at this time. For example, specific building renovation and site layout plans have not yet been developed and specific related impacts can only be discussed qualitatively. Similarly, although sanitary wastewater loads can be quantified at this time, industrial wastewater loads and air emissions cannot, since the specific type and requirements of such future uses are unknown. However, the qualitative analyses presented do identify sensitive environmental issues that need to be addressed and describe the types of permits (and their requirements) that must be obtained.

4.1 Land Use

4.1.1 No Action Alternative

Under the conditions of the No Action Alternative, only the operation of the Navy family housing complex, with 199 units for enlisted personnel and six units for officers, would continue at NAWCAD. The remaining portions of NAWCAD would be vacated and closed in accordance with *Base Realignment and Closure Facility Layaway and Caretaker Maintenance Standards*

(NAVFACENGCOM, September 1994). This action would not be consistent with existing land uses in central Bucks County, and continued abandonment could have a blighting influence on the surrounding area.

4.1.2 Reuse Plan

Implementation of the Reuse Plan for NAWCAD would result in the continued use and further development of the site as a technologically advanced R&D center, with more general industrial, business, and office uses; housing (both single-family and senior congregate-care); various municipal uses; and park and recreational uses. The existing airport, which accounts for the bulk of the NAWCAD land area, would be discontinued, and parts of the runway utilized as roadway and parking. Figure 2-1 in Chapter 2 shows the allocation of the proposed uses superimposed on a plan of the existing base.

The key land use elements would be accessed from the existing street network of Jacksonville Road, Street Road, Kirk Road, Bristol Road, Hatboro Road, and New Road. A proposed new internal road system would connect to the existing runway to serve the new business campus and the portion of new parkland that lies in the Town of Warminster.

In general terms, the reuse of existing facilities would be consistent with existing land uses. However, development of the new facilities and activities would involve a significant change in use from the existing airport (and its ancillary facilities) to the various proposed uses. As described in Subchapter 2.3, the proposed uses have been carefully considered, screened, and adopted by the FLRA, which was delegated the responsibility by the Bucks County Commissioners. The proposed uses are generally consistent with the land use character of the area surrounding NAWCAD: a mix of residential, commercial, light industrial, recreational, and rural uses. Nonetheless, the proposed uses would utilize the site more intensively than the present Navy activities do.

Zoning

Zoning and land use policy for NAWCAD reflect its status as a military facility. The largest portion, in Warminster Township, is zoned as a Military Reservation (MR). However, this zoning is under review by the Warminster Board of Supervisors and the Bucks County Planning Commission to accommodate the uses proposed under the Reuse Plan (Rockwell, July 29, 1998).

The site proposed for the congregate care facility under the Reuse Plan lies within Northampton Township, and is presently designated an Institutional/Public (I-P) zoning district. While a congregate care facility would be a permitted use, it would require a conditional use permit from the Board of Supervisors of Northampton Township (Northampton Zoning Code, Article VIII). The proposed parkland, also slated for the Northampton portion of NAWCAD, is a permitted use under

existing zoning. The proposed firehouse and municipal well would be located in an Agricultural-Residential (A-R) zoning district, and are uses permitted by special exception with approval by the Zoning Hearing Board.

In Ivyland, the 26-acre (11-hectare) site designated for residential development east of Jacksonville Road is presently zoned R-2, permitting single-family homes on lots of 25,000 sq ft (2,322 sq m). Given the current presence of buildings on the site and the requirements for roadways and other common spaces, the site may only accommodate approximately 40 units under the present zoning. If the 150 to 200 units proposed under the Reuse Plan were to proceed to development, Ivyland Borough would need to rezone the site to accommodate this greater density.

In addition, the portion of the multi-business park (approximately two acres [one hectare]) that lies west of Jacksonville Road in Ivyland is presently zoned I-C-2, permitting industrial and commercial uses. No specific use is proposed for this parcel in the Reuse Plan, although it is conceivable that it may serve as an extension of the existing parking for the multi-business complex.

4.1.3 University/Institutional Alternative

The University/Institutional Alternative was the original reuse plan for NAWCAD but it has been superseded by the current Reuse Plan. As its name suggests, it involves a major university/ institutional element, expanding on prior uses of the site as a technologically advanced R&D center. Other elements are broadly similar to the current Reuse Plan: expanded general industrial, business, and office uses; residential uses (both single-family and senior congregate care); various municipal uses; and park and recreational uses. A hotel and conference center are included under this alternative. The existing airport, which accounts for the bulk of the NAWCAD land area, would be discontinued and the runway removed. The key land use elements of this alternative would be tied together by a more elaborate new internal road system that connects Bristol Road to Street Road and Jacksonville Road. Figure 2-2 in Chapter 2 shows the allocation of the proposed uses superimposed on a plan of the existing base, including the runway and other existing structures.

As with the Reuse Plan, reuse of existing facilities under the University/Institutional Alternative would be consistent with existing land uses, but development of the new facilities and activities would involve a significant change in use from the existing airport (and its ancillary facilities) to the various proposed uses. While the proposed uses are generally consistent with the land use character of the area surrounding NAWCAD, they would utilize the site more intensively than the present Navy activities do; for example, the educational component would bring substantial numbers of students to the site.

Zoning

Zoning issues similar to those described for the Reuse Plan in Subsection 4.1.2 apply to the University/Institutional Alternative.

4.1.4 Residential Alternative

The Residential Alternative would involve less-intensive development than the proposed Reuse Plan. This alternative shares many basic elements with the proposed Reuse Plan, including reuse of the main buildings as a multi-business complex, the congregate care facility, the proposed residential development in Ivyland, and much of the recreational development. It differs from the Reuse Plan primarily in that it incorporates a 250-acre (101-hectare) golf/residential component that adds 400 dwelling units. This addition of 400 units to the 150 to 200 units on the Ivyland site would result in approximately 575 new dwelling units (Figure 2-3).

The residential reuse of much of NAWCAD, as proposed under this alternative, would conform with the surrounding residential land use in Warminster and Northampton Townships. The golf recreational component would provide an added market incentive and, given NAWCAD's location at the developing edge of the Philadelphia metropolitan region, would appear to have little problem in its potential marketability. The Reuse Plan's "Option 2" analysis presumed average home prices of $225,000.

4.1.5 Aviation Alternative

The Aviation Alternative would involve a level of development that is slightly more intensive than the proposed Reuse Plan's. This alternative shares some basic elements with the Reuse Plan, including the proposed reuse of the main buildings as a multi-business complex and the recreational development. It differs in that the congregate care and residential development are eliminated, an industrial/business component and a hotel/conference center are added, and the proposed industrial/business park is mostly shifted north of the runway (Figure 2-4).

The aviation reuse of part of NAWCAD, as proposed under this alternative, would be a basic general aviation facility for small aircraft. It would have a reduced-length runway and ancillary airport operations would be limited to the area south of the runway. The breakdown of approximate acreages for the different components of the aviation facility is as follows:

- Runway - 84 acres (34 hectares);
- Terminal - seven acres (three hectares); and
- Hangars, maintenance, and tiedowns - 77 acres (31 hectares).

This type of reuse of part of NAWCAD would be in conformity with the historical use of the facility as an airport. It would, however, introduce a level of aviation operations substantially greater than that seen at Warminster for many decades. As Warminster and Northampton Townships have grown over recent decades, issues of compatibility with the surrounding residential land use would undoubtedly be raised.

4.2 Socioeconomics

4.2.1 No Action Alternative

Demography

Under the No Action Alternative, the Navy would entirely vacate NAWCAD, with the exception of the six officer family housing units on Jacksonville Road and the 199-unit enlisted family housing complex (to be transferred to NAS JRB Willow Grove).

As of December 1998, there are 20 Navy employees associated with the Caretaker Site Office at NAWCAD. In addition, the FLRA has several interim leases for various facilities at the base. The number of employees associated with these facilities varies between 200 and 300 (Ames, December 2, 1998).

Of the former employees remaining in the region, it can be assumed that the great majority would seek alternative employment, and at least temporarily join the region's pool of unemployed workers. Others would be expected to retire or relocate from the region. A survey of NAWCAD employees by Coopers & Lybrand indicated that 9.5 percent of respondents would retire when NAWCAD closed (Bucks County EAC, May 1994). In the context of the population of Bucks County (541,224 in 1990) and the surrounding region, the numbers of those relocating out of the region are relatively small (less than one percent) and the No Action Alternative would not create significant adverse demographic impacts.

Employment and Income

Under the No Action Alternative, there would be no redevelopment at the base and hence no new income would be generated by businesses, institutions, and their employees.

There would be socioeconomic consequences of the Navy's withdrawal. Such consequences are likely to include a direct increase in unemployment in the region. If all the NAWCAD workers who do not relocate or retire are left unemployed, this would be approximately 665 workers. In the context of Bucks County's unemployment level of 4.9 percent (14,993 persons) in July 1995, the 665 person increment would increase the unemployment rate to 5.1 percent. There would also be direct and indirect declines in business activity, declines in demand for housing, and declines in local government revenues. While not creating these conditions, the No Action Alternative does nothing to alleviate them. Moreover, the virtual abandonment of the base could further detract from the quality of local conditions if vandalism or visual blight were to escalate, thereby lowering property values and/or inducing more households to leave the area.

Fiscal Impacts

Under the No Action Alternative, there would be no redevelopment at the base and hence no new tax revenues would be collected from real property taxes, earned income taxes, or other relevant business taxes and fees. The relevant local governments and the state would receive no revenues to offset the loss of the former activity at NAWCAD. Existing public infrastructure, facilities, and services would therefore have to be maintained by a reduced economic base. On the other hand, the No Action Alternative implies that there would be no inducement of new residential growth in the county as a result of the redeveloped base and, hence, there would be no increment of costs associated with the provision of additional services to the new households.

Housing

Under the No Action Alternative there would be no redevelopment at the base and no new housing would be constructed there. There would be no new workers and, hence, no new demand created for housing in the region by the reuse of NAWCAD. The No Action Alternative assumes the reassignment of 132 military personnel and relocation of approximately 600 civilian workers (as of May 1996) to NAWCAD Patuxent River. Additional unknown numbers of previous NAWCAD workers may relocate from the region to seek employment or retire. The net effect would be a small but noticeable depression in the Philadelphia metropolitan region's housing market, particularly in the short-term following closure of the base in 1996. The six officer family housing units on Jacksonville Road and the 199-unit enlisted family housing complex would continue to be occupied by the Navy.

4.2.2 Reuse Plan

Demography

The proposed Reuse Plan would introduce some 150 to 200 new homes in the Ivyland section of NAWCAD (ERA, 1995). Assuming that the average Bucks County 1990 household size of 2.8 persons would apply to these units, the new population generated would range from approximately 400 to 600 (This projection should be treated with caution, however, because Ivyland Borough recently "downsized" this parcel from R-1 to R-2, reducing the number of permitted units per acre from 4.3 to 1.7 [Steublis, January 31, 1997]). Table 3-2.2 shows the age breakdown of the Bucks County population in 1990. If these assumptions were to be applied to the new population, then approximately one-third would be under age 18. Another residential component of the Reuse Plan is the congregate care facility proposed in Northampton. This facility is projected to be approximately 250,000 sq ft (23,234 sq m) and is likely therefore to accommodate an estimated 500 seniors.

Other significant demographic consequences would result from the development of jobs at the former base. As elaborated in Subchapter 2.3, the proposed Reuse Plan would develop a total of 6,850 jobs at the redeveloped NAWCAD between the years 1996 and 2010.

The Reuse Plan anticipates phasing of this job development, as noted in Table 4.2-1. Exact phasing for redevelopment projects of this kind is inherently uncertain, so the Reuse Plan's assumptions are only approximate. It is assumed here that much of the development would occur in the later period.

Table 4.2-1

Reuse Plan Proposed Job Development at NAWCAD

Year	Jobs
1995-1996	200
Year 1-5	3,250
Year 6-10	1,760
Year 11-15	1,360

Source: Reuse Plan, Naval Air Warfare Center, Bucks County, Pennsylvania, March 1995.
Notes: For comparative purposes, NAWCAD loading was as high as 4,600 in 1990. It has been steadily declining since and, as of May 1996, totaled 1,129.

Placed in the relative context of the Bucks County labor force, an increase of 6,850 jobs under the Reuse Plan would represent less than 2.5 percent of the 1995 resident labor force. If all prospective employees were drawn from the pool of Bucks County unemployed workers, it would reduce the numbers of those who were unemployed by 50 percent (see Table 3.4-1) or, alternatively, would increase in-migration of new workers. Projections of the labor force from 1990 to the year 2010, by Bucks County Planning Commission, indicate a growth of between 51,386 to 86,646 persons (low and high projections, respectively), and thus easily able to absorb the proposed jobs at NAWCAD. Employment in the county is projected to increase between 49,316 and 83,216 jobs over the 1990 level (Bucks County Continuum, 1994).

The population of Bucks County is projected to increase by 124,578 between 1990 and 2010 (Bucks County Continuum, 1994); and new housing is projected to increase by 51,066 to 83,216 units (low and high projections, respectively) over the same time frame. This projected increase reflects, for the most part, anticipated in-migration to the county as the suburbanization of the Philadelphia metropolitan region continues.

Within the context of Bucks County and its projected growth through the year 2010, the proposed development at NAWCAD would be consistent with anticipated population and employment growth and unlikely to trigger any particular or unexpected problems. Moreover, the location of new workers at NAWCAD would not be limited to Bucks County. Although Bucks County would likely be the dominant place of residence for these workers, a substantial but unknown proportion is likely to live elsewhere, particularly in adjacent Montgomery County. Survey data, collected from NAWCAD employees in November 1993 by Coopers & Lybrand (consultants to the Bucks County Economic Adjustment Committee [EAC]), indicated that 62.5 percent resided in Bucks County, 24.9 percent in Montgomery County, and 12.6 percent elsewhere (Bucks County EAC, May 1994).

In light of the foregoing statistics and future projections, the specific demographic consequences of the proposed Reuse Plan may be difficult to define with any precision, but it appears that the anticipated growth at NAWCAD would be well within that already projected to be accommodated by the county through the year 2010.

Employment and Income

The characteristics of almost 6,850 new permanent jobs proposed by the Reuse Plan are broadly identified by industry category in the Reuse Plan (ERA, 1995) and are shown in Table 4.2-2. The mean earnings associated with these industry categories have been estimated in 1995 dollars based on national data provided by the Bureau of Labor Statistics. The total projected annual earnings of this proposed employment, in 1995 dollars, would be $181 million.

In addition to permanent jobs, there would be temporary jobs generated by the construction activity anticipated in the Reuse Plan and indirect employment generated as the earnings from the construction employment circulate in the regional economy. Total new construction costs under the Reuse Plan are estimated at $155 million (see Table 4.2-3). The Reuse Plan uses costs of $25 per sq ft for industrial space and $80 per sq ft for office space. These are probably very low estimates (by comparison, the Urban Land Institute uses $125 per sq ft as the cost for office development in its *Development Impact Handbook 1994*, and the city of Philadelphia uses values of $150 per sq ft for new office construction and $100 per sq ft for new industrial construction in its proposed Reuse Plan for the Naval Base and Shipyard [Philadelphia Office of Defense Conversion, 1994]).

For the sake of consistency, the Reuse Plan for NAWCAD is the source of the construction cost data used here but cost estimates for construction that would occur further into the future would need to be adjusted for cost inflation.

Table 4.2-2

Reuse Plan Proposed Employment and Estimated Earnings

Industry Category	Jobs	Estimated Mean Annual Wage ($ 1995)	Estimated Total Annual Earnings ($ 1995)
Multi-Business ("Incubator")	2,625	30,056	78,897,000
Industrial	2,850	27,100	77,234,000
Office	520	23,338	12,136,000
Congregate Care	800	14,033	11,227,000
Community	20	30,000	600,000
Parks and Recreational	35	23,504	588,000
Totals	6,850		181,682,000
Source: Based on Reuse Plan, Naval Air Warfare Center, Bucks County, Pennsylvania, March 1995; interviews with FLRA staff; and US Dept. Of Labor, Bureau of Labor Statistics, Employment and Earnings, August 1995.			

Table 4.2-3

Reuse Plan Estimated Construction Costs

Project	Est. Construction Costs ($millions)
Industrial	35.6
Business (Office)	10.4
Congregate Care	50.0
Parks and Recreation	3.0
Residential	35.0
Site Improvements	21.2
Totals	155.2
Source: Reuse Plan, Naval Air Warfare Center, Bucks County, Pennsylvania, March 1995.	

Based on these estimated construction costs, it is possible to project the number of direct construction jobs, and other indirect jobs, generated by this construction activity. The total economic impact of the construction expenditures can be derived from an econometric input/output model known as RIMS II. The US Bureau of Economic Analysis (BEA) model for the nine-county Philadelphia region was used for this EIS. On the basis of the employment and earnings multipliers provided by the model, it is possible to estimate the employment and income effects of the temporary construction employment in the region. These are shown in Table 4.2-4.

Table 4.2-4

Reuse Plan Construction and Other Indirect Employment
From Construction Activity

Activity	Employment	Earnings ($ millions)
Direct Construction	1,502	67.6
Indirect Other Industries	2,082	62.5
Totals	3,584	130.1
Source: Based on US Bureau of Economic Analysis, RIMS II model of Philadelphia Region, 1995.		

Direct construction employment is projected by the RIMS II model to provide a total of 1,502 person-year jobs, spread over the development period, this would average 100 jobs in each of the 15 years. In reality, there would likely be several peaks and troughs over the entire period. In addition, the model shows 2,080 indirect jobs would be created from the direct construction expenditures, for a total of 3,584 jobs associated with the new construction under the Reuse Plan. Assuming average construction wages of $45,000 (including benefits), total earnings from the direct construction jobs are estimated at over $67.6 million, and assuming other indirect jobs earn $30,000, they would generate $62.5 million, for total direct and indirect earnings of $130 million spread over the buildout period.

The permanent employment proposed under the Reuse Plan would reach approximately 6,850 jobs. The spending by the households of these employed workers would also generate additional secondary economic activity. Estimates of these secondary jobs and earnings have similarly been derived from the RIMS II model for the Philadelphia region. In this instance, the categories of employment are allocated to their respective standard industrial classification codes (SICC) in the detailed 471 industry input/output (I/O) matrix, which is then used to obtain the industry-specific direct-effect multipliers (Table 4.2-5). The total employment and earnings generated by the proposed activity are computed and indirect effects are obtained by deducting the direct employment and earnings. Total direct and indirect employment are computed at 14,354 jobs, with indirect employment representing 52 percent of this at 7,504 jobs. Total earnings are projected to be over

Table 4.2-5

Reuse Plan Direct and Indirect Employment and Earnings at Full Buildout

Industrial Classification	Industrial Code	Direct Jobs	Direct Earnings ($ million)	I/O Multipliers		Total Jobs	Indirect Jobs	Total Earnings ($ million)	Indirect Earnings ($ million)
				Jobs	Earnings				
Business "Incubator"	77.0402	2,625	78.897	1.6892	1.7996	4,434	1,809	141.983	63.086
Industrial	62.0100	2,850	77.234	2.5405	1.8358	7,240	4,390	141.786	64.552
Office	73.0105	520	12.136	2.6043	2.0564	1,354	834	24.956	12.820
Congregate Care	77.0800	800	11.227	1.5476	1.8747	1,238	438	21.047	9.820
Community	77.0402	20	0.6	1.736	2.1687	35	15	1.301	0.701
Park and Recreation	76.0206	35	0.588	1.5077	1.8787	53	18	1.105	0.517
Totals		6,850	181			14,354	7,504	332.179	151.497

Source: Based on US Bureau of Economic Analysis, RIMS II model of Philadelphia Region, 1995.
Notes: Dollars in 1995$
Numbers may not total exactly due to rounding.

$332 million, of which $151.5 million are generated indirectly. It should be emphasized that these numbers are in 1995 dollars but the volume is based on the full buildout scenario in year 2010. As the proposed reuse development is phased in, the indirect jobs and earnings would grow proportionately.

Fiscal Impacts

The proposed Reuse Plan suggests substantial fiscal benefits from the development of the base as described in Chapter 2. At full buildout, the Reuse Plan is estimated to provide 2.855 million sq ft (265,335 sq m) of new and reused industrial and office space, plus 150 to 200 new residential units, plus a 250,000-sq ft (23,000-sq m) congregate care facility. Much of this development would be newly brought onto the tax rolls for property taxes or provide payments in lieu of taxes (PILOT), the employment would generate new earned-incomes taxes, and the business activity generally would raise new revenues from business taxes and fees. Estimates of some of these new revenues are made in the community Reuse Plan.

Table 4.2-6 shows projected annual estimates of new property taxes, totaling $1,305,000, which would be derived from the new buildings of the industrial/office park ($810,000) and the new residential development ($495,000). These estimates, based on the Reuse Plan and an assessed value (AV) of six percent of market value, must be considered approximate because they assume relatively low market values per sq ft for the industrial and office space. Other business activities in the existing buildings and the proposed congregate care facility are designated as PILOT in the Reuse Plan and would be subject to negotiation because of the potential for public and non-profit ownership status. Consequently, the amount of revenues that would be generated by these functions is unknown at this time.

The applicable millage applied to the AV, the percent allocations to local government, and the share of the projected revenues are shown in Table 4.2-6, using Warminster as the "recipient jurisdiction." Ivyland and Northampton would receive a share from the property taxes for the residential and congregate care facilities, respectively.

Warminster would also benefit from an earned income tax of one percent applied to the earnings of the projected employees at the redeveloped base. Table 4.2-2 shows anticipated earnings, at full buildout, of almost $181 million (1995 dollars). Thus, Warminster could anticipate annual earned-income taxes of close to $1.8 million, a sum that would represent a 57 percent increase on the earned income tax revenue projected in Warminster's 1995 budget. Northampton would receive such income taxes from the projected employment at the congregate care facility that would be located on its portion of the base. Additional local revenues would flow from Business and Occupational Privilege Taxes, as well as from other minor taxes and fees. However, because they are relatively small and difficult to predict, no estimate of increases in these revenues is made at this time. Additional tax revenues would be generated on a temporary basis during the construction of the base.

Table 4.2-6
Projected Real Property Taxes

Recipient Government	Millage*	Percent Share	Dollar Share
Warminster	$21.75	7.4	$96,570
Centennial School District	$218.00	74.3	$969,615
Bucks County	$53.50	18.2	$237,510
Total	$293.25	100	$1,305,000

Note: * Millage is the rate applied per $1,000 of assessed value
Source: Reuse Plan, Naval Air Warfare Center, Bucks County, Pennsylvania, March 1995.

Depending on where employees of the redeveloped base and their households reside, and the extent to which they generate new residential construction, additional real property taxes would flow to local government. In Section 4.2.3, assumptions were made that many of the new workers would be former employees of NAWCAD or occupy homes already built. For central Bucks County, the projected 2,700 new housing units associated with employees of the redeveloped NAWCAD are mostly assigned to the Northampton and Doylestown planning areas (see discussion on housing below). Of the 1,009 assigned to the Northampton area, 722 were in Northampton Township and 40 in Warminster Township.

New households would generate new service demands on local governments. Because of the Reuse Plan's long buildout period and the uncertainty of exactly where these new employees would reside, it is not appropriate to model and project what the fiscal implications of their presence implies for specific local governments. While, in general, new homes and working households are likely to be net tax generators for local government, much depends on their specific geographic distribution and condition of the relevant schools and other local services at the time. At the present time, because of recent declines in its school population, the Centennial School District may be able to absorb many new school children before having to construct new facilities, and Warminster Township may have relatively few new service burdens associated with the redevelopment of the base. Nevertheless, it was noted already that Warminster Township would be a principal beneficiary of the earned income tax and that the Centennial School District would be the principal beneficiary of the increases in real property taxes at the base. A more equitable sharing of costs and burdens associated with the base and any new residents may be an issue for the relevant local governments to consider but it is too speculative to identify these issues more certainly at this time.

Housing

No detailed plans for the housing facilities proposed for the former base are provided. However, for the congregate care facility, an approximate project total sq ft of 250,000 sq ft (23,225 sq m) was indicated by FLRA staff. Applying an assumption of 500 gross sq ft (46 sq m) per bed indicates that

the facility would accommodate 500 residents. Under the Reuse Plan, 150 to 200 new units are proposed in Ivyland; however, the acreage available and the applicable zoning may reduce these proposed totals to something on the order of 40 units (see discussion under zoning impacts of Reuse Plan above). As a conservative assumption for measuring impacts, the estimate of 175 units in Ivyland is adopted here.

The anticipated demand for housing generated by the approximately 6,850 new workers at NAWCAD should be placed in the prior context, where base personnel loading was as high as 4,600 in 1990. Of these, 3,440 were civilian Navy employees and 800 were contract employees. Employment has been steadily declining at the base in recent years with a consequent weakening of the local economy, including the demand for housing as employees leave the region to retire or seek alternative employment. New employees at the redeveloped base would, potentially, include those idled by the departure of the Navy and therefore already in residence in the region, as well as those potential in-migrants who would be able to occupy residences vacated by those former employees who have relocated elsewhere. Nevertheless, there would be an increased demand for new housing created by the redeveloped NAWCAD.

Taking into account the previous levels of base loading, the aggregate increase in demand for new units was estimated, in order of magnitude terms, at approximately 3,000 new units for the previous Reuse Plan analyzed in the DEIS. As the present Reuse Plan has about ten percent less employment, the estimate of induced housing is reduced to 2,700 new units.

The Bucks County Planning Commission projects an increase in housing units of between 27,366 (low) to 35,466 (high) units over the period 1990 to 2000. Projections through year 2020 are shown in Table 4.2-7. Even if all the expected increment of approximately 2,700 new housing units accommodating the new workers at NAWCAD were to be located in Bucks County, the anticipated growth of housing in Bucks County could easily absorb this anticipated demand.

It is difficult to identify exactly where the new housing accommodating the redeveloped NAWCAD workers would be located. The survey of existing NAWCAD employees by Coopers & Lybrand (EAC, 1994) reported that 62.5 percent live in Bucks County. With lower Bucks County already largely built up, new housing development would most likely be concentrated in the central Bucks County region, particularly in areas where sewer and water services are being extended. The Bucks County Planning Commission has made projections of where it anticipates housing growth, by planning area and by municipality (Bucks County Planning Commission, 1994). Table 4.2-8 shows the projections by planning area and for the municipalities within the Northampton planning area, as well as the allocation of the decennial increments.

While it is impossible to predict accurately in which municipality specific numbers of new NAWCAD workers would reside, the Planning Commission's projected growth of the housing supply may serve as a reasonable surrogate for predicting the relative distribution of this new housing demand. On this basis, the Northampton planning area is anticipated to account for 33.6

Table 4.2.7

Bucks County Housing Unit Projections

	1980	1990	2000	2010	2020
Census	165,438	199,934	--	--	--
Low	--	--	227,300	251,000	262,100
Middle	--	--	232,900	260,600	283,900
High	--	--	235,400	269,300	296,300

Source: Buck County Planning Commission, Bucks County Continuum, January, 1994.

percent of the housing increment during the years 2000 to 2010 (Table 4.2-8), and Warminster Township would account for 1.3 percent of the projected increment.

Using this model and making the conservative assumptions that ***all*** of the 2,700 anticipated new housing units for the workers at the redeveloped NAWCAD were to be located in central Bucks County and ***all*** of this would occur in the single decade of 2000 to 2010, would imply that 908 of these units would locate in the Northampton planning area and, of these, an estimated 650 would locate in Northampton Township and 36 in Warminster Township. Warwick Township and Upper Southampton would account for about 153 and 67 housing units, respectively. Table 4.2-9 shows this geographic assignment of the anticipated 2,700 new housing units. For each planning area, the assignment of the new units attributable to NAWCAD accounts for about 20 percent of the Planning Commission's projected growth for the decade 2000 to 2010.

4.2.3 University/Institutional Alternative

The University/Institutional Alternative was the original Reuse Plan proposed by the FLRA and was analyzed as such in the DEIS. It is similar to the present Reuse Plan analyzed in Subchapter 4.2.2, except that it includes a major higher-educational component, a hotel/conference center, some undefined municipal uses, and a smaller park/recreation component.

Demography

The University/Institutional Alternative includes the same residential components as the Reuse Plan, with the same consequences as described in Subchapter 4.2.2.

Other significant demographic consequences would result from the development of jobs at the former base. As identified in Subchapter 2.5.2, the University/Institutional Alternative would develop 7,595 jobs at the redeveloped NAWCAD between the years 1996 and 2010. In addition,

Table 4.2-8

Distribution of Projected Housing Supply in Central Bucks County
(Middle Range Projections)

Planning Area	1990		2000		2010		2020		Increments					
	Units	%	Units	%	Units	%	Units	%	1990-2000		2000-2010		2010-2020	
									Units	%	Units	%	Units	%
Doylestown	18,671	27.5	23,760	27.7	28,710	28.9	32,960	30.4	5,089	28.2	4,950	37.0	4,250	46.6
Buckingham	5,578	8.2	6,650	7.7	7,620	7.7	9,190	8.5	1,072	5.9	970	7.2	1,570	17.2
Solebury	3,510	5.2	4,290	5.0	4,910	4.9	5,340	4.9	780	4.3	620	4.6	430	4.7
Northampton	30,748	45.4	37,750	43.9	42,250	42.6	44,570	41.1	6,966	38.6	4,500	33.6	2,320	25.4
Newtown	9,320	13.7	13,460	15.7	15,800	15.9	16,350	15.1	4,140	22.9	2,340	17.5	550	6.0
Total	67,863	100	83,850	100	99,290	100	108,410	100	18,047	100	13,380	100	9,120	100
Within Northampton Planning Area														
Ivyland	192	0.3	200	0.2	210	0.2	220	0.2	8	0.1	10	0.1	10	0.1
Northampton	11,486	16.9	16,080	18.7	19,300	19.4	20,730	19.1	4,594	25.5	3,220	24.1	1,430	15.7
Upper Southampton	5,918	8.7	6,580	7.7	6,910	7.0	7,020	6.5	662	3.7	330	2.5	110	1.2
Warminster	11,207	16.5	11,880	13.8	12,060	12.1	12,180	11.2	673	5.7	180	1.3	120	1.3
Warwick	1,981	2.9	3,010	3.5	3,770	3.8	4,420	4.1	1,029	38.6	760	5.7	650	7.1

Source: Bucks County Planning Commission, Bucks County Continuum, 1994.
Note: Numbers may not total exactly due to rounding

Table 4.2-9

Reuse Plan Assignment of Induced Housing Demand to Central Bucks County
(Middle Range Projections 2000-2010)

Planning Area	Projected Growth 2000-2010		Assignment of 2,700 Housing Units
	Housing Units	%	
Doylestown	4,950	37.0	999
Buckingham	970	7.2	196
Solebury	620	4.6	125
Northampton	4,500	33.6	908
Newtown	2,340	17.5	472
Total	13,380	100	2,700
Within Northampton Planning Area			
Ivyland	10	0.1	2
Northampton	3,220	24.1	650
Upper Southampton	330	2.5	67
Warminster	180	1.3	36
Warwick	760	5.7	153
Source: Housing projections from Bucks County Planning Commission, Bucks County Continuum, 1994.			

there would be some 2,500 students associated with the educational components. The number of jobs associated with this alternative is 10.9 percent greater than the present Reuse Plan.

As described in Subchapter 4.2.2, the employment of approximately 7,600 persons is well within the projected labor force and employment growth of Bucks County. Similarly described projections of Bucks County population and housing show that the anticipated growth at NAWCAD would be consistent with anticipated population and employment growth through the year 2010 and would be well within that already projected to be accommodated by the county. Moreover, the location of new workers at NAWCAD would not be limited to Bucks County.

Employment and Income

The University/Institutional Alternative would generate almost 7,600 new permanent jobs with direct earnings of $198.8 million, as shown in Table 4.2-10.

In addition to permanent jobs, there would be temporary jobs generated by the construction activity anticipated in the redevelopment of NAWCAD and indirect employment generated as the earnings from the construction employment circulate in the regional economy. Total construction costs under the University/Institutional Alternative are estimated at $216 million (Table 4.2-11). Similar construction costs are adopted as discussed in Subchapter 4.2.2, with the exception of the university component, for which the Reuse Plan provides no data. In this instance, a relatively modest estimate of $50 million is made for the university. Clearly, if constructed at very modest levels of amenity, a university facility could be less than this estimate. On the other hand, if more elaborate facilities (libraries, auditoria, laboratories, etc.) are included, costs could climb substantially.

Based on these estimated construction costs, it is possible to project the number of direct construction jobs, and other indirect jobs, generated by this construction activity. The total economic impact of the construction expenditures is derived from the econometric input/output model described in Subchapter 4.2.2 and shown in Table 4.2-12. Direct construction employment is projected by the model to provide a total of 2,087 person-year jobs spread over the development period, which would average 139 jobs in each of the 15 years. In reality, there would likely be several peaks and troughs over the entire period. In addition, the model shows 2,894 indirect jobs would be created from the direct construction expenditures, for a total of 4,981 jobs associated with the construction of new facilities under this alternative. Adopting the same assumptions as used in Subchapter 4.2.2 for the Reuse Plan, total earnings from the direct construction jobs are estimated at over $93.9 million, and from indirect jobs $86.8 million, for total direct and indirect earnings of $180 million spread over the build-out period.

Table 4.2-10

University/Institutional Alternative Employment and Estimated Earnings

Industry Category	Jobs	Estimated Mean Annual Wage ($ 1995)	Estimated Total Annual Earnings ($ 1995)
Multi-Business ("Incubator")/University	2,625	30,056	78,897,000
Industrial	2,850	27,100	77,234,430
Office	520	23,338	12,135,822
Hotel/Conference	260	12,501	3,250,208
Congregate Care	800	14,033	11,226,592
University use	515	30,056	15,478,840
Parks and Recreational	25	23,504	587,600
Totals	7,595		198,810,452

Source: Based on Reuse Plan, Naval Air Warfare Center, Bucks County, Pennsylvania, March 1995; BRAC 95 assumptions add 225 jobs to the multi-business complex and 115 jobs to the university and are derived from interviews with FLRA staff; and US Dept. Of Labor, Bureau of Labor Statistics, Employment and Earnings, August 1995.

Table 4.2-11

University/Institutional Alternative Estimated Construction Costs

Project	Est. Construction Costs ($millions)
Industrial	35.6
Business (Office)	10.4
Hotel/Conference	10.5
Congregate Care	50.0
University(a)	50.0
Parks and Recreation	3.0
Residential	35.0
Site Improvements	21.2
Totals	215.7

Note: (a) The estimated cost of the university campus is not provided in the Reuse Plan, the figure of $50 million is adopted here to provide an order of magnitude estimate.

Source: Reuse Plan, Naval Air Warfare Center, Bucks County, Pennsylvania, March 1995.

Table 4.2-12

University/Institutional Alternative Construction and Other Indirect Employment From Construction Activity

Activity	Employment	Earnings ($ millions)
Construction	2,087	93.9
Other Industries	2,894	86.8
Totals	4,981	180.8

Source: Based on US Bureau of Economic Analysis, RIMS II model of Philadelphia Region, 1995.

The permanent employment proposed under the University/Institutional Alternative would reach approximately 7,600 jobs. Secondary economic activity has been estimated similarly to Subchapter 4.2.2. Total direct and indirect employment is computed at 15,684 jobs, with indirect employment representing almost 52 percent of this at 8,089 jobs (Table 4.2-13). Total earnings are projected to be over $365 million, of which $166.5 million would be generated indirectly. It should be emphasized that these numbers are in 1995 dollars but the volume is based on the full buildout scenario in year 2010.

Fiscal Impacts

As with the proposed Reuse Plan, the University/Institutional Alternative would generate substantial fiscal benefits from the development of NAWCAD. At full buildout, the University/Institutional Alternative shows an estimated 4.85 million sq ft (450,565 sq m) of new and reused business and institutional space plus 150 to 200 new residential units. Much of this development would be newly brought onto the tax rolls for property taxes or provide PILOT, the employment would generate new earned-incomes taxes, and the business activity generally would raise new revenues from business taxes and fees. Estimates of some of these new revenues have been made in the Reuse Plan.

Annual estimates of real property taxes total $1,473,800 ($810,000 for the new industrial/office park; $168,000 for the hotel; and $495,000 for the new residential development). These estimates must be considered approximate because they assume relatively low values per sq ft for the industrial and office space (as provided in the community Reuse Plan). Other activities in the existing buildings and the proposed congregate care facility and university are designated as PILOT and would be subject to negotiation because of the potential for public and non-profit ownership status. Consequently, the amount of revenues that would be generated by these functions is unknown at this time.

The applicable millage applied to the AV, the percentage of allocations to local government, and the share of the projected revenues are shown in Table 4.2-14, using Warminster as the nominal recipient jurisdiction. Ivyland and Northampton would receive a share from the property taxes for the residential and congregate care facilities, respectively.

Warminster would also benefit from an earned-income tax of one percent applied to the earnings of the projected employees at the redeveloped base. Table 4.2-2 shows anticipated earnings at full buildout of almost $181 million (1995 dollars). Thus, Warminster could anticipate annual earned-income taxes of close to two million dollars, a sum that would represent a 63 percent increase on the earned-income tax revenue projected in Warminster's 1995 budget. Northampton would receive such taxes from the projected employment at the congregate care facility proposed for its portion of the base. Additional local revenues would flow from business and occupational privilege taxes, as well as from other minor taxes and fees. However, because they are relatively small and difficult to predict, no estimate of increases in these revenues is made at this time. Additional tax revenues would be generated on a temporary basis during the construction of the base.

Table 4.2-13

University/Institutional Direct and Indirect Employment and Earnings at Full Buildout

Industrial Classification	Industrial Code	Direct Jobs	Direct Earnings ($ million)	Multipliers		Total Jobs	Indirect Jobs	Total Earnings ($ million)	Indirect Earnings ($ million)
				Jobs	Earnings ($ million)				
"Incubator"/University	77.0402	2,625	78.897	1.6892	1.7996	4,434	1,809	141.983	63.086
Industrial	62.0100	2,850	77.234	2.5405	1.8358	7,240	4,390	141.786	64.552
Office	73.0105	520	12.136	2.6043	2.0564	1,354	834	24.956	12.820
Hotel/Conference	72.0100	260	3.25	1.9608	2.0287	510	250	6.593	3.343
Congregate Care	77.0800	800	11.227	1.5476	1.8747	1,238	438	21.047	9.820
University	77.0402	515	15.479	1.6892	1.7991	870	355	27.848	12.369
Park and Recreation	76.0206	25	0.588	1.5077	1.8787	38	13	1.105	0.517
Totals		7,595	198.811			15,684	8,089	365.319	166.508

Source: Based on US Bureau of Economic Analysis, RIMS II model of Philadelphia Region, 1995.
Notes: Dollars in 1995$
Numbers may not total exactly due to rounding

Table 4.2-14
Projected Real Property Taxes

Recipient Government	Millage*	Percent Share	Dollar Share
Warminster	$21.75	7.4	$109,061
Centennial School District	$218.00	74.3	$1,095,036
Bucks County	$53.50	18.2	$268,232
Total	$293.25	100	$1,473,804

Note: * Millage is the rate applied per $1,000 of assessed value
Source: Reuse Plan, Naval Air Warfare Center, Bucks County, Pennsylvania, March 1995.

As discussed in the fiscal section of Subchapter 4.2.2, additional real property taxes would flow to local government depending on where employees of the redeveloped base and their households reside, and the extent to which they generate new residential construction. Given the imprecision of anticipating induced new residential construction, order-of-magnitude assumptions similar to those used for Subchapter 4.2.2 are adopted, except that under the University/Institutional Alternative 3,000 induced new housing units are assumed.

Housing

The University/Institutional Alternative was the original Reuse Plan analyzed in the DEIS and would generate about ten percent more employment than the present Reuse Plan. Based on the discussion and assumptions described in the housing section of Subchapter 4.2.2, this employment level is projected to induce demand for some 3,000 new housing units. The conservative assumptions of distributing all these units to central Bucks County result in the allocation as shown in Table 4.2-15. The allocation represents about 22 percent of the Bucks County Planning Commission's projected growth in the planning areas over the decade 2000 to 2010.

4.2.4 Residential Alternative

Demography

The Residential Alternative would introduce more residents directly to the site than the Reuse Plan, but would reduce the number of anticipated jobs. Using the 1990 average household size for Bucks County of 2.8, the golf/residential complex of 400 units would introduce some 1,120 persons. Similarly, the area devoted to residential use in the Ivyland parcel is proposed for 150 to 200 units and implies, therefore, some 420 to 560 new residents (this element is already included in the Reuse

Table 4.2-15

University/Institutional Alternative Assignment of Induced Housing Demand to Central Bucks County
(Middle Range Projections 2000-2010)

Planning Area	Projected Growth 2000-2010		Assignment of 3,000 Housing Units
	Housing Units	%	
Doylestown	4,950	37.0	1,110
Buckingham	970	7.2	217
Solebury	620	4.6	139
Northampton	4,500	33.6	1,008
Newtown	2,340	17.5	525
Total	13,380	100	3,000
Within Northampton Planning Area			
Ivyland	10	0.1	2
Northampton	3,220	24.1	722
Upper Southampton	330	2.5	74
Warminster	180	1.3	40
Warwick	760	5.7	170
Source: Housing projections from Bucks County Planning Commission, Bucks County Continuum, 1994.			

Plan). Together, these two residential components would represent some 550 to 600 new households, composed of some 1,540 to 1,680 persons. The congregate-care facility in the Northampton portion of the base would be unchanged from the Reuse Plan, with an estimated population of approximately 500 residents.

Employment and Income

The employment and earnings estimated for the Residential Alternative are shown in Table 4.2-16. Direct employment at full buildout is projected to be 5,042, with associated earnings of over $133 million. In addition to the permanent jobs, there would be temporary jobs generated by the anticipated construction activity, and indirect employment generated as the earnings from the construction employment circulate in the regional economy.

Capital expenditures for infrastructure elements (new roads, utilities, etc.) are likely to be close to the $21.2 million estimate for the Reuse Plan. Other construction costs are identified in Table 4.2-17, which shows that total construction costs are estimated at $217 million. Based on these estimated construction costs, it is possible to project the number of direct construction jobs and other indirect jobs generated by this construction activity. Utilizing the method identified in the section on employment for the Reuse Plan, the model estimates that 2,101 construction jobs would be created. An additional 2,913 jobs would be created indirectly, thus generating a total of 5,014 direct and indirect jobs from the construction, spread over the development period. Total earnings associated with construction employment are estimated to be $94.5 million for direct and $87.4 million for indirect employment.

The permanent employment proposed under the Residential Alternative was noted above to total 5,042 jobs. The spending by the households of these employed workers will also generate additional secondary economic activity. Estimates of these secondary jobs and earnings have similarly been derived from the RIMS II model for the Philadelphia region. Again, the categories of employment are allocated to their respective SICC in the detailed 471-industry I/O matrix that is then used to obtain the industry-specific direct-effect multipliers. The total employment and earnings generated by the proposed activity are computed and indirect effects are obtained by deducting the direct employment and earnings.

The result of this modeling computes total direct and indirect employment at 9,567 jobs, with indirect employment representing 47 percent of this at 4,525 jobs. Total earnings are projected to be almost $243 million, of which almost $110 million are generated indirectly. It should be emphasized that these numbers are in 1995 dollars but the volume is based on the full buildout scenario for the year 2010. As the proposed reuse development is phased in, the indirect jobs and earnings would grow proportionately.

Table 4.2-16

Residential Alternative Anticipated Employment and Estimated Earnings

Industry Category	Jobs	Estimated Mean Annual Wage ($ 1995)	Estimated Total Annual Earnings ($ 1995)
"Incubator" (Multi-Business)	2,625	30,056	78,897,000
Industrial	1,165	27,100	31,571,500
Business	212	23,338	4,947,656
University/Institutional	115	30,056	3,456,440
Congregate Care	800	14,033	11,226,592
Golf/Residential	100	23,504	2,350,400
Parks and Recreation	25	23,504	587,600
Totals	5,042		133,037,188
Source: Reuse Plan, Naval Air Warfare Center, Bucks County, Pennsylvania, March 1995 (BRAC 95 assumptions add 225 jobs to the multi-business complex and 115 jobs to the university and are derived from interviews with Reuse Authority staff); and US Dept. Of Labor, Bureau of Labor Statistics, Employment and Earnings, August 1995.			

Table 4.2-17

Residential Alternative Estimated Construction Costs

Project	Est. Construction Costs ($millions)
Industrial	14.2
Business	4.2
Congregate Care	50.0
Golf/Residential	90.0
Parks and Recreation	2.6
Residential	35.0
Site Improvements	21.2
Totals	217.2
Based on: Reuse Plan, Naval Air Warfare Center, Bucks County, Pennsylvania, March 1995.	

Fiscal Impacts

As with the Reuse Plan, the Residential Alternative has the potential to provide substantial fiscal benefits from the base's redevelopment. Under the Residential Alternative, the estimated number of jobs generated would be 5,042, about 74 percent of the number projected to be generated under the Reuse Plan. Earnings are estimated at $133 million, also about 74 percent of the level under the Reuse Plan. The Residential Alternative would increase the number of on-site new housing units from 175, under the Reuse Plan, to 575.

Using the assumptions shown in the fiscal impacts section of Subchapter 4.2.2, and prorating them to the program proposed under the Residential Alternative, projections of real property taxes were developed and are shown in Table 4.2-18. Real property tax collections of $2.2 million plus PILOT payments are expected. Following the assumptions made in Table 4.2-6 above, these would be distributed to the relevant jurisdictions on the basis of 7.4 percent to the township, 74.3 percent to the school district, and 18.2 percent to the county. The PILOT payments would be subject to negotiation and the amount of revenues that would be generated by these functions is unknown at this time.

Warminster would also benefit from an earned-income tax of one percent applied to the earnings of the projected employees at the redeveloped base. Table 4.2-16 shows anticipated earnings at full buildout of the Residential Alternative as over $133 million (1995 dollars). Thus, Warminster could anticipate annual earned-income taxes of over $1.3 million, a sum that would represent a 32 percent increase on the earned-income tax revenue projected in Warminster's 1995 budget. Northampton would receive such income taxes from projected employment at the congregate care facility that would be located on its portion of the base. Additional local revenues would flow from business and occupational privilege taxes, as well as from other minor taxes and fees; such taxes represent about 14 percent of Warminster's 1995 budget. No estimate of increases in these revenues is made at this time. Additional tax revenues would also be generated on a temporary basis during the construction of the base.

Employees of the redeveloped base under the Residential Alternative are projected to number 5,042 at full buildout. Depending on where these employees and their households reside, and the extent to which they generate new residential construction, additional real property taxes would flow to local government. An estimate of 1,800 new housing units induced by the redevelopment is used in the analysis of demographic, housing, and community service impacts. Similar distribution assumptions would apply to sharing of real property taxes collected from these new units, but because of the uncertainty of exactly where such new residents would actually live, no estimate is made of what the specific fiscal implications would be. For Ivyland and Northampton, the Residential Alternative would have essentially the same fiscal consequences as the Reuse Plan because the proposed activities do not change. For Warminster, a major shift reduces the industrial/office park and university components and substitutes the golf/residential element. The fiscal consequence is expected to reduce

Table 4.2-18

Residential Alternative Revenues and Property Taxes (Years 1-15)

Use	Demand Forecast	Land Sales (totals)	Rent (per year)	Property Taxes (per year)
Multi-Business Complex	1.3 million sq ft (128,000 sq m)		$3,200,000	PILOT
Industrial/Business	65 acres (26 hectares)	$3,863,160		$331,168
Golf/Residential	250 acres (101 hectares)	$22,000,000***		$1,413,750
Residential (single family)	34 acres (14 hectares)	$5,000,000***		$495,250
Parks and Recreation	210 acres (85 hectares)			$0
Congregate Housing	38 acres (15 hectares)			PILOT
University (Bldgs 125 & 138)	61,000 sq ft (5,700 sq m)		$183,000**	PILOT
Inertial Lab	25,000 sq ft (2,300 sq m)		$74,500*	PILOT
Dynamic Flight Simulator	72,000 sq ft (6,700 sq m)		$216,000*	PILOT
Grand Total		$10,450,000	$3,673,000	$2,240,168 plus PILOT

Notes: PILOT = Payment in lieu of taxes, to be negotiated;
Land use acreage and amount of development are approximate based on estimates made for a long-term development plan that is subject to change. Numbers may not total exactly due to rounding and metric conversions;
* Based on assumption of $3 per sq ft used for other industrial/research space used in the Reuse Plan, actual revenues will be subject to appraisal and lease contracts;
** assumption based on 700 students and faculty;
*** estimates of land value.

Source: Reuse Plan, Naval Air Warfare Center, Bucks County, Pennsylvania, March 1995.

the earned-income tax revenues by about half, but to somewhat compensate for this reduction by increases in real property tax from the expanded golf/residential component. Under the Reuse Plan Warminster would receive estimated annual taxes of $2.3 million, plus additional PILOT payments; under the Residential Alternative, Warminster would receive $2.84 million but with few additional PILOT payments.

Housing

Many of the housing assumptions adopted for the Reuse Plan may be applied to the Residential Alternative. The total number of new housing units accommodated at the base would be increased from 175 under the Reuse Plan to 575 under the Residential Alternative. The total number of new units attributable to the new employment at the base should, however, be reduced because the anticipated employment would only be about 73 percent, at approximately 5,000 rather than 6,850, of that under the Reuse Plan. Moreover, the 400 additional units proposed under the Residential Alternative would likely accommodate a share of the new workers and their households. While it is inherently uncertain who will occupy these new units, at a minimum the new units would reduce the need for increases in the housing supply elsewhere to accommodate both the new workers at the base and the population growth anticipated for Bucks County.

The order-of-magnitude estimate of the new housing units induced by the Residential Alternative is 1,800 units. These would be distributed around the county in the same ratios used in the foregoing section on the Reuse Plan. Table 4.2-19 shows this estimated assignment to the planning areas and particularly within the Northampton planning area, which is estimated to receive 607, or 33.7 percent, of the new units. Again, the conservative assumptions made above, that all the housing development induced by the redevelopment of NAWCAD would be located in central Bucks County and all in the decade 2000 to 2010, are applied. In reality, the housing development is likely to spread over a longer time frame, and over a broader geographic region. As with the Reuse Plan, the Residential Alternative is unlikely to present unexpected or problematic growth to Bucks County. The estimated housing development is well within projected growth over the period.

4.2.5 Aviation Alternative

Demography

The Aviation Alternative would introduce no new residents to the site, but it would increase the number of anticipated jobs to a total of approximately 9,200.

Table 4.2-19

Assignment of Residential Alternative-Induced Housing to Central Bucks County
(Middle Range Projections 2000-2010)

Planning Area	Projected Growth 2000-2010		Assignment of 1,800 Housing Units
	Housing Units	%	
Doylestown	4,950	37.0	666
Buckingham	970	7.2	130
Solebury	620	4.6	83
Northampton	4,500	33.7	607
Newtown	2,340	17.5	315
Total	13,380	100	1,799
Within Northampton Planning Area			
Ivyland	10	0.1	2
Northampton	3,220	24.1	434
Upper Southampton	330	2.5	45
Warminster	180	1.3	23
Warwick	760	5.7	103

Note: Numbers may not add due to rounding.
Source: Housing projections from Bucks County Planning Commission, Bucks County Continuum, 1994.

Employment and Income

The employment and earnings estimated for the Aviation Alternative are shown in Table 4.2-20. Direct employment at full buildout is projected at 9,185, with associated earnings of over $251 million. In addition to the permanent jobs, there would be temporary jobs generated by anticipated construction activity, and indirect employment generated as the earnings from the construction employment circulate in the regional economy. Capital expenditures for infrastructure elements (e.g., new roads, utilities, etc.) are likely to be similar to the Reuse Plan's estimate of $21.2 million.

Other construction costs are identified in Table 4.2-21, using the construction cost assumptions applied to the other alternatives. Total Aviation Alternative construction costs are estimated at $142.3 million. An estimated 1,337 direct construction jobs and 1,909 indirect jobs would be generated from temporary construction. Earnings for the construction phase are estimated at $62 million for direct employment and $57 million for indirect employment. As noted in the section on employment for the Reuse Alternative, these jobs would phased in over the entire development period with several peaks and troughs likely.

The permanent employment proposed under the Aviation Alternative was noted above to total 9,185 jobs. The spending by the households of these employed workers would also generate additional secondary economic activity. Estimates of these secondary jobs and earnings have been derived from the RIMS II model for the Philadelphia region, as used in the employment sections of the other alternatives. Total direct and indirect employment is computed at 20,873 jobs, with indirect employment representing 56 percent of this at 11,688 jobs. Total earnings are projected to be almost $462 million, of which approximately $211 million are generated indirectly. It should be emphasized that these numbers are in 1995 dollars but the volume is based on the full buildout scenario in year 2010. As the proposed reuse development is phased in, the indirect jobs and earnings would grow proportionately.

Fiscal Impacts

As with the Reuse Plan, the Aviation Alternative would generate substantial fiscal benefits from the redevelopment of NAWCAD. Under the Aviation Alternative, the estimated number of jobs generated would be 9,185, which is 34 percent greater than under the Reuse Plan, and earnings are estimated at $251 million, about $70 million more.

Using the assumptions shown in the section above on the fiscal impacts of the Reuse Plan, and pro-rating them to the program proposed under the Aviation Alternative, projections of real property were made and are shown in Table 4.2-22. Annual real property tax collections of $1.9 million, plus PILOT payments, are expected. Following the assumptions made in Table 4.2-6, these would be distributed to the relevant jurisdictions on the basis of 7.4 percent to the township, 74.3 percent to the school district, and 18.2 percent to the county. The PILOT payments would be subject to negotiation and the amount of revenues that would be generated by these functions is unknown at

Table 4.2-20

Aviation Alternative Anticipated Employment and Estimated Earnings

Employment Category	Jobs	Estimated Mean Annual Wage ($ 1995)	Estimated Total Annual Earnings ($ 1995)
Multi-Business Complex	2,625	30,056	78,897,000
Industrial	5,605	27,100	151,895,500
Business	520	23,338	12,135,800
University	115	30,056	3,456,400
Aviation	40	27,100	1,084,000
Hotel/Conference	260	12,501	3,250,200
Parks and Recreation	20	23,504	470,100
Totals	9,185		251,189,000
Based on: Reuse Plan, Naval Air Warfare Center, Bucks County, Pennsylvania, March 1995 (BRAC 95 assumptions add 225 jobs to the multi-business complex and 115 jobs to the university and are derived from interviews with Reuse Authority staff); and US Dept. Of Labor, Bureau of Labor Statistics, Employment and Earnings, August 1995.			

Table 4.2-21

Aviation Alternative Estimated Construction Costs

Project	Est. Construction Costs ($millions)
Industrial	90.0
Business	10.4
Parks and Recreation	3.0
Aviation	7.2
Hotel/Conference	10.5
Site Improvements	21.2
Totals	142.3
Based on: Reuse Plan, Naval Air Warfare Center, Bucks County, Pennsylvania, March 1995.	

this time. The aviation activities are placed under PILOT at this time because the ultimate ownership status of this activity is not determined.

As with the Reuse Plan, Warminster would benefit from an earned-income tax of one percent applied to the earnings of the projected employees at the redeveloped base. With anticipated earnings at full buildout of almost $251 million (1995 dollars), under the Aviation Alternative Warminster could anticipate annual earned income taxes of $2.5 million, a sum that would represent an 80 percent increase on the earned income tax revenue projected in Warminster's 1995 budget. Additional local revenues would flow from business and occupational privilege taxes, as well as from other minor taxes and fees, although no estimate of these revenues is made at this time because of their relatively minor and uncertain nature. Additional tax revenues would be generated on a temporary basis during the reconstruction of the base.

Employees of the redeveloped NAWCAD under the Aviation Alternative are projected to number 9,185 at full buildout. Depending on where these employees and their households reside, and the extent to which they generate new residential construction, additional real property taxes would flow to local government. An estimate of 4,600 new housing units induced by the redevelopment is used. Similar distribution assumptions would apply to shares of real property taxes collected from these new units, but because of the uncertainty of exactly where such new residents would actually live, no estimate is made of what the specific fiscal implications would be.

Housing

Many of the housing assumptions adopted for the Reuse Plan may be applied to the Aviation Alternative. Although the total number of new housing units accommodated at NAWCAD would decline to zero, the total number of new units attributable to new employment would increase because the anticipated employment would increase by approximately 2,300. Whereas 2,700 new housing units were anticipated to be induced by the Reuse Plan, approximately 4,600 are projected to be induced by the Aviation Alternative. These would be distributed around the county in the same ratios as for the Reuse Plan. Table 4.2-23 shows this estimated assignment to the planning areas, particularly within the Northampton planning area, which is estimated to receive 1,550 (33.7 percent) of the new units.

The assumptions that all the housing development induced by the redevelopment of NAWCAD would be located in central Bucks County, and all in the decade 2000 to 2010, are conservative. In reality, the housing development is likely to spread over a longer time frame, and over a broader geographic region. As with the Reuse Plan, the Aviation Alternative is unlikely to present unexpected or problematic growth to Bucks County; however, in this case the estimated induced housing development accounts for about one-third of projected growth in the county over the period.

Table 4.2-22

Aviation Alternative Plan Revenues and Property Taxes (Years 1-15)

Use	Demand Forecast	Land Sales (totals)**	Rent (per year)	Property Taxes (per year)
Multi-Business Complex	1.3 million sq ft (128,000 sq m)		$3,200,000	PILOT
Industrial/Business	284 acres (115 hectares)	$18,460,000		$1,776,000
Aviation	168 acres (68 hectares)	$10,920,000		PILOT
Hotel/Conference	10 acres (4 hectares)	$1,000,000		$168,457
Parks and Recreation	162 acres (66 hectares)			$0
Inertial Lab	25,000 sq ft (2,300 sq m)		$74,500*	PILOT
Dynamic Flight Simulator	72,000 sq ft (6,700 sq m)		$216,000*	PILOT
Grand Total		$30,380,000	$3,673,000	$1,944,457 plus PILOT

Notes: PILOT = Payment in lieu of taxes, to be negotiated.
Numbers may not total exactly due to rounding and metric conversions.
Land use acreage and amount of development are approximate based on estimates made for a long-term development plan that is subject to change.
Land use acreage and amount of development are approximate based on estimates made for a long-term development plan that is subject to change.
* Based on assumption of $3 per sq ft used for other industrial/research space used in the Reuse Plan, actual revenues will be subject to appraisal and lease contracts.
** estimates of land value at $65,000 per acre as in the Reuse Plan.
Based on: Reuse Plan, Naval Air Warfare Center, Bucks County, Pennsylvania, March 1995.

Table 4.2-23

Assignment of Aviation Alternative-Induced Housing to Central Bucks County
(Middle Range Projections 2000-2010)

Planning Area	Projected Growth 2000-2010		Assignment of 4,600 Housing Units
	Housing Units	%	
Doylestown	4,950	37.0	1,703
Buckingham	970	7.2	332
Solebury	620	4.6	212
Northampton	4,500	33.6	1,550
Newtown	2,340	17.5	806
Total	13,380	100	4,600
Within Northampton Planning Area			
Ivyland	10	0.1	4
Northampton	3,220	24.1	1,109
Upper Southampton	330	2.5	115
Warminster	180	1.3	60
Warwick	760	5.7	262
Source: Housing projections from Bucks County Planning Commission, Bucks County Continuum, 1994.			

4.3 Community Services

4.3.1 No Action Alternative

Under the No Action Alternative there would be no redevelopment at the base and, thus, little or no new demand for community services. The six units of officer family housing on Jacksonville Road and the 199-unit enlisted family housing complex to be transferred to NAS JRB Willow Grove would continue to be occupied by the Navy. It is assumed that local municipalities would provide police and fire protection services to this housing. The No Action Alternative is used for comparison purposes.

4.3.2 Reuse Plan

Under the proposed Reuse Plan, certain community services (e.g., the emergency services of police, fire, and ambulance) would relate directly to the industrial and commercial redevelopment of the NAWCAD facility itself, but other services (e.g., education and health care) would relate more to the locations of induced resident workers and their families, as well as the direct development of new housing at the former base.

The numbers of new households and residents associated with the in-migrating workers at the redeveloped NAWCAD are estimated at 2,700 and 7,560, respectively (Table 4.3-1); the direct housing developed (if Ivyland Borough were to rezone to permit this) would total 175 units, accommodating an estimated population of 490. (The original Reuse Plan analyzed in the DEIS was projected to induce 3,000 new households and is analyzed in Subchapter 4.3.3 as the University/ Institutional Alternative).

Schools

In 1990, the school-age population (using census age groups ages 5-19) accounted for nearly 21 percent of Bucks County's population. This proportion is projected to decline to 19 percent by the year 2020 (Bucks County Planning Commission, 1994). Assuming that 20 percent of the new population would be school age, there would be 1,610 new students in the various school districts at full buildout of the redeveloped NAWCAD, generated by both the new workers and the new on-site housing at NAWCAD. The distribution of the student population among the three school districts serving central Bucks County in the school year 1990-91 is shown in Table 4.3-2.

The table also shows the distribution of the student population among the grades: approximately 50 percent are in elementary schools, and there are just under 25 percent each in middle and high schools. Students attending private schools in Bucks County represent 20 percent of the total student population. Applying these historical distributions to the projected student population from the

Table 4.3-1

Assignment of Reuse Plan-Induced Housing and Residents to Central Bucks County
(Middle-Range Projections 2000-2010)

Planning Area	Assignment of 2,700 Induced Housing Units (2000-2010)			Assignment of 175 Direct Housing Units		
	Units	Estimated Population	As % of Year 2010 Housing	Units	Estimated Population	As % of Year 2010 Housing
Doylestown	999	2,797	3.5	0	0	0.0
Buckingham	196	548	2.6	0	0	0.0
Solebury	125	350	2.5	0	0	0.0
Northampton	908	2,543	2.1	175	490	0.4
Newtown	472	1,322	3.0	0	0	0.0
Total	2,700	7,560	2.7	175	490	0.2
Within Northampton Planning Area						
Ivyland	2	6	1.0	175	490	83.3
Northampton	650	1,819	3.4	0	0	0.0
Upper Southampton	67	186	1.0	0	0	0.0
Warminster	36	102	0.3	0	0	0.0
Warwick	153	429	4.1	0	0	0.0
Source: Based on Bucks County Planning Commission, Bucks County Continuum, 1994.						

Table 4.3-2

Student Population of Central Bucks County (1990-1991)

Grades	Public School Districts						Total Bucks County	
	Centennial		Central Bucks		Council Rock			
	Students	%	Students	%	Students	%	Students	%
Elementary 1-6	2,878	50.1	4,788	51.3	4,580	49.2	35,728	51.1
Middle 7-9	1,375	24.3	2,265	24.3	2,381	25.6	18,012	25.7
High 10-12	1,402	24.8	2,279	24.4	2,353	25.3	16,248	23.2
Total	5,655	100	9,332	100	9,314	100	69,988	100
Private Schools								
Grades 1-8							12,930	72.4
Grades 9-12							4,940	27.6
Total							17,870	100

Note: Numbers may not total due to rounding
Source: Bucks County Planning Commission, Bucks County Continuum, 1994

in-migrating NAWCAD workers and the directly created new units in Ivyland implies that there would be an increment of about 320 new students to private schools (of which about 230 would be in grades one through eight and 90 in grades nine through 12) and 1,290 new students to public schools (of which approximately 645 would be in elementary grades, 322 in middle grades, and 322 in high school grades). If the distribution of new students were to follow the geographic pattern projected for housing/population in Table 4.3-1, and these communities are assigned to their respective school districts, the new public school students would be allocated approximately as follows: 11 percent to the Centennial District, 49 percent to the Central Bucks District, and 40 percent to the Council Rock District. Applying these assumptions results in a projected distribution of students to each of the districts as shown in Table 4.3-3.

Table 4.3-3

Reuse Plan Projected Distribution of New Student Population

Grades	Students in Public School Districts		
	Centennial	Central Bucks	Council Rock
Elementary 1-6	72	316	258
Middle 7-9	35	158	129
High 10-12	35	158	129
Total	142	632	516

Note: The model would have assigned a small percentage (4.6 percent) to the New Hope/Solebury District but these are conservatively assigned here to the three identified school districts.

If these projections are compared to recent student populations in the three school districts, as shown in Table 4.3-2, the very small increment that these new students represent is apparent. In the Central Bucks District, which is projected to receive the largest number of new students (632), this would represent an increase of 6.8 percent over the 1990-91 student population; for Council Rock the increase would represent 5.5 percent, and for Centennial 2.5 percent. In historical perspective, the Centennial District lost 31.3 percent of its student population over the course of the 1980s, and the Central Bucks District lost 6.5 percent.

On the other hand, Council Rock gained 9.8 percent over the same time frame (Bucks County Planning Commission, 1994). Council Rock has built three new elementary schools and two large additions over recent years and is developing a new capital plan to deal with continued growth. According to Council Rock School District Superintendent David Blatt, the district has been "growing" by 300 students per year (Blatt, December 18, 1995). Thus, the assignment of 552 new students to this district, phased in over a period of 20 years, is not expected to provide any unusual difficulty.

Among the basic assumptions utilized in the projected student distributions is the assignment of the entire increment of students (attributable to the new Reuse Plan workers) to these three central Bucks County school districts. In reality, these students are likely to be distributed among other school districts in Bucks County, Montgomery County, and elsewhere. Moreover, the time frame for this full buildout scenario extends some 15 to 20 years and these student population increments would not be reached until after year 2010, permitting substantial lead times for school districts to prepare for and incorporate the base reuse impacts and other unrelated demographic changes in the region.

Health Care

Subchapter 3.3.2 of this document examined the hospitals available in lower Bucks County, and Table 3.3-2 indicated the numbers of licensed beds and occupancy rates. Warminster General Hospital is the closest to NAWCAD, and provides 200 beds with an occupancy rate of 66.8 percent. The Bucks County Planning Commission's 1991 report on health care facilities indicated that projections of demand for medical/surgical and pediatric units in Bucks County general hospitals would decrease from 855 beds in 1988 to 794 beds in 2000 (Bucks County Planning Commission, 1991). The projected decline is based largely on trends towards reduced stays in hospitals. While uncertainty prevails over exactly which populations will need to be provided for in the future, the present availability of hospital beds and the possible decline in demand indicate that the population associated with redevelopment of NAWCAD would be unlikely to present any particular problems for the county's health care facilities.

Public Safety and Emergency Services

The redevelopment of NAWCAD would present a potential increase in demands on the surrounding communities' safety and security services. Subchapter 3.3.3 of this document inventoried the relevant services in proximity to NAWCAD. Discussions with township representatives indicated no problems in meeting this future demand (Hess, January 26, 1996; McClellan, January 5, 1996).

In the case of Warminster, recent declines in population have reduced demand for services (and the revenues to support these services); consequently, increases in population and the revenue base would be welcome in the township. One particular issue is related to the Navy's closure of the Fire/Crash House on the base. The Navy had, until late 1995, mutual-aid agreements with local fire services. Navy fire crews were typically first-on-the-scene respondents to daytime emergencies, because they were full-time crews in constant preparedness, whereas local crews, as volunteers, would typically have to leave their jobs and assemble prior to arrival at the scene. Warminster Township is currently considering full-time fire department employees, particularly for the day shift, due, in part, to both local need and the closure of NAWCAD (Hess, January 26, 1996). Also, Ivyland Borough officials indicated the need to expand its fire and police services with the redevelopment of NAWCAD under the Reuse Plan.

Northampton is in a population growth phase and does not foresee the proposed reuse of the base as presenting particular problems for safety and security services. The township intends to utilize a two-acre (one-hectare) area of the base on New Road for a proposed firehouse to meet the growing population needs in the western portion of the township (McClellan, January 5, 1996).

Ivyland fire protection is provided by a 20-plus volunteer force using 20-year old equipment, and its police force consists of five part-time police officers using two cars. Statements from borough officials indicated that there would be a need to expand these services with the redevelopment of NAWCAD as envisioned in the Reuse Plan (Kraus et al., April 4, 1996). The return of formerly tax-exempt Navy lands to local tax rolls would provide additional revenues to assist with financing any necessary expansion of these services.

Parks and Recreation

The Reuse Plan proposes the development of substantial park facilities totaling approximately 370 acres (150 hectares). Warminster Township would operate 250 acres (100 hectares) of the proposed parkland and Northampton Township would operate 124 acres (50 hectares).

Warminster proposes, for their portion, a variety of ballfields, athletic fields, and passive-recreation facilities including nature and picnic areas, all of which would be oriented towards and integrated with the existing Munro and Werner town parks. While the design of these particular lands may not be finalized for some time, this EIS analysis assumes that the township would operate 250 new acres of mostly active-oriented recreation/parkland, which represents a major addition to the township's supply of parkland. Existing Warminster Township and Centennial School District lands devoted to park and recreation use total 265 acres (107 hectares) (Bucks County Continuum, 1994).

In September 1995, Northampton Township submitted a Federal Lands-To-Parks Program application to the US Department of the Interior, National Park Service (NPS) for the 128 acres (52 hectares) allocated to it by the Reuse Plan. This application has been approved, and the parkland transferred to Northampton Township (Rockwell, September 18, 1998).

4.3.3 University/Institutional Alternative

The University/Institutional Alternative was the former Reuse Plan that was analyzed in the DEIS. It represents a more intensive use of the facility than the present Reuse Plan, generating about ten percent more employment at 7,595 workers, in addition to an estimated student population of 2,500. Under this alternative, the numbers of new households and residents associated with the in-migrating workers at the redeveloped NAWCAD are estimated at 3,000 and 8,400, respectively (Table 4.3-4). This is in addition to the direct housing that would be developed on the Ivyland portion of the site, estimated at 175 units accommodating a projected population of 490.

Schools

Applying assumptions similar to those used for the Reuse Plan, the new school-age population would be 1,778 new students in the various school districts at full buildout under the University/Institutional Alternative. This anticipated student population, which would be generated by both the new workers at the redeveloped NAWCAD and the new on-site housing, would be distributed among the three school districts serving central Bucks County as shown in Table 4.3-4. There would be 1,418 new students to public schools (of which approximately 709 would be in elementary grades, 355 in middle grades, and 355 in high-school grades). If the distribution of new students were to follow the geographic pattern projected for housing/population, and these communities are assigned to their respective school districts, the new public school students would be allocated approximately as follows: 11 percent to the Centennial District, 49 percent to the Central Bucks District, and 40 percent to the Council Rock District. In addition, there would be 360 new students to private schools (of which 260 would be in grades one through eight and 100 in grades nine through 12).

Table 4.3-4

University/Institutional Alternative Projected Distribution of New Student Population

Grades	Students in Public School Districts		
	Centennial	Central Bucks	Council Rock
Elementary 1-6	78	347	284
Middle 7-9	37	164	134
High 10-12	37	164	134
Total	152	675	552
Note: The model would have assigned a small percentage (4.6 percent) to the New Hope/Solebury District but these are conservatively assigned here to the three identified school districts.			

As with the Reuse Plan, these projected increases represent very small increments, particularly when based on the conservative assumptions utilized that include assigning the entire increment of students to these three central Bucks County school districts. Some unknown portion of these students are likely to be distributed among other school districts in Bucks County, Montgomery County, and elsewhere. Moreover, the time frame for this full buildout scenario extends some 15 to 20 years and these student population increments would not be reached until after the year 2010, permitting substantial lead times for school districts to prepare for and incorporate the base reuse impacts and other unrelated demographic changes in the region.

Health Care

As discussed in the section on health care for the Reuse Plan, the present availability of hospital beds and the possible decline in demand indicate that the redevelopment of NAWCAD at the levels proposed in the University/Institutional Alternative would be unlikely to present any particular problems for the county's health care facilities.

Public Safety and Emergency Services

The discussion of public safety and emergency services in the vicinity of NAWCAD presented under the Reuse Plan applies as well for this alternative; no problems are anticipated in meeting the demand proposed by the University/Institutional Alternative.

Parks and Recreation

The University/Institutional Alternative proposes the development of one-third less parkland than the Reuse Plan, but would still provide a substantial increment (250 acres [100 hectares]) to park facilities in the region. Warminster Township would operate 122 acres (49 hectares) of the proposed parkland, about half of what is in the Reuse Plan, and Northampton Township would operate the same 128 acres (52 hectares) as in the Reuse Plan. Activities similar to those described in Subsection 4.3.2 would occur, albeit on a reduced scale in the Warminster portion of these parklands.

4.3.4 Residential Alternative

Assumptions and estimates similar to those developed in Subsection 4.3.2 for the Reuse Plan may also be applied to the Residential Alternative. The primary adjustments necessary are for the increase of the number of direct residents on the former base and the decrease of the numbers of induced residents generated by employment at the redeveloped base. Table 4.3-5 shows both the direct increases in population from the housing development and the induced increases from employment.

The population that would be occupying the new housing on the former base is estimated at 1,610, compared to 490 under the Reuse Plan. The induced housing developed elsewhere in Bucks County is estimated to generate an additional population of 5,040 under the Residential Alternative, compared to 7,560 under the Reuse Plan. In total, therefore, direct and induced housing would be expected to bring a new population of 6,650 to the central Bucks County region, compared to 8,050 under the Reuse Plan.

Table 4.3-5

Residential Alternative Assignment of Direct and Induced Housing and Residents to Central Bucks County
(Middle-Range Projections 2000-2010)

Planning Area	Assignment of 1,800 Induced Housing Units (2000-2010)			Assignment of 575 Direct Housing Units		Totals		
	Units	Population	As % of Year 2010 Housing	Units	Population	Units	Population	As % of Year 2010 Housing
Doylestown	666	1,865	2.3	0	0	666	1,865	2.3
Buckingham	130	365	1.7	0	0	130	365	1.7
Solebury	83	234	1.7	0	0	83	234	1.7
Northampton	604	1,677	1.4	575	1,610	1,179	3,282	2.8
Newtown	315	881	2.0	0	0	315	881	2.0
Total	1,798	5,022	1.8	575	1,610	2,373	6,627	2.4
Within Northampton Planning Area								
Ivyland	1	4	0.6	175	490	176	493	84.0
Northampton	433	1,213	2.2	0	0	433	1,213	2.2
Upper Southampton	44	124	0.6	0	0	44	124	0.6
Warminster	23	68	0.2	400	1,120	423	1,184	3.5
Warwick	103	268	2.7	0	0	103	268	2.7

Source: Based on Bucks County Planning Commission, Bucks County Continuum, 1994; and Reuse Plan, Bucks County, PA, March 1995.

Schools

Adopting assumptions similar to those of the Reuse Plan for the proportion of school-age children, their distribution to public and private schools, and the grades to which they would be assigned results in a total of 1,064 public school children estimated under the Residential Alternative, which is 17.5 percent less than the 1,290 anticipated under the Reuse Plan. There would be fewer school-age children under the Residential Alternative, despite there being 400 more residential units on site, because anticipated employment (and therefore number of people with families) would be about 26 percent less than with the Reuse Plan. Impacts on schools in general would, therefore, be less than from the Reuse Plan. However, the model needs to be adjusted to account for a greater share of students allocated to the Centennial District because of the greater amount of on-site residential at the base. The projected school population increase for Centennial would be a total of 218, a projected increment of 3.8 percent on the 1991 student population, compared to 2.5 percent under the Reuse Plan. The other school districts would receive proportionately fewer students. The projected distribution among the districts and grades is shown in Table 4.3-6.

Table 4.3-6

Residential Alternative Projected Distribution of New School Population

Grades	Students in Public School Districts		
	Centennial	Central Bucks	Council Rock
Elementary 1-6	144	287	235
Middle 7-9	37	164	134
High 10-12	37	164	134
Total	218	615	503
Note: The model would have assigned a small percentage (4.6 percent) to the New Hope/Solebury District but these are conservatively assigned here to the three identified school districts.			

With the same caveats noted for the Reuse Plan in Subsection 4.3.2, the absorption of these students into the Centennial and Central Bucks Districts, which have been losing school-age populations, is not expected to create major problems over the 15-year development period. With respect to the growing Council Rock District, the Residential Alternative would generate fewer students than the Reuse Plan and, therefore, no adverse impact would be anticipated.

Health Care

The Residential Alternative is expected to generate a direct and induced new population of 6,650 in central Bucks County, or 17 percent fewer than under the Reuse Plan. In consequence, the

anticipated impacts upon health care service would be that much less than discussed for the Reuse Plan in Subchapter 4.3.2. No particular problems are anticipated under the Reuse Plan and, similarly, none are expected under the Residential Alternative.

Public Safety and Emergency Services

The analysis in Subchapter 4.3.2 of impacts on the surrounding community's safety and emergency services anticipated no major problems in meeting the potential demand created by the redevelopment of NAWCAD. While the Residential Alternative shifts some of the development from new employment to new residents at the base, only modest net shifts in demand for these services could be predicted. In general, the increase in the local tax base from private redevelopment of the base and the new wage tax revenues are expected to support the small increments in service capacity that would be needed.

Parks and Recreation

The Residential Alternative would provide an increment of 210 acres (85 hectares) of new public park and recreation land to the community. The portion in Northampton Township would remain the same as proposed in the Reuse Plan, whereas the portion in Warminster Township would be reduced to 86 acres (35 hectares) under the Residential Alternative. The substitution of a 250-acre (100-hectare) golf-oriented residential community accounts for the reduction in the Warminster portion. Inherently, the golf/residential uses would provide an attractive recreational amenity for the community. The provision of 210 acres (85 hectares) of new public parkland would, nonetheless, represent a major increase in the availability of public parkland in this area of Bucks County and in the Warminster and Northampton Townships.

4.3.5 Aviation Alternative

The Aviation Alternative represents the most-intensive reuse scenario. As with the other alternatives examined, certain community services relate directly to the NAWCAD facility itself, such as the emergency services of police, fire, and ambulance, but other services, such as education and health care, would relate more to the locations of induced resident workers and their families. The numbers of new households and residents associated with the in-migrating workers at the redeveloped NAWCAD are estimated at 4,600 and 12,880, respectively, for this alternative. There would be no new households introduced directly on the base.

Schools

Adopting assumptions similar to those of the Reuse Plan for the proportion of school-age children, their distribution to public and private schools, and the grades to which they would be assigned

results in a total of 2,576 school-age children estimated under the Aviation Alternative, 60 percent more than under the Reuse Plan.

Impacts on schools in general would, therefore, be greater than under the Reuse Plan. Variations also occur because there would be no new residents at the former base who would have been assigned to the Centennial School District. The projected school population increase for Centennial would be 227, which is four percent more than the 1991 student population, compared to 2.5 percent with the Reuse Plan. The projected distribution among the public school districts and grades is shown in Table 4.3-7. Parochial schools are projected to receive 515 new students.

Table 4.3-7

Aviation Alternative Projected Distribution of New School Population

Grades	Students in Public School Districts		
	Centennial	Central Bucks	Council Rock
Elementary 1-6	113	505	412
Middle 7-9	57	252	206
High 10-12	57	252	206
Total	227	1,009	824
Note: The model would have assigned a small percentage (4.6 percent) to the New Hope/Solebury District but these are conservatively assigned here to the three identified school districts.			

With the same caveats noted for the Reuse Plan in Subchapter 4.3.2, the absorption of these students into the Centennial and Central Bucks Districts, which have been losing school-age populations, is not expected to create major problems over the 15-year development period. With respect to the growing Council Rock District, the Aviation Alternative would generate 824 students but, as noted in the discussion on schools in the Reuse Alternative, Council Rock has been absorbing 300 new students per year and the projected growth from the Aviation Alternative is well within their projected growth trends.

Health Care

The Aviation Alternative is expected to generate an induced new population of 12,880 in Central Bucks County (as described at the beginning of this subchapter), or 70 percent more than under the Reuse Plan. Anticipated impacts upon health care service would be that much greater than discussed for the Reuse Plan. However, given the trends of declining demand for hospital beds, described in Subchapter 4.3.2, no particular problems are expected under the Aviation Alternative.

Public Safety and Emergency Services

The analysis of the proposed Reuse Plan's impacts on the surrounding community's safety and emergency services indicated no major problems in meeting the anticipated growth in demand created by the redevelopment of NAWCAD. While the Aviation Alternative would add new employment at the base, it would add no new residents. Consequently, only modest net shifts in demand for these services are predicted. In general, the increase in the local tax base from private redevelopment of the base and the new wage tax revenues are expected to support the small increments in service capacity that would be needed. The induced worker population would be distributed throughout the region and would be characterized as employed workers paying local property and other taxes sufficient to support any increment in service demand that they create in their local communities.

Parks and Recreation

The Aviation Alternative would provide an increment of 162 acres (66 hectares) of new public park and recreation land to the community. The 124 acres (50 hectares) in Northampton Township would increase by 38 acres (15 hectares), expanding to land that was devoted to congregate housing in the Reuse Plan. The portion of parkland in Warminster Township in the Reuse Plan would be eliminated. The provision of 162 acres (66 hectares) of new public parkland would, nonetheless, represent a major increase in the availability of public parkland in this area of Bucks County and especially for Northampton Township.

4.4 Transportation

In order to compare historical traffic volumes associated with NAWCAD to projected traffic volumes resulting from the four action alternatives, the number of trips generated at the time of the decision to close NAWCAD (April 1991) was computed. This was based on a total population of 38,900 at NAWCAD in April 1991 (civilian employees – 2,600; military personnel – 300; total annual incoming visitors – 35,000; and on-board contractors – 1,000) (Cody, July 22, 1996) and trip generation rates in *Trip Generation* (Institution of Transportation Engineers [ITE], 1991). The number of trips generated were determined to be the following:

- 1,844 during the am peak hour (6:30 to 9:30);
- 1,844 during the pm peak hour (3:30 to 6:30); and
- 10,310 total daily trips.

4.4.1 No Action Alternative

In order to predict future traffic volumes under the No Action Alternative, it is necessary to document historical traffic conditions and changes in the study area as well as future changes in traffic generators (residential and employment centers that will likely be constructed, expanded, or closed by the build year of 2010). A growth rate of one percent per year was chosen to account for general traffic growth in the area.

Several changes in traffic generation in the project area are expected to occur by 2010, including the following:

- **Closure of NAWCAD** - NAWCAD is now closed. When the existing traffic data for this EIS were gathered, employment at NAWCAD was approximately 1,400 civilians. This reduction of 1,400 personnel translates into a reduction of 1,302 vehicle trips based on current modal splits (93 percent arrive by auto). Therefore, 1,302 daily inbound and outbound vehicle trips were removed from the network. Reductions in hourly trips were based on a two-hour arrival/departure pattern.

- **Wal-Mart Retail Store** - This development is located at the southeast corner of Street Road and Jacksonville Road in Warminster Township. As this facility was not in operation when the traffic counting program was undertaken in April 1995, impacts associated with the operation of the Wal-Mart store were added onto the No Action Alternative traffic network. The number of trips generated by the development and the distribution of these trips were provided in the traffic study prepared for Wal-Mart (McMahon Associates, Inc., 1993). The trips for the Wal-Mart store have been surcharged onto the pm peak only, since the Wal-Mart store is

not open for business during the am peak hours and increase in traffic is therefore not expected at that time. The Wal-Mart study identifies 209 new vehicle trips entering and exiting during the pm peak.

The future No Action Alternative traffic network, therefore, uses the existing counts (taken in April 1995) as a baseline, provides one percent per year background growth, adds trips to account for development of the Wal-Mart store, and removes trips due to closure of NAWCAD under the No Action Alternative. The street network is assumed to remain similar to the existing network with the exception of minor signalization improvements at the Street Road/Jacksonville Road intersection. These improvements are programmed by the Pennsylvania Department of Transportation (PENNDOT) and should be completed by 2004.

LOS Analysis

Capacity analysis and Level of Service (LOS) determinations for No Action Alternative conditions were performed for the same intersections considered under existing conditions. Despite the closure of NAWCAD, background traffic growth and other nearby developments, such as the Wal-Mart store, would cause further degradations in LOS at the intersections studied. Poor operation (LOS E, or worse) would be expected at all study area intersections under the No Action Alternative. Table 4.4-1 presents the results of the No Action Alternative capacity analysis for the am and pm peaks.

Public Transportation

The existing public transportation system provides convenient access to NAWCAD. Therefore, the closure of NAWCAD would likely result in subsequent decreases in transit ridership.

4.4.2 Reuse Plan

The proposed site development, in accordance with the new Reuse Plan adopted by the FLRA in 1997, would result in the continued use and further development of the site for R&D, general industrial and office development, housing (both single-family and senior congregate care), and recreational uses.

Assumptions

The following assumptions have been used in the development of these trips:

- Employee-based trips have assumed an absenteeism rate of ten percent;

Table 4.4-1

Summary of LOS Analysis - No Action Alternative

Intersection	AM Peak Hour				PM Peak Hour			
	Appr. Volume	V/C Ratio	Stopped Delay	LOS	Appr. Volume	V/C Ratio	Stopped Delay	LOS
Bristol Road and Jacksonville Road (Location 1)								
EB	681	1.010	39.7	D	796	1.100	*	F
WB	579	1.664	*	F	659	1.783	*	F
NB	508	1.565	*	F	475	1.463	*	F
SB	555	1.338	*	F	598	1.412	*	F
Overall:			*	F			*	F
Bristol Road and Hatboro Road (Location 2)								
EB LT	700	-	5.2	B	792	-	6.8	B
WB TR	684	-	-	A	726	-	-	A
SB L	131	-	287.3	F	128	-	*	F
SB R	161	-	7.3	B	93	-	6.4	B
Overall:			21.0				43.0	
Street Road and Old York Road (Location 3)								
EB L	260	1.089	112.3	F	738	3.090	*	F
EB T	770	0.849	34.7	D	937	1.004	53.6	E
EB R	45	0.111	23.1	C	136	0.326	24.4	C
WB L	213	0.893	58.1	E	208	0.870	55.0	E
WB T	559	0.616	28.2	D	820	0.880	36.0	D
WB R	335	0.678	30.9	D	309	0.597	28.3	D
NB L	260	0.889	57.3	E	302	0.774	43.9	E
NB T	1026	0.993	48.3	E	889	0.980	48.7	E
NB R	181	0.302	22.2	C	71	0.187	23.7	C
SB L	154	0.525	40.2	E	355	0.908	54.7	E
SB TR	778	0.770	29.1	D	704	0.777	31.8	D
Overall:			42.3	E			*	F

Table 4.4-1, Continued

Summary of LOS Analysis - No Action Alternative

Intersection	AM Peak Hour				PM Peak Hour			
	Appr. Volume	V/C Ratio	Stopped Delay	LOS	Appr. Volume	V/C Ratio	Stopped Delay	LOS
Street Road and Jacksonville Road (Location 4)								
EB L	44	0.242	26.7	D	129	0.706	35.5	D
EB T	964	0.957	34.5	D	1176	1.167	*	F
EB R	371	0.721	23.4	C	229	0.469	18.1	C
WB L	308	1.707	*	F	303	1.682	*	F
WB T	1065	1.057	59.0	E	959	0.952	33.7	D
WB R	201	0.294	16.5	C	363	0.688	22.3	C
NB L	220	1.605	*	F	360	2.632	*	F
NB T	184	0.429	20.1	C	458	1.070	78.1	F
NB R	53	0.141	18.0	C	164	0.455	20.5	C
SB L	161	1.223	*	F	216	1.639	*	F
SB T	466	1.081	82.4	F	168	0.390	19.8	C
SB R	254	0.572	22.3	C	31	0.032	17.5	C
Overall:			*	F			*	F
Street Road and Second Street Pike (Location 5)								
EB L	76	0.469	16.2	C	150	0.789	29.2	D
EB TR	962	0.912	31.0	D	1055	1.017	49.3	E
WB L	93	0.556	18.9	C	105	0.538	18.5	C
WB TR	860	0.784	24.5	C	1233	1.167	*	F
NB L	59	0.330	14.9	B	252	1.031	73.6	F
NB TR	422	0.764	24.6	D	693	1.143	*	F
SB L	213	0.991	62.2	F	180	0.729	22.7	C
SB TR	555	0.856	29.2	D	556	0.944	40.9	E
Overall:			29.1	D			*	F
County Line Road and Blair Mill Road (Location 6)								
EB TR	862	0.849	25.3	D	1195	1.181	*	F
WB L	489	0.994	48.3	E	402	1.024	61.3	F
WB T	813	0.413	5.6	B	940	0.531	8.6	B
NB	385	0.967	51.4	E	687	1.275	*	F
Overall:			26.8	D			*	F

Table 4.4-1, Continued

Summary of LOS Analysis - No Action Alternative

Intersection	AM Peak Hour				PM Peak Hour			
	Appr. Volume	V/C Ratio	Stopped Delay	LOS	Appr. Volume	V/C Ratio	Stopped Delay	LOS
County Line Road and Old York Road (Location 7)								
EB L	49	0.156	22.6	C	139	0.437	24.0	C
EB TR	863	0.985	44.4	E	1056	1.133	*	F
WB L	320	1.116	*	F	438	1.463	*	F
WB TR	993	1.200	*	F	1086	1.182	*	F
NB L	190	0.931	55.9	E	138	0.688	34.2	D
NB T	526	0.765	26.8	D	518	0.721	26.8	D
NB R	350	1.014	67.8	F	303	0.758	31.2	D
SB L	59	0.294	25.7	D	106	0.532	29.6	D
SB T	444	0.675	24.9	C	785	1.142	*	F
SB R	75	0.249	20.9	C	54	0.139	21.4	C
Overall:			*	F			*	F
County Line Road and Jacksonville Road (Location 8)								
EB	1020	0.741	13.3	B	1087	1.350	*	F
WB LT	907	0.704	12.5	B	1096	0.830	17.0	C
WB R	320	0.286	8.5	B	247	0.274	9.6	B
NB	408	0.898	35.8	D	468	1.109	91.9	F
SB	779	0.872	25.2	D	889	0.914	27.0	D
Overall:			18.4	C			*	F

Notes: NB-Northbound; SB-Southbound; EB-Eastbound; WB-Westbound

L-Left turn; R-Right turn; T-Through

* Indicates an approach that is expected to operate at a volume/capacity ratio greater than 1:2. In such cases, the stopped delay is not calculated, but LOS is F.

- Indicates an unsignalized intersection.

- The existing modal split as noted in the NAWCAD Master Plan (1991) is approximately 95 percent private automobile use. Therefore, for development of project-generated vehicle trips, a 95 percent auto use has been assumed;

- All employees have been assumed to work within one shift with a two-hour arrival pattern during the am and pm peak periods; and

- Trips generated by the hotel/conference, residential, and congregate care land uses are based on rates denoted in *Trip Generation* (ITE, 1991).

The development of trips generated by the proposed Reuse Plan were distributed throughout the roadway network based on the Journey to Work data for existing employees at NAWCAD. Distribution of these trips also accounted for the new access points proposed in the Reuse Plan. Based on information provided by the FLRA, NAWCAD employees commuting to the base live in the following areas: Bucks County – 58 percent; Montgomery County – 23 percent; Philadelphia County – nine percent; Delaware County – two percent; New Jersey – three percent; and other – four percent. The distribution of trips on the local street network is provided in Figure 4.4-1 (Vehicle Trip Distribution).

Results

The development of trips generated by the Reuse Plan has been based on the anticipated number of employees and trip generation rates in *Trip Generation* (ITE, 1991). Table 4.4-2 provides a summary of the trips that would be generated by the Reuse Plan. The proposed reuse of the site would generate the following trips to the site: 2,826 additional peak-hour trips (2,340 – enter and 486 – exit) would be generated during the am peak hour and 2,886 additional trips (567 – enter and 2,319 – exit) during the pm peak, compared to the No Action Alternative. These trips were applied to the existing commuter am and pm peak hours. The proposed Reuse Plan would generate 15,370 total daily trips.

Capacity analyses were performed for the same intersections considered under existing and future (No Action Alternative) conditions. The additional trips generated by the Reuse Plan would create considerable traffic delays at *all* study area intersections, since the existing street network offers limited residual capacity. The results of the capacity analyses are provided in Table 4.4-3. As indicated in the table, under the Reuse Plan, all intersections except two would operate at unacceptable levels (LOS F) during the peak hours with extensive delays to be expected at all study area intersections. Bristol Road and Hatboro Road (Location 2) and Street Road and Second Street Pike (Location 5) would both operate at LOS E in the am peak.

As noted in Table 3.4-1, LOS F describes operations with delays in excess of sixty seconds per vehicle. This level of operation, considered to be unacceptable to most drivers, often occurs with oversaturation; i.e., when arrival flow rates exceed the capacity of the intersection (Transportation

Vehicle Trip Distribution

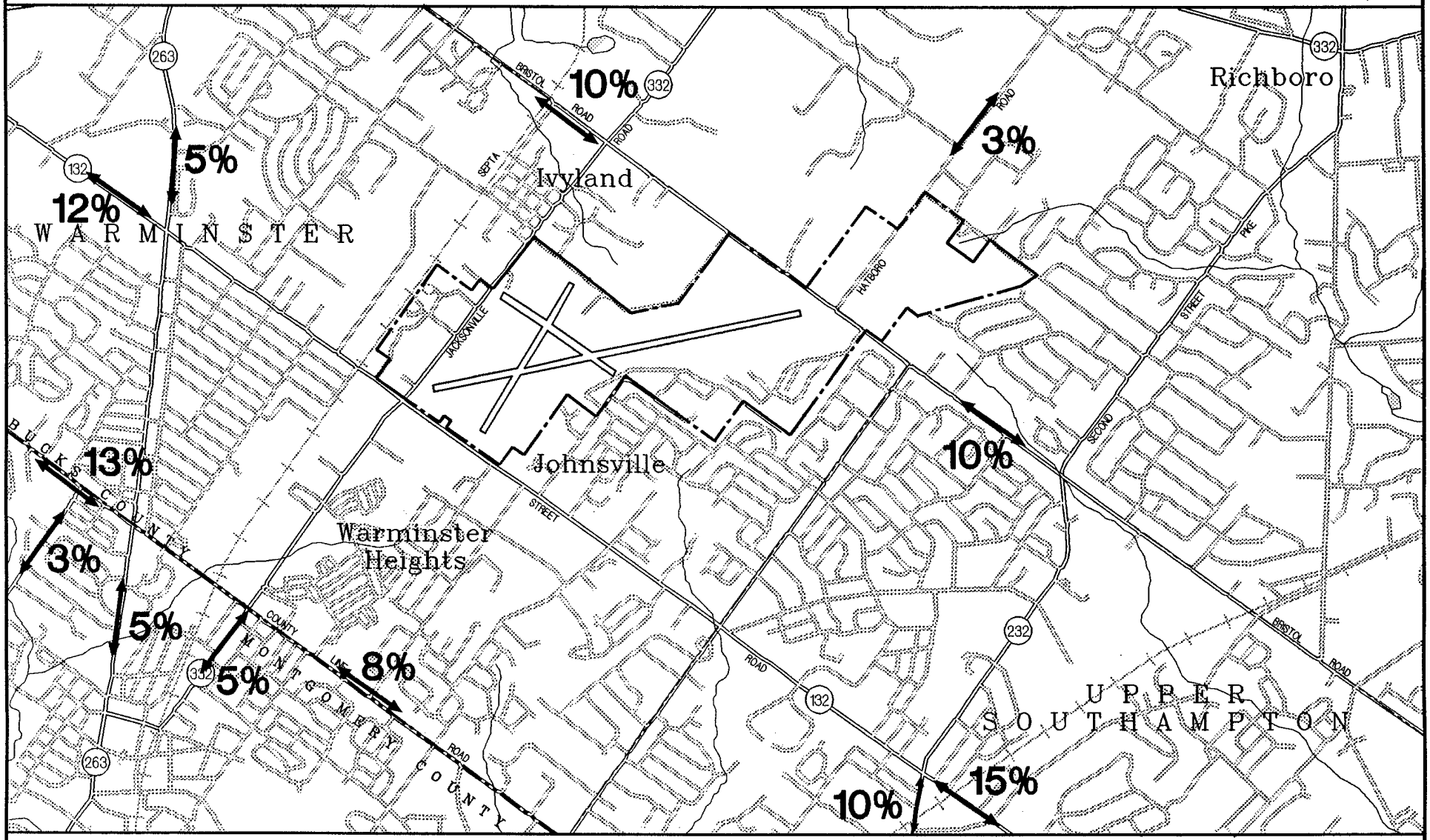


Figure 4.4-1

Table 4.4-2

Generated Vehicle Trips - Reuse Plan

Land Use	Number of Employees	Number of Dwelling Units	Vehicle Trips Generated			
			AM Peak Hour		PM Peak Hour	
			Enter	Exit	Enter	Exit
Multi-Business Complex						
Research Park	2625		971	158	105	971
Industrial	2850		1055	171	257	1026
Office	520		208	16	31	172
Residential		175 homes	34	99	116	63
Congregate Care		500 beds	38	38	53	53
Community Redevelopment	20		20	5	5	20
Parks/Recreation	35		14	0	0	14
Total peak hour trips generated			2340	486	567	2319

Table 4.4-3

Summary of LOS Analysis - Reuse Plan

Intersection	AM Peak Hour				PM Peak Hour			
	Appr. Volume	V/C Ratio	Stopped Delay	LOS	Appr. Volume	V/C Ratio	Stopped Delay	LOS
Bristol Road and Jacksonville Road (Location 1)								
EB LTR	915	1.325	*	F	853	1.225	*	F
WB LTR	628	1.570	*	F	891	2.056	*	F
NB LTR	508	1.483	*	F	475	1.387	*	F
SB LTR	555	1.267	*	F	598	1.338	*	F
Overall:		*	*	F		*	*	F
Bristol Road and Hatboro Road (Location 2)								
EB LT	764	-	-	C	1326	-	-	F
WB TR	1152	-	-	-	840	-	-	-
SB L	131	-	-	F	128	-	-	C
SB R	231	-	-	F	110	-	-	B
Overall:			403.9	F			*	F
Street Road and Old York Road (Location 3)								
EB L	260	1.089	112.3	F	738	3.090	*	*
EB T	1051	1.097	85.1	F	1005	0.969	44.3	E
EB R	45	0.105	23.1	C	136	0.294	23.1	C
WB L	213	0.846	51.4	E	208	0.824	49.3	E
WB T	617	0.644	28.6	D	1098	1.058	67.6	F
WB R	359	0.699	31.4	D	425	0.787	33.4	D
NB L	260	0.842	51.7	E	302	0.782	44.8	E
NB T	1026	0.941	39.0	D	889	0.954	44.5	E
NB R	181	0.286	22.0	C	71	0.182	24.2	C
SB L	271	0.876	55.1	E	383	0.992	70.9	F
SB TR	778	0.729	27.9	D	704	0.757	31.6	D
Overall:		1.012	50.7	E		*	*	F

Table 4.4-3 (continued)

Summary of LOS Analysis - Reuse Plan

Intersection	AM Peak Hour				PM Peak Hour			
	Appr. Volume	V/C Ratio	Stopped Delay	LOS	Appr. Volume	V/C Ratio	Stopped Delay	LOS
Street Road and Jacksonville Road (Location 4)								
EB L	442	2.423	*	F	225	1.234	*	F
EB T	964	0.907	28.4	D	1176	1.106	78.7	F
EB R	371	0.683	22.0	C	229	0.444	17.8	C
WB L	308	1.616	*	F	303	1.593	*	F
WB T	1065	1.001	42.4	E	959	0.902	28.1	D
WB R	552	1.087	83.1	F	448	0.849	30.1	D
NB L	220	0.521	*	F	360	2.494	*	F
NB T	980	2.168	*	F	651	1.439	*	F
NB R	53	0.134	18.0	C	164	0.431	20.2	C
SB L	246	1.767	*	F	564	4.058	*	F
SB T	659	1.447	*	F	956	2.099	*	F
SB R	350	0.812	30.9	D	425	1.135	*	F
Overall:		*	*	F		*	*	F
Street Road and Second Street Pike (Location 5)								
EB L	76	0.512	19.1	C	150	0.789	29.2	D
EB TR	1035	0.926	31.2	D	1403	1.348	*	F
WB L	93	0.607	20.7	C	105	0.538	18.5	C
WB TR	1211	1.039	53.5	E	1318	1.246	*	F
NB L	59	0.356	16.3	C	252	1.031	73.6	F
NB TR	656	1.178	124.9	F	750	1.235	*	F
SB L	213	1.074	92.8	F	180	0.729	22.7	C
SB TR	604	0.930	36.7	D	788	1.329	*	F
Overall:		1.108	58.1	E		*	*	F
County Line Road and Blair Mill Road (Location 6)								
EB TR	1166	1.153	*	F	1269	1.255	*	F
WB L	504	1.025	57.1	E	472	1.203	*	F
WB T	876	0.445	5.8	B	1241	0.701	10.7	B
NB LTR	455	1.181	*	F	704	1.314	*	F
Overall:		*	*	F		*	*	F

Table 4.4-3 (continued)

Summary of LOS Analysis - Reuse Plan

Intersection	AM Peak Hour				PM Peak Hour			
	Appr. Volume	V/C Ratio	Stopped Delay	LOS	Appr. Volume	V/C Ratio	Stopped Delay	LOS
County Line Road and Old York Road (Location 7)								
EB L	49	0.156	22.6	C	139	0.437	24.0	C
EB TR	1237	1.411	*	F	1147	1.230	*	F
WB L	344	1.198	*	F	554	1.850	*	F
WB TR	1071	1.295	*	F	1457	1.587	*	F
NB L	190	0.931	55.9	E	138	0.688	34.2	D
NB T	526	0.765	26.8	D	518	0.721	26.8	D
NB R	467	1.457	*	F	331	0.847	37.4	D
SB L	59	0.294	25.7	D	106	0.532	29.6	D
SB T	444	0.675	24.9	C	785	1.142	*	F
SB R	75	0.249	20.9	C	54	0.139	21.4	C
Overall:		*	*	F		*	*	F
County Line Road and Jacksonville Road (Location 8)								
EB L	512	6.887	*	F	220	3.153	*	F
EB TR	999	1.115	*	F	986	1.230	*	F
WB L	26	0.363	10.0	B	18	0.242	9.6	B
WB T	881	0.999	37.0	D	1078	1.258	*	F
WB R	507	0.553	10.8	B	292	0.340	10.0	B
NB L	54	1.211	*	F	90	1.375	*	F
NB TR	471	1.135	93.8	F	406	0.959	44.7	E
SB LTR	961	*	*	F	1678	1.778	*	F
Overall:			*	F		*	*	F

Notes: NB-Northbound; SB-Southbound; EB-Eastbound; WB-Westbound
L-Left turn; R-Right turn; T-Through
* Indicates an approach that is expected to operate at a volume/capacity ratio greater than 1:2. In such cases, the stopped delay is not calculated, but LOS is F.
- Indicates an unsignalized intersection.

Research Board, 1994). The proposed Reuse Plan would require roadway improvements to mitigate this impact. The mitigation measures investigated and the effects of each are discussed in Chapter 5 (Mitigation Measures).

4.4.3 University/Institutional Alternative

The University/Institutional Alternative (the FLRA's former Reuse Plan, which was presented in the DEIS) incorporates land use components similar to those of the new Reuse Plan, but it features more intensive development and less park and recreation use. The trips generated by this alternative were developed using assumptions similar to those used for the Reuse Plan. Using these methodologies, Table 4.4-4 was developed. The University/Institutional Alternative would generate the following trips to the site: 3,721 additional peak-hour trips (3,513 – enter and 208 – exit) would be generated during the am peak hour and 3,826 additional trips (281 – enter and 3,545 – exit) during the pm peak, compared to the No Action Alternative. These trips were applied to the existing commuter am and pm peak hours. The proposed University/Institutional Alternative would generate 26,410 total daily trips.

Comparison of Table 4.4-4 with Table 4.4-2 indicates that the University/Institutional Alternative would generate more vehicles than the Reuse Plan. Impacts of this alternative, therefore, would be greater. Capacity analyses have been conducted for two locations to demonstrate the impacts, presented in Table 4.4-5. Both locations would operate at LOS F (as with the Reuse Plan) during peak hours, with extensive delays expected.

4.4.4 Residential Alternative

The Residential Alternative would involve increased residential development and diminished industrial use. The trips generated by this alternative were developed using assumptions similar to those used for the Reuse Plan. Using these methodologies, Table 4.4-6 was developed. Compared to the No Action Alternative, the Residential Alternative would generate additional trips to the site as follows: 2,188 additional peak hour trips (1,827 – enter and 361 – exit) would be generated during the am peak hours and 2,367 additional trips (428 – enter and 1,939 – exit) during the pm peak hours. The Residential Alternative would generate 18,051 total daily trips.

Comparison of Table 4.4-6 with Table 4.4-2 indicates that the Residential Alternative would generate fewer vehicles than the Reuse Plan. While impacts of this alternative are less than for the Reuse Plan, local street operations would remain constrained during the am and pm peak hours. Capacity analyses have been conducted for two locations to demonstrate the impacts, presented in Table 4.4-7. Both locations would operate at LOS F (as with the Reuse Plan and the University/Institutional Alternative) during peak hours, with extensive delays expected.

Table 4.4-4

Generated Vehicle Trips
University/Institutional Alternative

Land Use	Number of Employees	Number of Dwelling Units	Vehicle Trips Generated			
			AM Peak Hour		PM Peak Hour	
			Enter	Exit	Enter	Exit
Multi-Business	2400		1026	0	0	1026
Industrial/Business	3370		1441	0	0	1441
Hotel/Conference		100 beds	108	71	112	96
Residential		175	34	99	116	63
Park/Recreation	25		11	0	0	11
Congregate Care		500 beds	38	38	53	53
University/Industrial	2000		855	0	0	855
Total peak-hour trips generated			3513	208	281	3545

Table 4.4-5

Summary of LOS Analysis - University/Institutional Alternative

Intersection	AM Peak Hour				PM Peak Hour			
	Appr. Volume	V/C Ratio	Stopped Delay	LOS	Appr. Volume	V/C Ratio	Stopped Delay	LOS
Street Road and Jacksonville Road (Location 4)								
EB L	724	3.967	*	F	159	0.873	50.8	E
EB T	965	0.958	34.6	D	1205	1.196	*	F
EB R	398	0.788	26.5	D	229	0.469	18.1	C
WB L	326	1.806	*	F	328	1.816	*	F
WB T	1082	1.074	65.4	F	984	0.977	37.7	D
WB R	619	1.312	*	F	382	0.734	23.8	C
NB L	220	1.605	*	F	360	2.632	*	F
NB T	1209	2.823	*	F	506	1.181	*	F
NB R	81	0.224	18.5	C	192	0.538	21.7	C
SB L	187	1.421	*	F	639	4.850	*	F
SB T	506	1.173	*	F	1206	2.796	*	F
SB R	280	0.650	24.0	C	719	2.069	*	F
Overall:			*	F			*	F
County Line Road and Old York Road (Location 7)								
EB L	154	0.486	25.2	D	143	0.449	24.2	C
EB TR	1324	1.510	*	F	1093	1.172	*	F
WB L	320	1.116	*	F	544	1.814	*	F
WB TR	1037	1.252	*	F	1550	1.689	*	F
NB L	190	0.931	55.9	E	138	0.688	34.2	D
NB T	604	0.879	32.0	D	521	0.725	26.9	D
NB R	455	1.412	*	F	307	0.772	32.0	D
SB L	59	0.294	25.7	D	106	0.532	29.6	D
SB T	444	0.675	24.9	C	864	1.256	*	F
SB R	75	0.249	20.9	C	160	0.472	23.9	C
Overall:			*	F			*	F

Notes: NB-Northbound; SB-Southbound; EB-Eastbound; WB-Westbound
L-Left turn; R-Right turn; T-Through
* Indicates an approach that is expected to operate at a volume/capacity ratio greater than 1:2. In such cases, the stopped delay is not calculated, but LOS is F.

Table 4.4-6

Generated Vehicle Trips
Residential Alternative

Land Use	Number of Employees	Number of Dwelling Units	Vehicle Trips Generated			
			AM Peak Hour		PM Peak Hour	
			Enter	Exit	Enter	Exit
Multi-Business	2515		1075	0	0	1075
Industrial/Business	1377		589	0	0	589
Residential		575	114	323	375	211
Park/Recreation	25		11	0	0	11
Congregate Care		500 beds	38	38	53	53
Total peak-hour trips generated			1827	361	428	1939

Table 4.4-7

Summary of LOS Analysis - Residential Alternative

Intersection	AM Peak Hour				PM Peak Hour			
	Appr. Volume	V/C Ratio	Stopped Delay	LOS	Appr. Volume	V/C Ratio	Stopped Delay	LOS
Street Road and Jacksonville Road (Location 4)								
EB L	536	2.941	*	F	185	1.016	83.3	F
EB T	965	0.958	34.6	D	1177	1.168	*	F
EB R	371	0.721	23.4	C	229	0.469	18.1	C
WB L	308	1.707	*	F	304	1.687	*	F
WB T	1065	1.057	59.0	E	960	0.953	33.9	D
WB R	510	1.047	68.9	F	419	0.826	28.7	D
NB L	220	1.605	*	F	360	2.632	*	F
NB T	820	1.915	*	F	550	1.284	*	F
NB R	54	0.144	18.1	C	164	0.455	20.5	C
SB L	161	1.223	*	F	540	4.098	*	F
SB T	542	1.256	*	F	827	1.918	*	F
SB R	254	0.572	22.3	C	538	1.534	*	F
Overall:			*	F			*	F
County Line Road and Old York Road (Location 7)								
EB L	122	0.385	24.1	C	139	0.437	24.0	C
EB TR	1180	1.346	*	F	1075	1.153	*	F
WB L	320	1.116	*	F	508	1.694	*	F
WB TR	993	1.200	*	F	1407	1.533	*	F
NB L	190	0.931	55.9	E	138	0.688	34.2	D
NB T	587	0.855	30.4	D	536	0.747	27.4	D
NB R	423	1.291	*	F	303	0.758	31.2	D
SB L	59	0.294	25.7	D	106	0.532	29.6	D
SB T	444	0.675	24.9	C	850	1.236	*	F
SB R	75	0.249	20.9	C	127	0.368	22.8	C
Overall:			*	F			*	F

Notes: NB-Northbound; SB-Southbound; EB-Eastbound; WB-Westbound
L-Left turn; R-Right turn; T-Through

* Indicates an approach that is expected to operate at a volume/capacity ratio greater than 1:2. In such cases, the stopped delay is not calculated, but LOS is F.

4.4.5 Aviation Alternative

The trips generated by the Aviation Alternative were developed using assumptions similar to those used for the Reuse Plan. Using these methodologies, Table 4.4-8 was developed. The Aviation Alternative would generate trips to the site as follows: 4,001 additional peak-hour trips (3,920 – enter and 81 – exit) would be generated during the am peak hours and 4,030 additional trips (122 – enter and 3,908 – exit) during the pm peak hours, compared to the No Action Alternative. The Aviation Alternative would generate 27,044 total daily trips.

Comparison of Table 4.4-8 with Table 4.4-2 indicates that the Aviation Alternative would generate more vehicles than the Reuse Plan. Impacts of this alternative, therefore, would be more substantial. Capacity analyses have been conducted for two locations to demonstrate the impacts, presented in Table 4.4-9. Both locations would operate at LOS F (as with the Reuse Plan and other alternatives) during peak hours, with extensive delays expected.

Table 4.4-8

Generated Vehicle Trips
Aviation Alternative

Land Use	Number of Employees	Number of Dwelling Units	Vehicle Trips Generated			
			AM Peak Hour		PM Peak Hour	
			Enter	Exit	Enter	Exit
Multi-Business	2400		1025	0	0	1025
Industrial/Business	6465		2760	0	0	2760
Aviation	40		17	10	10	17
Hotel/Conference		100 beds	108	71	112	96
Park/Recreation	20		10	0	0	10
Total peak hour trips generated			3920	81	122	3908

Table 4.4-9

Summary of LOS Analysis - Aviation Alternative

Intersection	AM Peak Hour				PM Peak Hour			
	Appr. Volume	V/C Ratio	Stopped Delay	LOS	Appr. Volume	V/C Ratio	Stopped Delay	LOS
Street Road and Jacksonville Road (Location 4)								
EB L	781	4.283	*	F	152	0.834	45.7	E
EB T	984	0.977	37.7	D	1178	1.169	*	F
EB R	371	0.721	23.4	C	229	0.469	18.1	C
WB L	309	1.712	*	F	323	1.791	*	F
WB T	1066	1.058	59.3	E	979	0.972	36.8	D
WB R	652	1.391	*	F	363	0.688	22.3	C
NB L	220	1.605	*	F	360	2.632	*	F
NB T	1293	3.020	*	F	493	1.152	*	F
NB R	73	0.200	18.4	C	165	0.458	20.6	C
SB L	170	1.291	*	F	665	5.048	*	F
SB T	489	1.133	*	F	1274	2.955	*	F
SB R	269	0.618	23.2	C	766	2.207	*	F
Overall:			*	F			*	F
County Line Road and Old York Road (Location 7)								
EB L	163	0.513	25.5	D	143	0.449	24.2	C
EB TR	1353	1.543	*	F	1071	1.149	*	F
WB L	322	1.122	*	F	551	1.838	*	F
WB TR	1003	1.212	*	F	1575	1.717	*	F
NB L	190	0.931	55.9	E	138	0.688	34.2	D
NB T	612	0.890	32.8	D	521	0.725	26.9	D
NB R	464	1.445	*	F	307	0.772	32.0	D
SB L	59	0.294	25.7	D	106	0.532	29.6	D
SB T	446	0.678	24.9	C	871	1.266	*	F
SB R	77	0.255	20.9	C	167	0.495	24.2	C
Overall:			*	F			*	F

Notes: NB-Northbound; SB-Southbound; EB-Eastbound; WB-Westbound
L-Left turn; R-Right turn; T-Through
* Indicates an approach that is expected to operate at a volume/capacity ratio greater than 1:2. In such cases, the stopped delay is not calculated, but LOS is F.

4.5 Air Quality

4.5.1 No Action Alternative

Mobile Sources

The purpose of this air quality analysis is to evaluate the impacts of traffic-related CO for the Reuse Plan and alternatives, including the No Action Alternative. Average hourly CO concentrations were predicted for the peak am and pm one-hour traffic periods using an air pollutant dispersion model. These concentrations were multiplied by a persistence factor of 0.7 to determine the eight-hour concentrations. Background CO concentrations (Subchapter 3.5.2) were added to the traffic-related concentrations predicted from the model to obtain a total CO impact level.

This analysis used the same receptors used in the study of existing conditions. The results of the air quality analysis for the No Action Alternative show no violations of the NAAQS CO one-hour standard of 35 ppm and eight-hour standard of nine ppm (Tables 4.5-1 and 4.5-2) for both the am and pm peak periods. The results indicate CO levels less than those under existing conditions due to a decrease in per vehicle emissions resulting from compliance with the Federal Vehicle Emission Control Program.

Stationary Sources

Under the No Action Alternative, only the six officer family housing units on Jacksonville Road and the 199-unit enlisted family housing complex to be transferred to NAS JRB Willow Grove would continue to be occupied. Stationary source emissions would, therefore, decrease substantially.

4.5.2 Reuse Plan

Mobile Sources

Utilizing the same modeling assumptions described in Subchapter 4.5.1, the results of the air quality analysis for the Reuse Plan show no violations of the NAAQS CO one-hour standard of 35 ppm and eight-hour standard of nine ppm (Tables 4.5-1 and 4.5-2). Due to increased traffic, CO levels would be higher under the Reuse Plan than the No Action Alternative at all locations; however, the increases are not significant.

Table 4.5-1

Comparison of Worst Case Projected AM Peak CO Levels
for No Action Alternative and Reuse Plan (Year 2010)

Location	One-Hour Concentration (ppm)		Eight-Hour Concentration (ppm)	
	No Action Alternative	Reuse Plan Alternative	No Action Alternative	Reuse Plan Alternative
Jacksonville Road/Bristol Road	7.0	7.4	4.7	5.0
Bristol Road/Hatboro Road	6.0	6.3	4.0	4.2
Street Road/Old York Road	9.7	10.3	6.6	7.0
Jacksonville Road/Street Road	8.9	10.0	6.0	6.8
Street Road/Second Street Pike	7.8	8.3	5.3	5.6
County Line Road/Blair Mill Road	8.4	9.5	5.7	6.5
County Line Road/Old York Road	9.4	9.6	6.4	6.5
Jacksonville Road/County Line Road	8.0	8.5	5.4	5.8

Notes: CO levels include background concentrations of 5.0 ppm (one-hour) and 3.3 ppm (eight-hour).
Pennsylvania standard is 35 ppm for 1-hour and 9 ppm for 8-hour averaging periods

Table 4.5-2

Comparison of Worst Case Projected PM Peak CO Levels
for No Action Alternative and Reuse Plan (Year 2010)

Location	One-Hour Concentration (ppm)		Eight-Hour Concentration (ppm)	
	No Action Alternative	Reuse Plan Alternative	No Action Alternative	Reuse Plan Alternative
Jacksonville Road/Bristol Road	7.1	7.6	4.8	5.1
Bristol Road/Hatboro Road	6.1	6.5	4.1	4.4
Street Road/Old York Road	10.4	10.3	7.1	7.0
Jacksonville Road/Street Road	9.1	10.1	6.2	6.9
Street Road/Second Street Pike	8.3	8.6	5.6	5.8
County Line Road/Blair Mill Road	8.3	8.5	5.6	5.8
County Line Road/Old York Road	9.1	10.0	6.2	6.8
Jacksonville Road/County Line Road	8.2	8.4	5.5	5.7

Notes: CO levels include background concentrations of 5.0 ppm (one-hour) and 3.3 ppm (eight-hour).
Pennsylvania standard is 35 ppm for 1-hour and 9 ppm for 8-hour averaging periods.

Stationary Sources

The long-term impact on air quality that would arise from stationary emission sources, including heating units, would depend upon the nature and extent of the activities conducted on the property under the proposed Reuse Plan. The Pennsylvania Department of Environmental Protection would have jurisdiction over these emission sources, and it would be necessary for all such sources to comply with agency standards. Certain sources would require appropriate permits from the Pennsylvania Department of Environmental Protection.

Construction Impacts

The major air quality concerns during construction and demolition are fugitive dust from on-site construction activities and mobile source emissions from construction vehicles and equipment and the motor vehicles of construction workers.

Preventive measures such as the use of water to control dust during demolition and construction operations would sufficiently minimize significant airborne particulate release. Additionally, periodic sweeping and wetting of dirt or gravel paths, roadways, material stockpiles, and other surfaces may be necessary.

Mobile source emissions would be generated from construction vehicles and equipment and the motor vehicles of construction workers. However, these effects would not be significant and would be short-term in nature.

Clean Air Act Conformity

The USEPA general conformity rule (40 CFR Part 51 Subpart W) applies to federal actions in areas designated nonattainment for any of the criteria pollutants under the CAA. However, the rule does not apply to implementation of the reuse alternatives, as the Navy will not retain control of the property after it is disposed (see exemptions under 40 CFR 51.853 (c) (XIV) and (XIX)). This is further documented in the Record of Non-Applicability included in Appendix C.

4.5.3 University/Institutional Alternative

Mobile Sources

The CO modeling results for two representative intersections that would be affected by implementation of the University/Institutional Alternative are shown in Table 4.5-3. The locations modeled were the Street Road and Jacksonville Road intersection and the County Line Road and

Table 4.5-3

Comparison of Worst Case Projected CO Levels
for No Action and University/Institutional Alternative (Year 2010)

Receptor	One-Hour Concentration (ppm)		Eight-Hour Concentration (ppm)	
	No Action Alternative	University/ Institutional Alternative	No Action Alternative	University/ Institutional Alternative
Street Road and Jacksonville Road	9.1	10.1	6.2	6.9
County Line Road and York Road	9.1	10.0	6.2	6.8

Notes: Levels include background concentrations of 5.0 ppm (1-hour) and 3.3 ppm (8-hour).
Pennsylvania standard is 35 ppm for 1-hour and 9 ppm for 8-hour averaging periods.

York Road intersection. The table shows that CO levels would be higher under the University/ Institutional Alternative than the future No Action Alternative, due to increased traffic. However, there would be no violations of the NAAQS CO one-hour standard of 35 ppm and eight-hour standard of nine ppm.

Stationary Sources

As discussed for the proposed Reuse Plan, the long-term impact on air quality that would arise from stationary emission sources, including heating units, would depend upon the nature and extent of the activities conducted on the property. The Pennsylvania Department of Environmental Protection would have jurisdiction over these emission sources, and it would be necessary for all such sources to comply with agency standards. Certain sources would require appropriate permits from the Pennsylvania Department of Environmental Protection.

4.5.4 Residential Alternative

Mobile Sources

The CO modeling results for two representative intersections that would be affected by implementation of the proposed Residential Alternative are shown in Table 4.5-4. The locations modeled were the Street Road and Jacksonville Road intersection and the County Line Road and York Road intersection. The table shows that CO levels would be higher under the Residential Alternative than the future No Action Alternative due to increased traffic. However, there would be no violations of the NAAQS CO one-hour standard of 35 ppm and eight-hour standard of nine ppm.

Stationary Sources

As discussed for the proposed Reuse Plan, the long-term impact on air quality that would arise from stationary emission sources, including heating units, would depend upon the nature and extent of the activities conducted on the property. The Pennsylvania Department of Environmental Protection would have jurisdiction over these emission sources, and it would be necessary for all such sources to comply with agency standards. Certain sources would require appropriate permits from the Pennsylvania Department of Environmental Protection.

Table 4.5-4

Comparison of Worst Case Projected CO Levels
for No Action and Residential Alternatives (Year 2010)

Receptor	One-Hour Concentration (ppm)		Eight-Hour Concentration (ppm)	
	No Action Alternative	Residential Alternative	No Action Alternative	Residential Alternative
Street Road and Jacksonville Road	9.1	9.9	6.2	6.7
County Line Road and York Road	9.1	10.0	6.2	6.8

Notes: Levels include background concentrations of 5.0 ppm (1-hour) and 3.3 ppm (8-hour).
Pennsylvania standard is 35 ppm for 1-hour and 9 ppm for 8-hour averaging periods.

4.5.5 Aviation Alternative

Mobile Sources

The CO modeling results for two representative intersections that would be affected by implementation of the proposed Aviation Alternative are shown in Table 4.5-5. The locations modeled were the Street Road and Jacksonville Road intersection and the County Line Road and York Road intersection. The table shows that CO levels would be higher under the Aviation Alternative than the future No Action Alternative due to increased traffic. However, there would be no exceedances of the NAAQS CO one-hour standard of 35 ppm and eight-hour standard of nine ppm.

Aircraft engines emit pollutants during all phases of operation, whether idling on the ground or in flight. However, only those emissions emitted below the atmospheric mixing layer would have a potential air quality impact on ground-level ambient concentrations (the mixing layer is the air layer between the ground and the height above which the vertical mixing of pollutants decreases significantly). Therefore, according to the USEPA guidance (USEPA, 1992), aircraft emissions released above 3,000 ft (915 m) would not have an impact at ground level. Furthermore, the increase in ground-level emissions would not be significant because over 90 percent of the aircraft would be

Table 4.5-5

Comparison of Worst Case Projected CO Levels
for No Action and Aviation Alternatives (Year 2010)

Receptor	One-Hour Concentration (ppm)		Eight-Hour Concentration (ppm)	
	No Action Alternative	Aviation Alternative	No Action Alternative	Aviation Alternative
Street Road and Jacksonville Road	9.1	10.4	6.2	7.1
County Line Road and York Road	9.1	10.0	6.2	6.8

Notes: Levels include background concentrations of 5.0 ppm (1-hour) and 3.3 ppm (8-hour).
Pennsylvania standard is 35 ppm for 1-hour and 9 ppm for 8-hour averaging periods.

small single-engine aircraft, the number of aircraft operations would be small (i.e., only eight operations per hour on average), and the duration of landing and takeoff operations would be short.

Stationary Sources

As described for the Reuse Plan and other alternatives, the long term impact on air quality that would arise from stationary emission sources, including heating units, would depend upon the nature and extent of the activities conducted on the property under the Aviation Alternative. The Pennsylvania Department of Environmental Protection would have jurisdiction over these emission sources, and it would be necessary for all such sources to comply with agency standards. Certain sources would require appropriate permits from the Pennsylvania Department of Environmental Protection.

4.6 Noise

Human response to changes in noise levels depends on many factors, including the quality of sound, the magnitude of the change, 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 with the individual, as does response to the perceived changes. However, the average ability of an individual to perceive changes in noise levels is well-documented (Table 4.6-1).

Table 4.6-1

Average Ability to Perceive Changes in Noise Levels

Change (dBA)	Human Perception of Sound
2-3	Barely perceptible
5	Readily noticeable
10	A doubling or halving of the loudness of sound
20	A "dramatic change"
40	Difference between a faintly audible sound and a very loud sound
Source: Bolt, Beranek and Neuman, Inc., June 1973.	

Generally, a three dBA or smaller change in noise levels would be barely perceptible to most listeners, whereas a ten dBA change is normally perceived as a doubling (or halving) of noise levels. These guidelines permit direct estimation of an individual's probable perception of changes in noise levels.

4.6.1 No Action Alternative

Mobile Sources

The methodology for predicting future noise levels is based on the assumption that existing noise levels are dominated by, and are a function of, existing traffic volumes, and that future noise levels can be determined based on the proportional increase in traffic (on a logarithmic basis) associated with a project. For example, if the existing volume on a street is 100 vehicles per hour (vph), and if the future traffic is increased by 50 vph for a total of 150 vph, the noise levels would increase by approximately 1.8 decibels. If future traffic is increased by 100 vph to a total of 200 vph, noise levels would increase by three decibels; in other words a doubling of traffic volume corresponds to a three decibel increase in noise level.

There would be an increase in noise under no action conditions as there would be general traffic growth in the region (a growth rate of one percent a year is assumed). Future predicted noise levels for the Reuse Plan in the year 2010 are presented in Table 4.6-2. The computations are based on the traffic analyses presented in Subchapter 4.4. All increases in noise levels from existing conditions to future no action conditions (assuming base reuse does not occur) are less than or equal to one decibel (zero values for net change represent increases of less than one half decibel).

4.6.2 Reuse Plan

Mobile Sources

Changes in noise levels due to implementation of the Reuse Plan were determined by adding the noise attributable to development-generated traffic to noise levels previously calculated for the No Action Alternative. Table 4.6-2 presents the results of the am peak, midday peak, pm peak, pre-midnight, 24-hour L_{eq} and L_{dn} analysis, as well as specific hours of the day where there was a three dBA or greater change at specific sites (a three dBA or greater change in noise levels becomes perceptible to most listeners). The hourly L_{eq} analysis shows that with the exception of a few hours of the day, noise levels would increase less than or equal to one decibel from the No Action Alternative to the Reuse Plan. Noise increases equal to or greater than three dBA are noted below:

- **Site 2 (on Bristol Road, east of Hatboro Road)** - would experience increases in noise levels of three decibels between 5 am and 6 am;
- **Site 3 (on Bristol Road, west of Hatboro Road)** - would experience increases in noise levels of five decibels between 5 am and 6 am and three decibels between 6 am and 7 am;
- **Site 4 (on Jacksonville Road)** - would experience increases in noise levels of five decibels between 5 am and 6 am and three decibels between 6 am and 7 am; and
- **Site 6 (east of Davisville Road)** - would experience increases in noise levels of four decibels between 5 am and 6 am and three decibels between 6 am and 7 am.

At Sites 2, 3, 4, and 6, noise increases would be noticeable in the early morning hours. However, the noise measurement program established that existing noise levels near the residential receptors studied are already high and typical of a suburban neighborhood. In some cases, ambient noise levels exceed some criteria. Overall future noise impacts of the Reuse Plan can be summarized as follows (Table 4.6-2):

Table 4.6-2

Predicted Noise Levels for No Action Alternative and Reuse Plan

Site	Hour	Noise Level (L_{eq} in dBA)		
		No Action	Reuse Plan	Net Change
1	AM Peak (8-9 am) Midday Peak (12 -1 pm) PM Peak (5-6 pm) Pre-midnight (9-10 pm)	66 65 66 62	66 65 66 62	0 0 0 0
	No hours with net change of ≥ 3 dBA			
	24-Hour L_{eq} L_{dn}	63 66	63 66	0 0
2	AM Peak Midday Peak PM Peak Pre-midnight	65 64 65 59	66 64 65 59	1 0 0 0
	5 am - 6 am	53	56	3
	24-Hour L_{eq} L_{dn}	62 65	63 65	1 0
3	AM Peak Midday Peak PM Peak Pre-midnight	64 64 65 63	65 66 66 63	1 2 1 0
	5 am - 6 am 6 am - 7 am	57 61	62 64	5 3
	24-Hour L_{eq} L_{dn}	63 66	64 67	1 1

Table 4.6-2, Continued

Predicted Noise Levels for No Action Alternative and Reuse Plan

Site	Hour	Noise Level (L_{eq} in dBA)		
		No Action	Reuse Plan	Net Change
4	AM Peak Midday Peak PM Peak Pre-midnight	64 64 66 64	65 66 67 64	1 2 1 0
	5 am - 6 am 6 am - 7 am	58 62	63 65	5 3
	24-Hour L_{eq} L_{dn}	63 66	64 68	1 2
5	AM Peak Midday Peak PM Peak Pre-midnight	67 66 69 65	67 66 69 65	0 1 0 0
	No hours with net change of ≥ 3 dBA			
	24-Hour L_{eq} L_{dn}	65 68	65 68	0 0
6	AM Peak Midday Peak PM Peak Pre-midnight	67 65 68 64	68 66 69 64	1 1 1 0
	5 am - 6 am 6 am - 7 am	58 64	62 67	4 3
	24-Hour L_{eq} L_{dn}	65 68	65 69	0 1

at Sites 4, 5, and 6 exceed these criteria for some hours of the day and night. At Sites 5 and 6 the criterion is exceeded for the same hours as under existing conditions; and

- **HUD Environmental Criteria and Standards** - The HUD "Acceptable" criterion for housing is an L_{dn} of 65 dBA. The increase in L_{dn} noise level from the No Action Alternative to future implementation of the Reuse Plan would be less than or equal to one decibel at Sites 1 and 5. At Sites 1, 4, 5, and 6 the acceptable noise zone criteria would be exceeded under the Reuse Plan condition, as it is for the No Action Alternative. At Site 2, the acceptable noise zone criterion would be exceeded under the Reuse Plan condition, but not exceeded under the No Action Alternative.

Stationary Sources

Any exterior mechanical equipment (e.g., fans, compressors) would be designed to comply with all local and state noise ordinances. As a result, under the Reuse Plan noise levels from such mechanical equipment at the site would not be significant.

Construction Impacts

Impacts on community noise levels during construction activities associated with the Reuse Plan would include noise from construction equipment operating at the site and construction/delivery vehicles traveling to and from the site. Noise impacts would also vary widely, depending on the phase of construction (e.g., demolition, land clearing and excavations, foundation and capping, erection of structural steel, construction of exterior walls, etc.) and the specific task being undertaken. Increased noise levels would be most significant during the early stages of each construction phase, although these periods would be of relatively short duration. In any event, the noise generated would be similar to noise generated by other local construction projects and all phases of construction would comply with the restrictions specified in local noise ordinances.

Noise levels at a given receptor location would depend on the type and number of pieces of construction equipment being operated and the receptor distance from the construction site. Typical noise levels for construction equipment are shown in Table 4.6-3.

In addition, small increases in noise levels would be expected as a result of the operation of delivery trucks and other construction vehicles. These increases would be expected mainly along a few defined truck routes and close to the development site, but would not be significant.

Table 4.6-3

Typical Noise Emission Levels for Construction Equipment

Type of Equipment	Noise Level at 50 feet (dBA)
Air Compressor	81
Asphalt Spreader (paver)	89
Asphalt truck	88
Backhoe	85
Bulldozer	87
Compactor	80
Concrete Plant	83
Concrete Spreader	89
Concrete Mixer	85
Concrete Vibrator	76
Crane (derrick)	88
Delivery Truck	88
Diamond Saw	90
Dredge	88
Dump Truck	88
Front End Loader	84
Gas-Driven Vibro-compactor	76
Hoist	76
Jackhammer (Paving Breaker)	88
Line Drill	98
Motor Crane	83
Pile Driver/Extractor	101
Pump	76
Roller	80
Shovel	82
Truck	88
Tug	85
Vibratory Pile Driver/Extractor	89

Source: Patterson, et al., 1974.

4.6.3 University/Institutional Alternative

In general, future mobile source noise impacts associated with the University/Institutional Alternative would be the same as those associated with the Reuse Plan, given the comparable level of trip generation. Stationary source impacts and construction noise impacts under this alternative would also be similar to those previously described for the Reuse Plan.

4.6.4 Residential Alternative

Future mobile source noise impacts associated with the Residential Alternative would be less than those of the Reuse Plan and the University/Institutional Alternative, given the smaller amounts of vehicular trips that would be generated. Stationary source impacts and construction noise impacts under this alternative would also be similar to those previously described for the Reuse Plan.

4.6.5 Aviation Alternative

Aircraft

Aircraft noise levels are typically expressed in terms of dB, which are a logarithmic expression of sound energy. Frequency weightings have been developed to more closely duplicate the human hearing response; dBA are the weighting network most often applied to aircraft noise evaluation. A variety of noise metrics based on dB and dBA have been developed. Two types of metrics are typically used: single-event and cumulative.

Single-event metrics describe individual aircraft events. Two types of single-event energy metrics include:

- EPNL - Effective Perceived Noise Level; and
- SEL - Sound Exposure Level.

Cumulative metrics describe average noise levels over a period of time. Several cumulative metrics derived from EPNL or SEL are available to describe aircraft noise. Of these, the Day-Night Average Sound Level (DNL) is currently the officially accepted metric of the Federal Aviation Administration (FAA).

In June 1980, a Federal Interagency Committee (FIC) on Urban Noise published guidelines (FIC, June 1980) relating DNL to compatible land uses. This committee was composed of representatives from the DoD; the Department of Transportation (DOT); the Department of Housing and Urban Development (HUD); the Environmental Protection Agency (EPA); and the Veterans Administration

(VA). Since the issuance of these guidelines, federal agencies have generally adopted these guidelines for their noise analyses.

Following the lead of the committee, the DoD and the FAA adopted the concept of land-use compatibility as the accepted measure of aircraft noise effect. The FAA included the committee's guidelines in the Federal Aviation Regulations. Although these guidelines are not mandatory, they provide the best means for determining noise impact in airport communities. In general, residential land uses normally are not compatible with outdoor DNL above 65 dB, and the extent of land areas and populations exposed to DNL of 65 dB and higher provides the best means for assessing the noise impacts of alternative aircraft actions.

In 1990 a new FIC on Noise was formed to review the manner in which aviation noise effects are assessed and presented. This group released its report in 1992 and reaffirmed the use of DNL as the best metric for this purpose (FIC, August 1992).

The DNL is the average of aircraft sound levels at a location over a complete 24-hour period, with a ten-decibel adjustment added to those noise events which take place between 10:00 pm and 7:00 am (local time) the following morning. This ten-decibel "penalty" represents the added intrusiveness of sounds that occur during normal sleeping hours, both because of the increased sensitivity to noise during those hours and because ambient sound levels during nighttime are typically about ten dB lower than during daytime hours. For this environmental study, levels of DNL equal to and greater than 65 dB were used for assessing community noise impact.

Aircraft operation options under the Aviation Alternative were developed based on the potential for interest in general aviation activities in the Warminster area. A forecast of general aviation activity was prepared, assuming 1994 as the base year, 2000 as the short-term projection, and 2010 as the planning horizon. These forecasts were developed for general aviation and for light air cargo/freight operations. Three ranges of forecasts (high, mid, and low) for based aircraft and resultant operations were developed:

- High range: Equal to 100 percent of registered aircraft owners in zip codes within a 30-minute average travel time from the site;
- Mid range: Equal to 40 percent of registered aircraft. This is the average percentage of registered aircraft within the market areas of two nearby airports (Doylestown and Wings Field) that are actually based at these airports; and
- Low range: Equal to 24 percent of registered aircraft. This is similar to the average percentage of registered aircraft within the market area of Buehl Field that are actually based there.

For modeling purposes, the mid-range forecasts, representing the reasonable worst-case operation scenario, were used. The detailed methodology and assumptions used to derive the forecast can be found in Appendix B. Assumptions used for the following noise analysis are in Appendix E.

The FAA's preferred computer model, Integrated Noise Model (INM, version 5.0), was utilized to predict the noise impact from the forecasted mid-range aircraft operations. INM was developed by the FAA as a planning tool for determining approximate aircraft noise levels at and around airports. The model incorporates a database of known sound levels from various aircraft and uses mathematical processes which consider the degradation of sound energy over distance.

The average daily aircraft operations forecasted for the mid-range scenario and the type of the aircraft used in INM model are presented in Table 4.6-4. This table also indicates that 45,900 annual aircraft operations are forecast for the day and 600 for the night, for a total of 46,500. Figure 4.6-1 (Possible Flight Tracks for Aviation Alternative) presents the flight tracks configuration. The DNL 55 dB through 85 dB contours (Figure 4.6-2, Average Daily DNL Contours for Aviation Alternative) indicate that the noise impact of the Aviation Alternative would not be significant due to the type of aircraft and the light aircraft traffic predicted. Table 4.6-5 shows the land acreage affected by aircraft operations with noise levels that are equal to or higher than 65 dB. The affected areas would be within the runway's clear zones; therefore, no significant noise impact was predicted from the Aviation Alternative.

For comparative purposes, historic noise levels at NAWCAD were reviewed. Contours above 60 dB for 1988 operations at the NAWCAD airfield were reported (Harris Miller Miller & Hanson Inc., 1989), and are shown in Figure 4.6-3 (1988 DNL at NAWCAD Warminster). The noise impact from the Aviation Alternative would be significantly less than in 1988, a difference that is attributable to the different type of aircraft operations, as the noise level from general aviation aircraft would be low compared with military aircraft such as T-2 and A-7 jets.

Ground Vehicles

With respect to ground vehicles, the Aviation Alternative would generate higher traffic volumes than the other alternatives. As a result, it would be expected that noise levels generated would also be higher than for the other alternatives. Stationary source impacts and construction noise impacts would be similar to those previously described for the Reuse Plan.

Table 4.6-4

Forecast Annual Aircraft Operations and INM Model Type

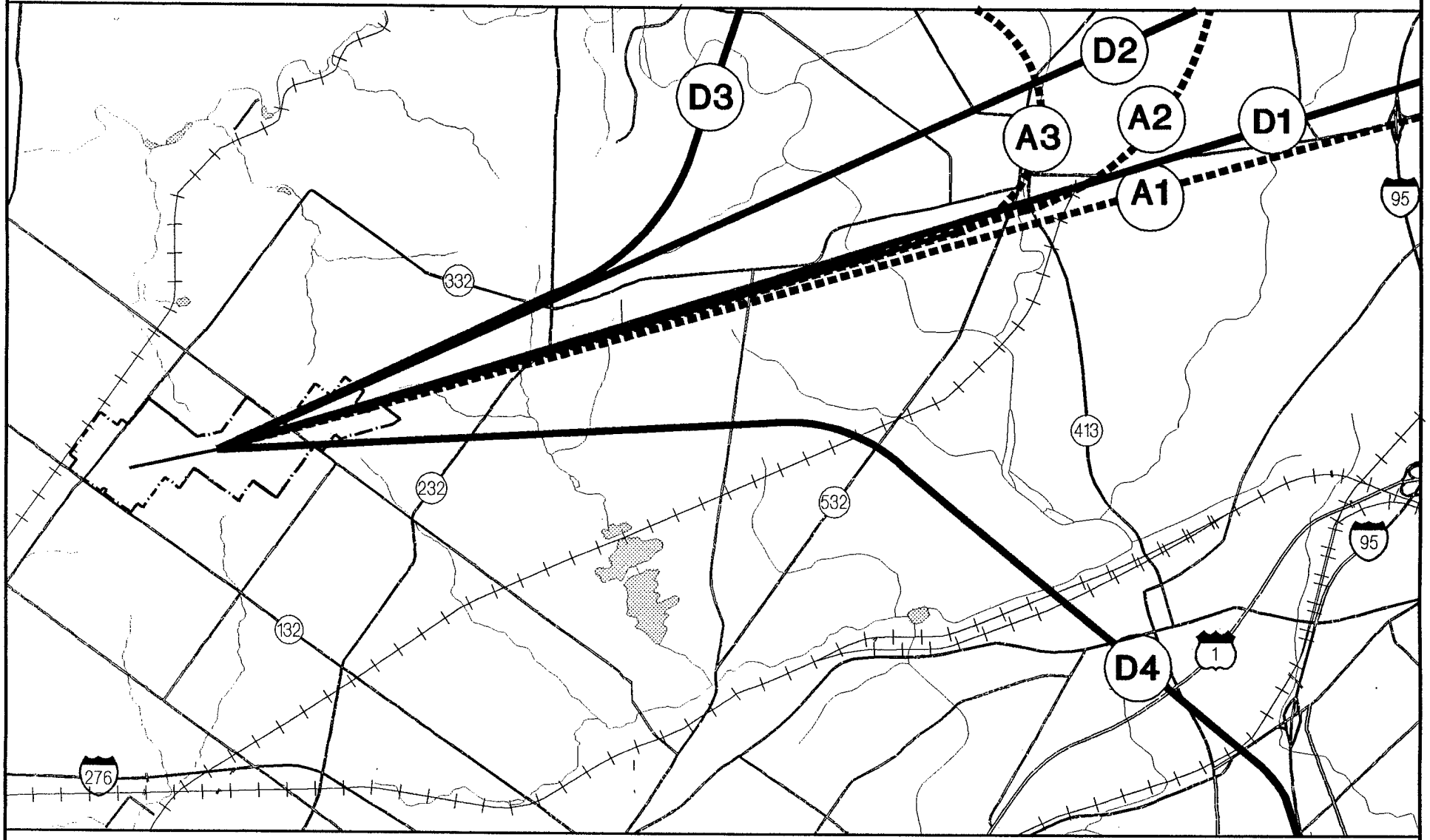
Aircraft Type	INM Model Type	Mid-Range		
		Total	Day	Night
Single-Engine Piston (SEP) - CNA177	GASEPF	42,900	42,450	450
Multi-Engine Piston (MEP) - BEC58P	BEC58P	3,000	2,950	50
Turboprop (TUR) - CNA441	CNA441	600	500	100
TOTAL		46,500	45,900	600

Table 4.6-5

Areas Within Noise Exposure Contours at NAWCAD

DNL Contour	Acres (Hectares)
65	19 (8)
70	6 (2)
75	0
80	0
85	0
Note: All contours are within the NAWCAD boundary	

Possible Flight Tracks for Aviation Alternative



NAWCAD Property Boundary

Arrival Track

Departure Track

Source: USGS, 1983.

1 0 1
Scale In Miles

2 0 2
Scale In Kilometers

N

Figure 4.6-1

Average Daily DNL Contours for Aviation Alternative

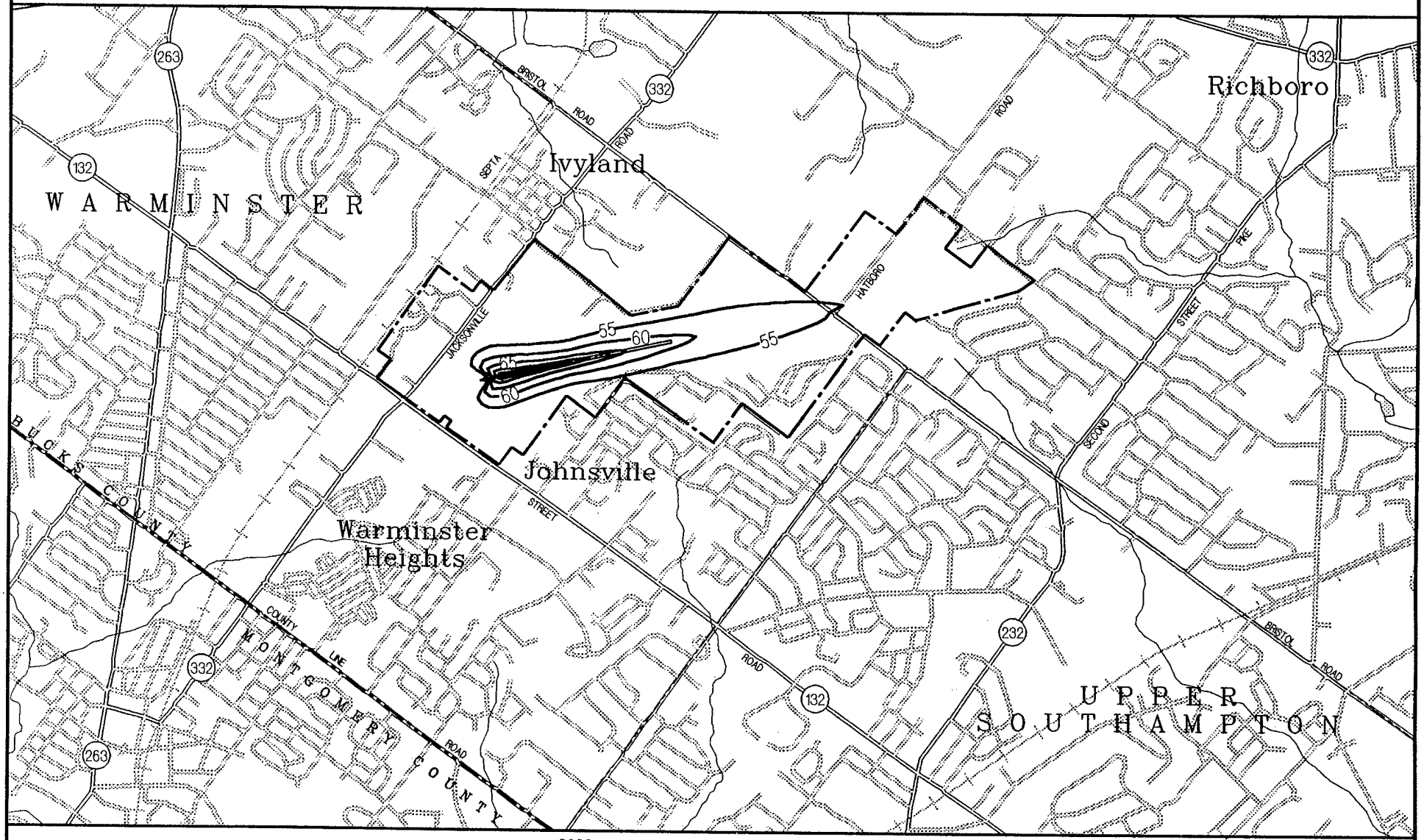
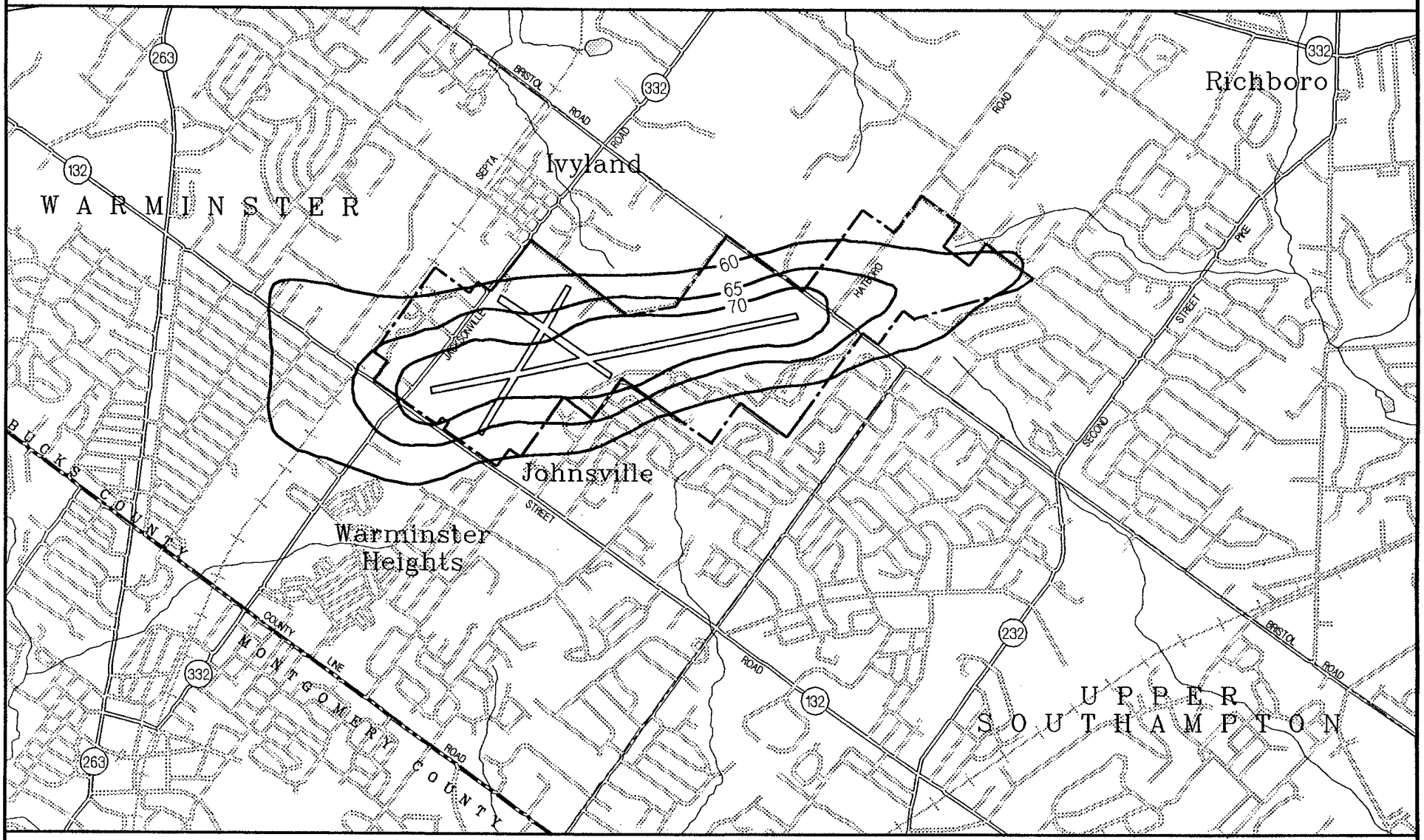


Figure 4.6-2

1988 DNL at NAWCAD Warminster



—60— Noise Contour (DNL)

—·— NAWCAD Property Boundary

3000 0 3000
Scale in Feet

1000 0 1000
Scale in Meters

N

Figure 4.6-3

4.7 Infrastructure

4.7.1 No Action Alternative

Under the No Action Alternative there would be no redevelopment at the base and, thus, little or no new demand created for utilities. The six units of officer family housing on Jacksonville Road and the 199-unit enlisted family housing complex to be transferred to NAS JRB Willow Grove would continue to be occupied by the Navy. It is assumed that local municipalities would provide utility services to this housing.

4.7.2 Reuse Plan

Electricity

Electrical service to NAWCAD would continue to be provided by PECO Energy. According to the initial Reuse Plan (which is now the University/Institutional Alternative) prepared by the FLRA in March 1995 (ERA, 1995), a study was initiated to investigate methods of converting the electrical distribution system from a radial system to a loop primary system to add redundancy and emergency power. Additional study would be required to address the gradual replacement and upgrade of the distribution system in accordance with the phased implementation of the Reuse Plan (ERA, 1995). Given the scope and flexibility of the current proposed Reuse Plan (FLRA, 1997), actual future industrial tenants cannot be predicted at this time; therefore, their actual demands on the electrical system cannot be predicted as well.

Steam Production

Steam would continue to be supplied to the Bldgs 1, 2, and 3 complex and other existing buildings to be utilized as per the Reuse Plan. It is anticipated that there would be ample steam available for future heating and industrial use.

Water Supply

Water would continue to be supplied by the Warminster Municipal Authority. Per capita water usage is estimated to be approximately 35 gallons (133 liters) per day. Water usage by the roughly 6,900 persons predicted under the proposed Reuse Plan would, therefore, be approximately 242,000 gallons (910,000 liters) per day. This demand would exceed the historic usage of up to 5,000 personnel utilizing roughly 175,000 gallons (662, 000 liters) per day of potable water at NAWCAD.

There have been discussions with respect to the proposed Reuse Plan about how some of the existing wells at NAWCAD might be incorporated into the adjacent municipal authority systems (ERA,

1995). It was noted that a great deal of additional study would be required for such consideration (ERA, 1995). The development of any new wells would be done in accordance with the Pennsylvania Safe Drinking Water Act. A wellhead protection program would be established for any new wells or for wells transferred to municipal ownership consistent with the *Bucks County Water Supply and Wellhead Protection Study* (1996).

Potential sources of additional potable water for the proposed Reuse Plan were identified as the Northampton Municipal Authority and the Warminster Municipal Authority systems (ERA, 1995), as both Northampton and Warminster Townships have water distribution lines in the vicinity of NAWCAD. Warminster Municipal Authority has indicated that an extension to an existing water line would be required to strengthen the distribution system, and that the estimated cost of providing that extension would be approximately $500,000. The Warminster system could then supply 0.5 to one million gallons (two to four million liters) per day (ERA, 1995), which would provide an adequate source of potable water under the proposed Reuse Plan.

Wastewater System

The Warminster Wastewater Treatment Plant has two million gallons (7.6 million liters) per day of available capacity, of which approximately 1.5 million gallons (5.7 million liters) per day are allocated for future development (ERA, 1995). A representative of the Warminster Municipal Authority has expressed interest in providing service for the proposed Reuse Plan (ERA, 1995).

Per capita sanitary flow is estimated to be approximately 35 gallons (132 liters) per day, and future sanitary flow from 6,900 persons would therefore be approximately 242,000 gallons (910,000 liters) per day, which is within the amount of available capacity at the Warminster Wastewater Treatment Plant. Should a new line be required to convey wastewater from the site to the treatment plant, approximately 17,500 lineal ft (5,330 lineal m) of 12-inch (30-cm) gravity sewer could be installed for an order of magnitude cost estimate of $1.4 million. Additional study of line capacity would be required at later stages of Reuse Plan implementation (ERA, 1995).

Historically, industrial wastes generated at NAWCAD were pre-treated in a two-stage treatment system consisting of three batch-operated 45,000-gallon (170,325-liter) holding/treatment tanks. Presently, there are no industrial wastes discharged to these facilities (ERA, 1995). Future industrial development under the proposed Reuse Plan may result in individual facilities requiring industrial discharges. Industrial discharges into publicly-owned treatment plants do not require a NPDES permit but are subject to USEPA's general pretreatment standards as implemented by Warminster. These standards include general pretreatment regulations and specific pretreatment standards covering specific industrial categories for new and existing facilities, and apply to pollutants from industrial sources that interfere with or pass untreated through a publicly-owned treatment works. Pretreatment standards are similar to the limitations imposed on direct discharges from industrial sources into surface waters. The PA Department of Environmental Protection's Bureau of Water Quality Management (WQM) regulates discharges to meet NPDES requirements.

Stormwater

Construction activities associated with development of the Reuse Plan would be subject to the NPDES permit program. Stormwater pollution prevention plans, including elements addressing sedimentation basins, would need to be prepared prior to a formal approval for permit coverage. The permit would need to include applicable components of the local sediment and erosion control site plan standards, site permits, and stormwater management site plans. The FLRA has indicated that a comprehensive stormwater management plan for the entire NAWCAD site would be prepared at later stages of Reuse Plan implementation (ERA, 1995). Any new stormwater management facilities would be developed in accordance with municipal regulations governing such systems and, as applicable, in accordance with the requirements of the *Little Neshaminy Creek Watershed Stormwater Management Plan.*

Presently there are about 200 acres (81 hectares) of impervious surface on the 824-acre (334-hectare) site. Full buildout of the Reuse Plan would result in a total of approximately 436 acres (176 hectares) of paved land. It is therefore estimated that the potential increase in impervious surfaces would be about 236 acres (96 hectares) under the Reuse Plan.

Solid Waste

Solid waste would continue to be disposed of off-site by a private contractor, who is responsible for disposal method and location, and for adhering to all federal, state, and local regulations.

A typical per capita solid waste generation rate for residential and commercial use (excluding special [i.e., bulky items, consumer electronics, white goods, yard wastes, batteries, oils, and tires] and hazardous wastes) is 3.8 lbs (1.7 kg) per day (Tchobanoglous, Theisen and Vigil, 1993). Under the proposed Reuse Plan, per capita solid waste generation by approximately 6,900 people would, therefore, result in the generation of approximately 13 tons (12 metric tons) of solid waste per day. This would exceed historical per capita generation of solid waste at NAWCAD of roughly ten tons (nine metric tons) per day from up to 5,000 people.

Despite the increase in solid waste generation, it is anticipated that implementation of the proposed Reuse Plan would have no significant adverse effect. Disposal of solid waste under the proposed Reuse Plan would continue to follow federal and state regulations, and would be in compliance with the *Bucks County Municipal Waste Management Plan.* This plan calls for a 40 percent reduction of the solid waste stream (through source reduction and recycling), along with the use of environmentally sound processing, disposal methods, and technologies. According to the plan, landfills would remain, overall, a key part of the county's integrated waste management program for the foreseeable future (Bucks County Planning Commission, 1993).

Other Utilities

Natural gas would continue to be provided by PECO Energy. Existing telephone lines would be available under the proposed Reuse Plan. No significant impacts to these utility systems would be anticipated with implementation of the Reuse Plan.

4.7.3 University/Institutional Alternative

Electricity

PECO Energy would continue to provide electrical service under the University/Institutional Alternative. As with the proposed Reuse Plan, additional study would be required to address the gradual replacement and upgrade of the distribution system in accordance with the phased implementation of the University/Institutional Alternative.

Steam Production

Steam would continue to be supplied to the facilities proposed in the University/Institutional Alternative, and it is anticipated that there would be ample steam available for future heating and industrial use.

Water Supply

Per capita water usage is estimated to be approximately 35 gallons per day (132 liters) for industrial use. Implementation of the University/Institutional Alternative would result in approximately 7,600 personnel. Per capita water usage is therefore estimated to be about 266,000 gallons (one million liters) per day, which would exceed historical demand at NAWCAD. Potential sources of additional potable water for the University/Institutional Alternative would be the same as those identified for the proposed Reuse Plan.

Wastewater System

Per capita sanitary flow is estimated to be 35 gallons per day (132 liters) for industrial use. Implementation of the University/Institutional Alternative would result in approximately 7,600 personnel. Per capita sanitary flow is therefore estimated to be about 266,000 gallons (one million liters) per day, which is within the amount of available capacity at the Warminster Wastewater Treatment Plant.

Stormwater

As previously described for the proposed Reuse Plan, construction activities associated with development of the University/Institutional Alternative would be subject to the NPDES permit program. Presently, there are about 200 acres (81 hectares) of impervious surface on the 824-acre (334-hectare) site. Full buildout of the University/Institutional Alternative would result in a total of approximately 540 acres (220 hectares) of paved land. Therefore, it is estimated that the potential increase in impervious surfaces would be about 340 acres (138 hectares) under the University/ Institutional Alternative.

Solid Waste

As mentioned for the proposed Reuse Plan, a typical per capita solid waste generation rate for residential and commercial use is 3.8 pounds (1.7 kilograms) per day (Tchobanoglous, Theisen and Vigil, 1993). Per capita solid waste generation by approximately 7,600 people under the proposed University/Institutional Alternative would, therefore, result in the generation of approximately 14 tons (13 metric tons) of solid waste per day. This would exceed historical per capita generation of solid waste at NAWCAD of roughly ten tons (nine metric tons) per day from up to 5,000 people. As with the proposed Reuse Plan, despite the increase in solid waste generation, it is anticipated that implementation of the University/Institutional Alternative would have no significant adverse effect. Disposal of solid waste would continue to follow federal and state regulations.

Other Utilities

Natural gas would continue to be provided by PECO Energy. Existing telephone lines would be available under the University/Institutional Alternative. No significant impacts to these utilities would be expected.

4.7.4 Residential Alternative

Electricity

PECO Energy would continue to provide electrical service under the Residential Alternative. As with the proposed Reuse Plan and University/Institutional Alternative, additional study would be required to address the gradual replacement and upgrade of the distribution system in accordance with the phased implementation of the Residential Alternative.

Steam Production

Steam would continue to be supplied to the non-residential facilities proposed in the Residential Alternative, and it is anticipated that there would be ample steam available for future heating and industrial use.

Potable Water

Per capita water usage is estimated to be approximately 100 gallons (379 liters) per day for residential use and 35 gallons per day (132 liters) for industrial use. Implementation of the Residential Alternative would result in approximately 1,600 residents and 5,000 personnel. Per capita water usage is, therefore, estimated to be about 335,000 gallons (1.3 million liters) per day, which would exceed historical demand at NAWCAD. Potential sources of additional potable water for the Residential Alternative would be the same as those identified for the proposed Reuse Plan.

Wastewater System

Per capita sanitary flow is estimated to be 100 gallons (379 liters) per day for residential use and 35 gallons per day (132 liters) for industrial use. Implementation of the Residential Alternative would result in approximately 1,600 residents and 5,000 personnel. Per capita sanitary flow is, therefore, estimated to be about 335,000 gallons (1.3 million liters) per day, which is within the amount of available capacity at the Warminster Wastewater Treatment Plant.

Stormwater

As previously described, construction activities associated with development of the Residential Alternative would be subject to the NPDES permit program. Presently, there are about 200 acres (81 hectares) of impervious surface on the 824-acre (334-hectare) site. Full buildout of the Residential Alternative would result in a total of approximately 410 acres (166 hectares) of paved land. It is, therefore, estimated that the potential increase in impervious surfaces would be about 210 acres (85 hectares) under the Residential Alternative.

Solid Waste

A typical per capita solid waste generation rate for residential and commercial use is 3.8 pounds (1.7 kilograms) per day (Tchobanoglous, Theisen and Vigil, 1993). Per capita solid waste generation by approximately 6,600 people under the proposed Residential Alternative would, therefore, result in the generation of approximately 12.5 tons (11 metric tons) of solid waste per day. This would exceed the historical per capita generation of solid waste at NAWCAD of roughly ten tons (nine metric tons) per day from up to 5,000 people. Despite the increase in solid waste generation, it is anticipated that implementation of the Residential Alternative would have no significant adverse

effect. Disposal of solid waste would continue to follow federal and state regulations, and would be in compliance with the *Bucks County Municipal Waste Management Plan.*

Other Utilities

Natural gas would continue to be provided by PECO Energy. Existing telephone lines would be available under the Residential Alternative. No significant impacts to these utilities would be expected.

4.7.5 Aviation Alternative

Electricity

PECO Energy would continue to provide electrical service under the Aviation Alternative. As with the other reuse alternatives, additional study would be required to address the gradual replacement and upgrade of the distribution system in accordance with the phased implementation of the Aviation Alternative.

Steam Production

Steam would continue to be supplied to the facilities proposed in the Aviation Alternative, and it is anticipated that there would be ample steam available for future heating and industrial use.

Water Supply

Per capita water usage is estimated to be approximately 35 gallons per day (132 liters) for industrial use. Implementation of the Aviation Alternative would result in approximately 9,000 personnel. Per capita water usage is, therefore, estimated to be about 315,000 gallons (1.2 million liters) per day, which would exceed historical demand at NAWCAD. Potential sources of additional potable water for the Residential Alternative would be the same as those identified for the other reuse alternatives.

Wastewater System

Per capita sanitary flow is estimated to be 35 gallons per day (132 liters) for industrial use. Implementation of the Aviation Alternative would result in approximately 9,000 personnel. Per capita sanitary flow is, therefore, estimated to be about 315,000 gallons (1.2 million liters) per day, which is within the amount of available capacity at the Warminster Wastewater Treatment Plant.

Stormwater

As mentioned for the other reuse alternatives, construction activities associated with development of the Aviation Alternative would be subject to the NPDES permit program. Stormwater pollution prevention plans, including elements addressing sedimentation basins, would need to be prepared prior to a formal approval for permit coverage. The permit would need to include applicable components of the local sediment and erosion control site plan standards, site permits, and stormwater management site plans.

Presently, there are about 200 acres (81 hectares) of impervious surface on the 824-acre (334-hectare) site. Full buildout of the Aviation Alternative would result in a total of approximately 670 acres (271 hectares) of paved land. It is, therefore. estimated that the potential increase in impervious surfaces would be about 470 acres (190 hectares) under the Aviation Alternative.

Solid Waste

As mentioned for the other reuse alternatives, a typical per capita solid waste generation rate for residential and commercial use is 3.8 lbs (1.7 kg) per day (Tchobanoglous, Theisen and Vigil, 1993). Per capita solid waste generation by approximately 9,000 people under the proposed Aviation Alternative would therefore result in the generation of approximately 17 tons (16 metric tons) of solid waste per day. This would exceed historical per capita generation of solid waste at NAWCAD of roughly ten tons (nine metric tons) per day from up to 5,000 people. It is anticipated that implementation of the Aviation Alternative would have no significant adverse effect. Disposal of solid waste would continue to follow federal and state regulations, and would be in compliance with the *Bucks County Municipal Waste Management Plan.*

Other Utilities

Natural gas would continue to be provided by PECO Energy. Existing telephone lines would be available under the Aviation Alternative. No significant impacts to these utilities would be expected.

4.8 Cultural Resources

Section 106 of the National Historic Preservation Act provides that federal agencies take into account the effect of their actions on any district, site, buildings, structure, or object included in or eligible for inclusion in the National Register of Historic Places. Implementing regulations for Section 106 are contained in 36 CFR 800, *Protection of Historic Properties*. These regulations provide specific criteria for assessing the effect of federal undertakings on historic properties and identifying adverse effects of proposed undertakings on historic properties. The effects that a proposed undertaking will have on a cultural resource are predicted for the significant characteristics or distinguishing elements of the resource and the design and anticipated consequences of the undertaking. Effects to cultural resources in or eligible for listing in the National Register of Historic Places are evaluated with regard to the *Criteria of Effect and Adverse Effect*, established by the Advisory Council on Historic Preservation (36 CFR 800.9). These criteria are summarized in Table 4.8-1.

A Phase IB archaeological investigation of portions of NAWCAD Warminster was initiated in November 1998 to address the cultural resource issues raised through the Phase IA research (as discussed in Subchapter 3.8). This Phase IB survey was designed to determine the presence or absence of National Register-eligible resources in a 52-acre (21-hectare) study area determined to possess moderate sensitivity for cultural resources. This study area is comprised of:

- Quarters A and B - the 6.1 acre (2.5 hectare) area consisting of the yards surrounding Buildings 100, and 101;
- The headwater zone - the approximately 28 acre (11.3 hectare) area located within a 656-ft (200-m) radius of the headwaters of the project vicinity's low-order streams; and
- The grassland zone - the approximately 18 acre (7.3 hectare) area beyond the 656-ft (200-m) radius of the headwater zone and extending generally to the apron of the runways.

The results of this Phase IB survey will be incorporated in the Navy's implementation of the mitigation specified in the Programmatic Agreement of December 1998 (Appendix G).

4.8.1 No Action Alternative

Under future no action conditions, there would be no new construction or alteration in the area of the historic buildings. Closure of NAWCAD, except those areas used by the realigned Navy functions (housing) that would continue its operation after closure, would follow the standards and

Table 4.8-1

Criteria of Effect and Adverse Effect

An undertaking has an effect on a historic property when it may alter characteristics of the property that may qualify the property for inclusion in the National Register. For purposes of determining effect, alteration to features of the property's location, setting, or use may be significant depending on a property's significant characteristics and should be considered (36 CFR 800.9[a]).
An undertaking is considered to have an adverse effect when the effect on a historic property may diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Adverse effects on historic properties include, but are not limited to: 1. Physical destruction, damage, or alteration of all or part of the property; 2. Isolation of the property from or alteration of the character of the property's setting when that character contributes to the property's qualification for the National Register; 3. Introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting; 4. Neglect of a property resulting in its deterioration or destruction; and 5. Transfer, lease, or sale of the property (36 CFR 800.9[b]).
Effects of an undertaking that would otherwise be found to be adverse may be considered as being not adverse for the purpose of these regulations: 1. When the historic property is of value only for its potential contribution to archeological, historic, or architectural research, and when such value can be substantially preserved through the conduct of appropriate research, and such research is conducted in accordance with applicable professional standards and guidelines; 2. When the undertaking is limited to the rehabilitation of buildings and structures and is conducted in a manner that preserves the historical and architectural value of the affected historic property through conformance with the Secretary's "Standards for Rehabilitation and Guidelines for Rehabilitating Buildings;" or 3. When the undertaking is limited to the transfer, lease or sale of a historic property, and adequate restrictions or conditions are included to ensure preservation of the property's significant historic features (36 CFR 800.9[c]).

procedures for mothballing facilities published in *Base Realignment and Closure Facility Layaway and Caretaker Maintenance Standards* (NAVFACENGCOM, September 1994). These guidelines and procedures meet the requirements for mothballing historic structures outlined by the NPS in *Preservation Brief 31: Mothballing Historic Buildings* (NPS, September 1993). By following the Navy and NPS guidelines in accomplishing the work, there should be no adverse effect on the historic structures.

4.8.2 Reuse Plan

The Reuse Plan proposes that the inertial guidance laboratory (Bldg 108) and centrifuge (Bldg 70) continue in their historic usage, and that the ejection tower (Structure 361) remain and be used as an antenna tower. The proposed disposal of NAWCAD by the Navy results in a finding of adverse effect on all three historic structures. To mitigate this effect, the Navy will place restrictive deed covenants on each of the individual buildings prior to property transfer. Mitigation for this adverse effect is specified in the Programmatic Agreement of December 1998 (Appendix G).

4.8.3 University/Institutional Alternative

As a result of the similarities in land use in the vicinity of the eligible buildings of both the Reuse Plan and the University/Institutional Alternative, the impacts on the cultural resources at NAWCAD would be the same.

4.8.4 Residential Alternative

As a result of the similarities in land use in the vicinity of the eligible buildings of both the Reuse Plan and the Residential Alternative, the impacts on the cultural resources at NAWCAD would be the same.

4.8.5 Aviation Alternative

As a result of the similarities in land use in the vicinity of the eligible buildings of both the Reuse Plan and the Aviation Alternative, the impacts on the cultural resources at NAWCAD would be the same.

4.9 Natural Resources

4.9.1 No Action Alternative

Under future no action conditions, existing natural resources would remain unchanged. All identified wetlands within the site would remain intact. The proposed closure of NAWCAD would have no direct adverse impact on existing vegetation, wildlife, floodplains, or topography, geology, and soils. The base closure would result in much fewer cars (other than residents in the military housing) on the base, which would be a positive impact on resident wildlife.

4.9.2 Reuse Plan

Vegetation

Existing vegetation communities in the areas of the runways, taxiways, and developed areas along roadways are characterized by maintained turf lawns with ornamental and opportunistic tree and shrub species. Development of these areas under the proposed Reuse Plan would result in the decrease of these low-value communities. The extreme eastern portion of the site has not been used by NAWCAD and is currently farmland. The development of park and recreation land in this area would result in a change from farmland to park and recreation use. The area just south of the enlisted family housing is currently degraded woodland and would remain as woodland under the proposed Reuse Plan.

Wildlife

No adverse impact to wildlife would be expected to occur with implementation of the proposed Reuse Plan. Open space would still be available to the wildlife species that currently utilize the site, and the woodland habitat just south of the family housing would remain unaltered. There would be no impact to threatened and endangered species as no such species or their habitats are known at the site.

Wetlands

Existing background information, coupled with a field reconnaissance, indicates that a small acreage of freshwater wetlands (approximately one to five acres [0.4 to two hectares]) occurs on site. The proposed Reuse Plan provides a broad planning framework for NAWCAD that would serve to guide future development; therefore, there are no detailed site plans at this time. The exact impacts of the reuse on wetlands would depend on specific site development in the future.

All disturbances to wetlands would require a permit from the US Army Corps of Engineers (COE) and the PA Department of Environmental Protection. Since the PA Department of Environmental Protection's wetland program is more stringent than the COE's wetland program, the Commonwealth's application requirements are described below. Federal permit requirements would be met by fulfilling the state requirements.

Wetland permit applications would require, at a minimum, a floodplain management analysis; alternatives analysis; mitigation plan; impact analysis; a surveyed wetland boundary; and a stormwater management analysis. In connection with the alternatives analysis, the *Memorandum of Agreement Between the Environmental Protection Agency and the Department of the Army Concerning the Determination of Mitigation under the Clean Water Act Section 404 (b)(1) Guidelines* emphasizes:

- **Avoidance** - avoid potential impacts to the maximum extent practicable;
- **Minimization** - take appropriate and practicable steps to minimize the adverse impacts (e.g., limit the anticipated impact to an area of the wetland with lesser value than other areas, or reduce the actual size of the impacted area); and
- **Compensatory Mitigation** - take appropriate and practicable compensatory mitigation action for unavoidable adverse impacts which remain after all appropriate and practicable minimization has been required (created a new wetland area, restore existing degraded wetland, or enhance low value wetland into improved wetland).

Adherence to this hierarchy would be required for any future development that would disturb wetland acreages at NAWCAD.

Floodplains

Because NAWCAD does not lie within the 100-year or 500-year floodplain, the proposed Reuse Plan would have no impact on floodplains.

Topography, Geology, and Soils

Specific development activities under the proposed Reuse Plan would involve earthmoving activities. An erosion and sedimentation control program, which applies to such activities, has been developed by the PA Department of Environmental Protection. The primary requirement of this program is that all persons engaged in earthmoving activities must develop and implement soil erosion and sedimentation control measures, and set forth such measures in a soil erosion and sedimentation control plan. In addition, the Department of Environmental Protection's regulations require that, prior to the commencement of most earthmoving activities, an earth distribution permit must be obtained from the Commonwealth's Bureau of Soil and Water Conservation. Permit

applications accompanied by erosion and sedimentation control plans are submitted to the county conservation district, which conducts an initial technical review of the plan and forwards the application to the Commonwealth's Bureau of Soil and Water Conservation for final permit issuance. The submission of such a soil erosion and sedimentation control program would be required for future earthmoving construction activities at NAWCAD.

4.9.3 University/Institutional Alternative

Vegetation

Development of areas that are currently characterized by maintained lawns with ornamental trees would result in the decrease in or loss of such communities. Similar to what was proposed under the Reuse Plan, the development of a park and recreation area on the current farmland would result in a change from farmland to athletic fields surrounded by maintained lawn with ornamental trees. The area just south of the enlisted family housing is currently degraded woodland and would remain as woodland with the Residential Alternative.

Wildlife

No adverse impact to wildlife would be expected to occur with implementation of the University/ Institutional Alternative. Open space characterized by maintained lawns and ornamental trees would remain available to the wildlife species which currently utilize the site, and the woodland habitat just south of the family housing would remain unaltered. There would be no impact to threatened and endangered species as no such species or their habitats are known at the site.

Wetlands

As with the proposed Reuse Alternative, the exact impacts of the University/Institutional Alternative on wetlands would depend on specific site development in the future. As discussed in Subchapter 4.9.2, all disturbances to wetlands would require a permit from the COE and the PA Department of Environmental Protection, with avoidance being the preferred strategy.

Floodplains

Because NAWCAD does not lie within the 100-year or 500-year floodplain, the University/ Institutional Alternative would have no impact on floodplains.

Topography, Geology, and Soils

Implementation of the University/Institutional Alternative would involve significant earthmoving activities and would require the submission of an erosion and sedimentation control plan to the PA Department of Environmental Protection. As described above in Subchapter 4.9.2, this plan must be designed to minimize potential impacts during construction.

4.9.4 Residential Alternative

Vegetation

Development of areas that are currently characterized by maintained lawns with ornamental trees would result in the decrease or loss of such communities; however, the Residential Alternative would feature buffer areas in and around the proposed residential units, which would also be characterized by lawns and ornamental trees. Similar to the proposed Reuse Plan and the University/Institutional Alternative, the development of a park and recreation area from land that is currently farmland would result in a change from farmland to athletic fields surrounded by maintained lawn with ornamental trees. The area just south of the enlisted family housing is currently degraded woodland and would remain as woodland with the Residential Alternative.

Wildlife

No adverse impact to wildlife would be expected to occur with implementation of the Residential Alternative. Open space characterized by maintained lawns and ornamental trees would remain available to the wildlife species which currently utilize the site, and the woodland habitat just south of the family housing would remain unaltered. There would be no impact to threatened and endangered species as no such species or their habitats are known at the site.

Wetlands

As with the proposed Reuse Plan and the University/Institutional Alternative, exact impacts of the Residential Alternative on wetlands would depend on specific site development in the future. As discussed in Subchapter 4.9.2, all disturbances to wetlands would require a permit from the COE and the PA Department of Environmental Protection, with avoidance being the preferred strategy.

Floodplains

Because NAWCAD does not lie within the 100-year or 500-year floodplain, the Residential Alternative would have no impact on floodplains.

Topography, Geology, and Soils

Implementation of the Residential Alternative would involve significant earthmoving activities, and would require the submission of an erosion and sedimentation control plan to the PA Department of Environmental Protection. As described above in Subchapter 4.9.2 (Topography, Geology, and Soils), this plan must be designed to minimize potential impacts during construction.

4.9.5 Aviation Alternative

Vegetation

Development of areas that are currently characterized by maintained lawns with ornamental trees would result in the decrease or loss of such vegetation under the Aviation Alternative. Similar to the other reuse alternatives already discussed, the development of a park and recreation area from land that is currently farmland would result in a change from farmland to athletic fields surrounded by maintained lawn with ornamental trees. The area just south of the enlisted family housing is currently degraded woodland and would remain as woodland with the Aviation Alternative.

Wildlife

No significant adverse impact to wildlife would be expected to occur with implementation of the Aviation Alternative. The woodland habitat just south of the family housing would remain unaltered. There would be no impact to threatened and endangered species as no such species or their habitats are known at the site.

Wetlands

As with the other reuse alternatives, the exact impacts of the Aviation Alternative on wetlands would depend on specific site development in the future. As discussed in Subchapter 4.9.2, all disturbances to wetlands would require a permit from the COE and the PA Department of Environmental Protection, with avoidance being the preferred strategy.

Floodplains

Because NAWCAD does not lie within the 100-year or 500-year floodplain, the Aviation Alternative would have no impact on floodplains.

Topography, Geology, and Soils

Implementation of the Aviation Alternative would involve significant earthmoving activities, and would require the submission of an erosion and sedimentation control plan to the PA Department of Environmental Protection. As described above in Subchapter 4.9.2 (Topography, Geology, and Soils), this plan must be designed to minimize potential impacts during construction.

4.10 Petroleum and Hazardous Substances

4.10.1 No Action Alternative

Under the No Action Alternative, the Navy would continue to provide for cleanup of contaminated sites as identified in the CERFA, the *BRAC Cleanup Plan*, and the Federal Facilities Agreement between the Navy and USEPA (September 1990). The Federal Facilities Agreement provides the USEPA an opportunity to comment on any CERCLA remedial investigation or action and provides a mechanism for resolving any dispute between the Navy and the USEPA regarding the nature of such activities.

With the operational closure of NAWCAD in April 1997, use of most hazardous materials ceased. Some chemicals may be used in the Pump and Treat Facility constructed as part of the groundwater cleanup program. Environmental compliance activities at NAWCAD would continue for all facilities. Also, as part of closure activities, the Navy is obligated to comply with DoD Defense Environmental Security Council policies for radon (May 6, 1994), lead-based paint (LBP) (May 10, 1994), and asbestos (May 10, 1994). These policies provide guidance for addressing radon, LBP, and installations before their demolition, transfer, or disposal, as follows:

- **Radon**: DoD policy is to ensure that any available and relevant radon assessment data pertaining to property being transferred is included in property transfer documents. No radon assessment and mitigation is to be performed prior to transfer unless required by applicable law. The status of the radon survey is presented in Chapter 3.10.

- **Lead-based paint**: DoD policies on LBP differ depending upon the date of the property transfer and the date of construction of the residential housing being transferred. Target housing constructed after 1960 and before 1978 must be inspected for LBP hazards, although no abatement is required. Target housing constructed before 1960 must be inspected for LBP hazards, and such hazards must be abated. However, DoD policy does not require LBP inspection and abatement when a building is scheduled for demolition by the transferees and the transfer document prohibits occupation of the building prior to demolition or when a building is not targeted for reuse.

  Prior to demolition of any building that is known or suspected to contain LBP, a sampling program would be conducted to confirm the presence or absence of lead above RCRA Toxicity Characteristic levels. This sampling would be the responsibility of the new owner of the building, who would have to follow 29 CFR 1926.62 (OSHA construction standards for buildings with LBP), and be responsible for the sampling, analysis, abatement, and disposal of debris. The Navy's

responsibility is to disclose that the presence of LBP can be assumed at NAWCAD due to the age of the structures. This has been documented in the Basewide Phase I EBS.

Comprehensive testing for LBP at Quarters A and B has been completed, due to their proposed reuse for residential purposes. Abatement measures were completed in 1988 at Quarters A and B.

- **Asbestos-containing material**: The DoD policy with regard to asbestos-containing material is to manage it in a manner protective of human health and the environment, and to comply with all applicable federal, state, and local laws and regulations governing asbestos-containing material hazards. All friable, accessible, and damaged (FAD) asbestos identified at NAWCAD as per the current Asbestos O&M Plan will be removed by the Navy by 1999.

  Unless it is determined by a certified industrial hygienist that asbestos-containing material at the property does pose a threat to human health at the time of transfer, all property containing ACM would be conveyed, leased, or otherwise disposed of "as is." Asbestos remediation is not required when a building is scheduled for demolition by the transferees and the transfer document prohibits building occupancy before demolition. Assuming the previous conditions are met, the transferee assumes responsibility for the future management of asbestos-containing material in accordance with applicable laws.

4.10.2 Reuse Plan

Hazardous Substances/Waste Quantities

With implementation of this alternative, the use of hazardous materials by the Navy at NAWCAD would cease. This would result from a realignment of most of the RDT&E functions from NAWCAD to Patuxent River, Maryland. Environmental compliance activities at NAWCAD would continue for storage tanks, hazardous substances and hazardous waste, PCBs, asbestos, and NPDES permits. The *BRAC Cleanup Plan* (BRAC Cleanup Team and EA Engineering, March 1995) describes compliance strategies in detail.

The Reuse Plan (Subchapter 2.3) provides for a new industrial/business/office R & D complex on the Jacksonville Road and Street Road frontages. Some hazardous substances may be generated by the operation and maintenance of private industries locating in this area. The amount of hazardous substances that might be used by these industries cannot be quantified at this time, as the nature of industries that would locate in the excessed area is not known. Hazardous substances users would

be subject to inspection by the Bucks County Fire Department and would be required to file information on hazardous material usage with the PA Department of Environmental Protection.

Site Contamination

The transfer of excess DoD property related to base closures and realignments is a two-step process: (1) review of currently available information and preparation of an Environmental Baseline Survey (EBS); and (2) preparation of a Finding of Suitability for Transfer (FOST). The purpose of the FOST is to report the environmental suitability of a parcel for transfer to nonfederal agencies or to the public by disclosing that one of the following is true:

1. No hazardous substances were stored for one year or more, or are known to have been released or disposed of on the parcel; or

2. The requirements CERCLA 120(h)(3) have been met for the parcel being transferred, which specifies that where item (1) above does not apply, deeds to transfer must disclose/contain:

    a. information on the type and quantity of the release of hazardous substances, and a description of the remedial action (RA) taken;

    b. a covenant warranting that approved remedial design has been completed and the remedy has been demonstrated to USEPA to be operating properly and successfully and any additional remedial action found to be necessary after the date of such transfer shall be conducted by the federal government; and

    c. a clause granting the federal government access to the property for remedial action.

Completion of remedial action does not necessarily have to take place prior to property transfer. If the construction and installation of an approved remedial design has been completed, and the remedy has been demonstrated to the USEPA to be operating properly and successfully, the property could be transferred prior to complete remediation.

Investigations are continuing to determine the suitability of NAWCAD for transfer, as is described in Subchapter 3.10. Various sites are undergoing investigation consistent with the FLRA's proposed Reuse Plan. The BRAC Cleanup Team is coordinating with the FLRA in addressing the environmental issues related to transfer parcels scheduled for reuse. Department of the Navy Policy Memorandum 95-02, *Consideration of Future Land Use in Determining Cleanup Standards for Base Realignment and Closure Property* (August 17, 1995), applies to the cleanup of NAWCAD.

In the 1995 EBS, NAWCAD was divided into eight geographic zones (Figure 4.10-1, NAWCAD Hazardous Waste Cleanup Zones). To further facilitate the disposal and reuse process, the BRAC Cleanup Team prepared the *1997 Business Plan* for NAWCAD, which is essentially an update to the BRAC Cleanup Plan. This plan identifies what are referred to as "Environmental Sites" (sites) at NAWCAD. These are defined as "a portion of NAWCAD property targeted for closure which, at a minimum, requires an investigation to determine if the property presents a threat to human health and the environment and thus requires a cleanup prior to leasing or transfer." The sites are shown in Figure 4.10-2 (Environmental Sites at NAWCAD).

Environmental Sites

- Environmental Site 1- Area A;
- Environmental Site 2- Area B;
- Environmental Site 3- Area C;
- Environmental Site 4- Area D;
- Environmental Site 5- The balance of NAWCAD property targeted for transfer (Zones 1, 2, 3, and 4); and
- Environmental Site 6- All buildings (and associated structures/soils) targeted for transfer.

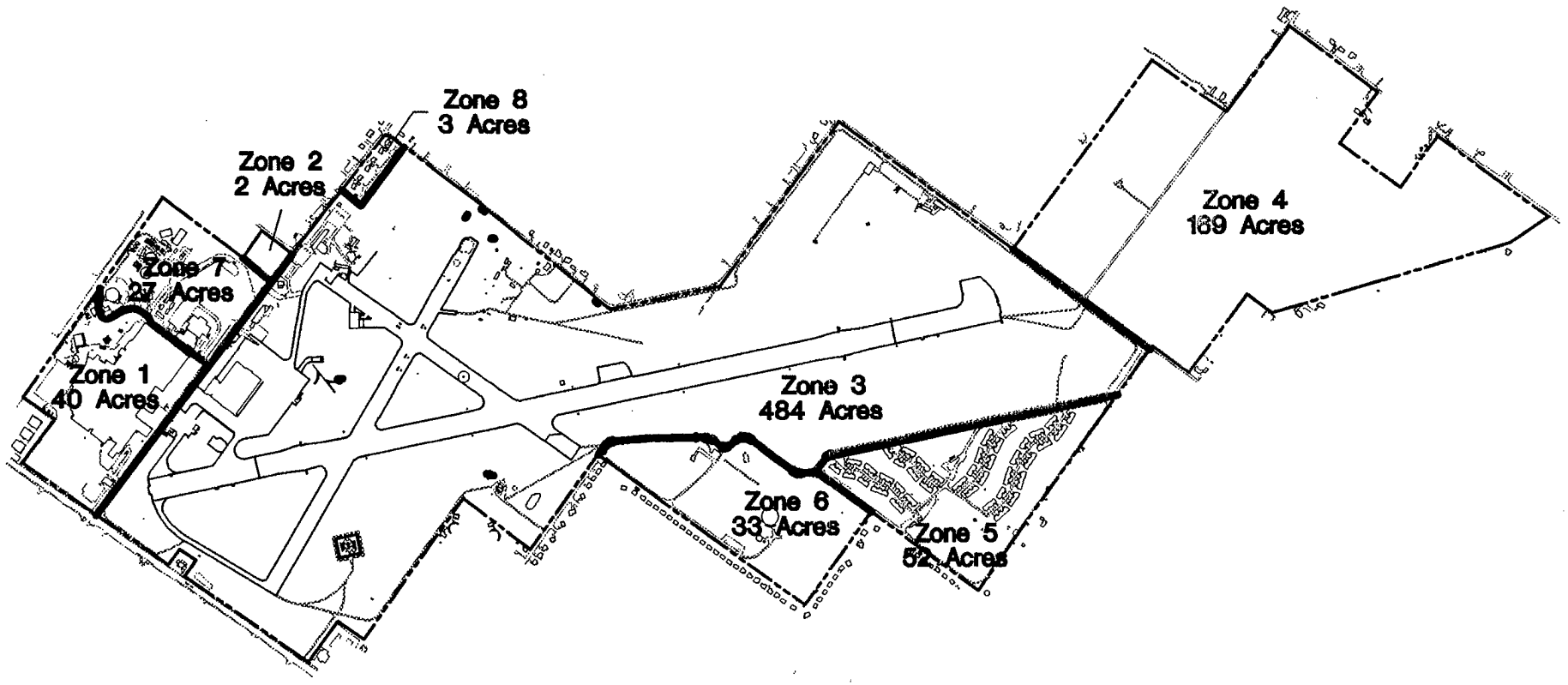
Releases of hazardous wastes or substances to the soil and/or groundwater have occurred within Areas A, B, C, and D. The releases of concern will be investigated and remediated, as specified by CERCLA and/or RCRA. The Navy is conducting all remedial activities in accordance with CERCLA and the National Contingency Plan. For areas of known releases of hazardous wastes or substances to soil and/or groundwater, CERCLA requires a Remedial Investigation (RI). In addition, for each area, and for the remaining property targeted for transfer, studies will be conducted to determine if hazardous substances, hazardous wastes, and/or petroleum products have been stored, released, or disposed. If release or disposal of such substances is confirmed, CERCLA and/or RCRA cleanup requirements will be met prior to property transfer.

The BRAC Cleanup Team (BCT) is coordinating with the FLRA in addressing the environmental issues related to transfer parcels scheduled for reuse. The Department of the Navy Policy Memorandum 95-02, *Consideration of Future Land Use in Determining Cleanup Standards for Base Realignment and Closure Property* (August 17, 1995), applies to the cleanup of NAWCAD. In addressing the cleanup levels, the BCT would give consideration to BRAC future land use as identified in the proposed Reuse Plan.

Based on the input of the Restoration Advisory Board, the FLRA, and adjacent municipalities and boroughs, the BRAC Cleanup Team has identified the following priorities (BCP, 1997):

- Issue Findings of Suitability to Lease (FOSLs) for selected buildings;
- Issue FOSLs for McKinney Act Properties;

NAWCAD Hazardous Waste Cleanup Zones



Building

Property Boundary

Zone Boundary

1500 0 1500
Scale in Feet

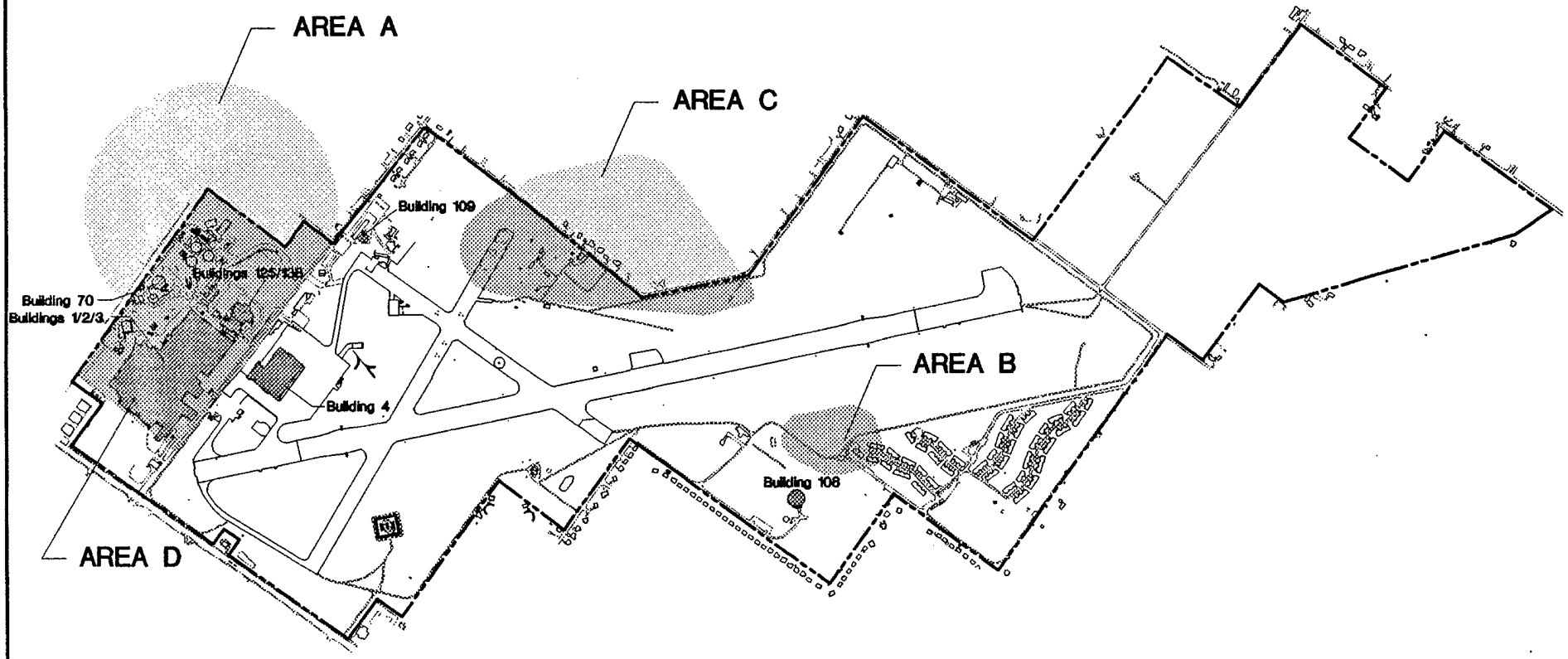
500 0 500
Scale in Meters

N

Source: EA Engineering, Science, and Technology, Inc., March 1995.

Figure 4.10-1

Environmental Sites at NAWCAD



Buildings Targeted for Transfer

Areas Targeted for Transfer

Property Boundary

Source: BRAC Cleanup Team, 1996.

1500 0 1500
Scale in Feet

500 0 500
Scale in Meters

N

Figure 4.10-2

- Conduct follow-on EBS work;
- Initiate removal action for Area A sources;
- Complete feasibility study for Site 6;
- Begin Pump and Treat Operations for Area D groundwater; and
- Complete documentation of property to be transferred as parkland.

Investigations and cleanup actions will be completed as soon as practicable, so that all known environmental problems are either under remediation or the problem is defined and a cleanup strategy is selected. While the most critical environmental problem at NAWCAD is the groundwater contamination, it is recognized that reuse can proceed concurrently with the groundwater cleanup, primarily through initially leasing facilities. Other environmental concerns, identified by the regulators and the initial EBS, will be addressed consistent with priorities identified for the reuse of the base.

Building Use and Reuse by the Community

The BRAC 95 properties and their prospective reuses are outlined in Subchapter 2.3. Any reuse, modification, renovation, and/or demolition of buildings would have to address the issues of LBP and asbestos:

- **Lead-based Paint** - Due to the age of most of the buildings at the NAWCAD, the presence of some LBP should be assumed as a possibility. Reuse and/or modifications to any of the buildings would take into consideration the likelihood of a LBP hazard relative to reuse.

- **Asbestos** - Asbestos material identified as FAD will be removed by the Navy in 1998. Asbestos must be removed in accordance with 40 CFR Part 61 Subpart M (National Emission Standard for Asbestos) and Part 61.145 (Standard for Demolition and Renovation).

4.10.3 University/Institutional Alternative

As with the Reuse Plan, the use of hazardous materials by the Navy at NAWCAD would cease under the University/Institutional Alternative. Environmental compliance activities at NAWCAD would continue for storage tanks, hazardous substances and hazardous waste, polychlorinated biphenyls (PCBs), asbestos, and NPDES permits per the *BRAC Cleanup Plan* (BRAC Cleanup Team and EA Engineering, March 1995).

Operation and maintenance of private industries located in the area of the new multi-business complex may generate hazardous substances, but amounts cannot be quantified at this time, as the nature of those industries are not known.

4.10.4 Residential Alternative

Under the Residential Alternative, the scale of the industrial/business park would be reduced to 65 acres (26 hectares), reducing the amount of hazardous generation from these facilities. A residential format for this parcel would probably generate little hazardous waste other than herbicides for grounds maintenance.

4.10.5 Aviation Alternative

The Aviation Alternative would keep the airfield in operation as a general aviation facility. Operation of an airfield would generate petroleum and hazardous substance during routine maintenance and operation of aircraft. Under the Aviation Alternative, the scale of the industrial/business park would increase to 284 acres (115 hectares), which would increase the potential for generation of hazardous substances.

4.11 Cumulative Impacts of the Preferred Alternative

This chapter addresses the cumulative impacts of the preferred alternative, the Reuse Plan. Cumulative impacts have been defined by the CEQ in 40 CFR 1508.7 as:

> "impacts on the environment which result from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions."

The CEQ regulations also state that the cumulative impacts addressed should not be limited to those from actual proposals, but must include impacts from actions being contemplated or that are reasonably foreseeable.

Cumulative impacts upon the study area as a result of the redevelopment of NAWCAD would include the phaseout and closure of the base itself. In 1990, base personnel loading totaled 4,605 personnel. This number declined to 1,398 in August 1995 and to 1,129 in May 1996. As of July 1998, there were 20 employees associated with the Caretaker Site Office at NAWCAD. The FLRA has several interim leases for various facilities at the base; the number of employees associated with these facilities varies between 200 and 300 (Ames, July 24, 1998). The loss of this employment center and its ancillary functions is a significant feature that is included in No Action Alternative conditions (e.g., traffic volumes generated by the base have declined, and will continue to decline up to its closure). Impacts generated by a redeveloped NAWCAD have taken into account this anticipated reduction.

Interviews conducted in 1995 and 1996 with Bucks County planners and township officials indicated no major new projects were planned in the study area. The most significant project identified was the new Wal-Mart store on Street Road at Jacksonville Road that opened January 1996. The Wal-Mart traffic studies submitted to PENNDOT were incorporated into the traffic analysis in Subchapter 4.4. Other proposed projects identified by township officials were:

- A new residential subdivision for approximately 400 units in Warwick Township, beyond the one-mi (1.6-km) study area; and
- A small industrial subdivision of 20 acres (eight hectares) (26 parcels but with no specific projects identified) about one-half mi (one km) northwest of NAWCAD in Warminster.

These other projects are relatively small and are included within the background growth factors used in the traffic analysis or demographic projections for the area.

5 MITIGATION MEASURES

The need for mitigation measures with respect to implementation of the proposed Reuse Plan and its alternatives is addressed below.

5.1 Reuse Plan

5.1.1 Land Use

No significant environmental impacts have been identified and therefore no mitigation is required.

5.1.2 Socioeconomics

No significant environmental impacts have been identified and therefore no mitigation is required.

5.1.3 Community Facilities and Services

No significant environmental impacts have been identified and therefore no mitigation is required. However, local school districts and other service providers should be kept informed in a timely manner by the FLRA of anticipated demand at the former base. This is in order to facilitate their planning for increases in service demand as a result of direct new housing development or induced development from expanded employment at the facility.

5.1.4 Transportation

Implementation of the Reuse Plan would cause significant impacts at most of the study area intersections. Several potential mitigation measures have been investigated, including signal modifications, geometric improvements, and regulatory measures. Implementation of these measures would be at the discretion of the FLRA.

The feasibility of introducing mitigation measures at each intersection impacted was evaluated. The configuration of certain intersections would preclude further widening (i.e., existing left-turn lanes), while others support adjacent development that would be substantially impacted if geometric improvements were undertaken. A summary of potential improvements at each intersection considered follows:

- Bristol Road and Jacksonville Road (Location 1): The undeveloped land adjacent to this intersection facilitates the construction of an additional lane per approach. This improvement, along with minor signal modifications, results in operation that is more favorable then no-build operation, despite significant project-generated trips at the intersection. Overall operation of the intersection would improve to LOS C.

- Bristol Road and Hatboro Road (Location 2): The Reuse Plan would introduce an additional approach to this existing unsignalized T-intersection. To mitigate the adverse impacts, signalization of this intersection has been suggested. Minor widening of each of the approaches would also be necessary. These measures would improve operations over unmitigated conditions. Overall operation would be LOS F during the am peak, but only due to a failing westbound through/right movement. Every other approach at the intersection would operate at LOS D or better. In the pm peak, conditions operate at LOS F for the intersection.

- Street Road and Jacksonville Road (Location 4): The majority of project-generated trips would be surcharged onto this intersection. Therefore, in order to mitigate the resulting impacts, significant improvements would be necessary. The mitigated conditions assume dual left-turn lanes for all approaches (existing conditions provide one left-turn lane per approach). In addition, the widening of the Jacksonville Road approaches would provide two through lanes, thus facilitating movements to and from the project site. Despite these improvements, am and pm peaks would still operate at LOS F. In the am, however, only one approach (eastbound left) would fail, which would cause the intersection to fail overall. The pm mitigated condition would provide operation similar to no action conditions, but improved. Therefore, both peak periods, after mitigation, would exhibit improved operation when compared to the No Action Alternative.

- County Line Road and Blair Mill Road (Location 6): To mitigate impacts at this location, minor widening of the Blair Mill Road approach to provide left and right turn lanes would be necessary. This improvement, along with signal adjustments, would provide LOS C operation during the am and pm peaks.

The results of capacity analyses based on these mitigated conditions are provided in Table 5-1. As noted, despite these improvements, several intersections continue to operate at undesirable levels. Also, other intersections for which mitigation is not feasible would continue to operate poorly. Therefore, other mitigation measures such as staggered work hours and ride-sharing would be necessary, but have not been evaluated here.

Table 5-1
Summary of LOS Analysis - Reuse Plan Mitigated Conditions

Intersection	AM Peak Hour				PM Peak Hour			
	Appr. Volume	V/C Ratio	Stopped Delay	LOS	Appr. Volume	V/C Ratio	Stopped Delay	LOS
Bristol Road and Jacksonville Road (Location 1)								
EB L	167	0.647	11.5	B	91	0.773	27.3	D
EB TR	748	1.032	46.9	E	762	0.963	29.1	D
WB L	55	0.237	8.6	B	77	0.655	17.8	C
WB TR	573	0.832	16.8	C	814	1.027	44.1	E
NB LTR	508	0.786	17.7	C	475	0.478	9.0	B
SB LTR	555	0.688	14.6	B	598	0.501	9.2	B
Overall:		0.933	24.0	C		0.764	25.0	C
Bristol Road and Hatboro Road (Location 2)								
EB L	120	0.610	22.8	C	289	1.288	*	F
EB TR	794	0.956	25.9	D	1097	1.386	*	F
WB L	100	0.526	21.0	C	42	0.193	17.6	C
WB TR	1152	1.371	*	F	840	1.091	*	F
NB LTR	58	0.265	14.4	B	266	1.071	*	F
SB L	131	0.385	15.1	C	128	0.570	17.4	C
SB TR	236	0.692	19.8	C	115	0.314	14.1	B
Overall:		*	*	F		*	*	F
Street Road and Jacksonville Road (Location 4)								
EB L	442	1.213	*	F	225	0.672	31.9	D
EB T	964	0.907	28.4	D	1176	1.105	78.5	F
EB R	371	0.457	12.3	B	229	0.297	10.9	B
WB L	308	0.799	35.7	D	303	0.859	41.1	E
WB T	1065	0.968	35.4	D	959	0.9	28.4	D
WB R	552	0.742	17.4	C	448	0.579	13.8	B
NB L	220	0.760	36.7	D	360	1.123	*	F
NB T	980	1.062	63.8	F	651	1.294	*	F
NB R	53	0.079	10.5	B	164	0.254	11.5	B
SB L	246	0.851	43.1	E	564	1.760	*	F
SB T	659	0.715	23.4	C	956	1.900	*	F
SB R	350	0.478	13.4	B	425	0.668	16.4	C
Overall:		*	*	F		*	*	F

Table 5-1 (continued)
Summary of LOS Analysis - Reuse Plan Mitigated Conditions

Intersection	AM Peak Hour				PM Peak Hour			
	Appr. Volume	V/C Ratio	Stopped Delay	LOS	Appr. Volume	V/C Ratio	Stopped Delay	LOS
County Line Road and Blair Mill Road (Location 6)								
EB TR	1166	0.908	22.3	C	1269	1.017	40.0	D
WB L	504	0.978	41.9	E	472	0.948	36.9	D
WB T	876	0.382	2.5	A	1241	0.560	3.8	A
NB L	90	0.369	23.1	C	160	0.512	23.3	C
NB R	365	0.464	10.6	B	544	0.597	11.7	B
Overall:		0.857	18.3	C		0.905	22.9	C

Notes: NB-Northbound; SB-Southbound; EB-Eastbound; WB-Westbound
L-Left turn; R-Right turn; T-Through

5.1.5 Air Quality

Short-term construction and demolition-related effects on air quality would occur, but impacts could be alleviated through implementation of common construction management practices (e.g., dust suppression, phasing of construction, etc.).

5.1.6 Noise

Demolition and construction activities would temporarily increase noise levels near construction areas. To mitigate for temporary noise effects, these activities would only take place during regular working hours.

5.1.7 Infrastructure

No significant impacts have been identified and therefore no mitigation is required.

5.1.8 Cultural Resources

The Reuse Plan proposes that the inertial guidance laboratory (Bldg 108) and centrifuge (Bldg 70) continue in their historic usage, and that the ejection tower (Structure 361) remain and be used as an antenna tower. The proposed disposal of NAWCAD by the Navy results in a finding of adverse effect on all three historic structures. To mitigate this effect, the Navy will place restrictive deed covenants on each of the individual buildings prior to property transfer. Mitigation for this adverse effect is specified in the Programmatic Agreement of December 1998 (Appendix G).

5.1.9 Natural Resources

The only natural resource that may be impacted by implementation of the Reuse Plan would be wetlands (if future development were to affect wetlands). The alternatives analysis for any proposed project under the Reuse Plan that would affect wetlands must consider avoiding impacts to wetlands. Only after wetland impacts have been avoided, to the greatest extent practicable, should other mitigative measures be considered. Other mitigation measures, as per PA Department of Environmental Protection guidelines, would involve both consideration of area and wetland function. With regard to area, mitigation is required within the same watershed and near the wetland impact. The PA Department of Environmental Protection's mitigation ratio is a minimum of 1:1 (i.e., for every acre disturbed by development, one acre of wetlands must be replaced or created).

5.1.10 Hazardous Substances

Section 120(h) of CERCLA addresses property transferred by federal agencies and specifies the contents of deeds to transfer such property. The deeds must contain the following three parts: (1) information regarding the type and quantity of release of hazardous substances and the description of remedial action taken; (2) a covenant warranting that remedial action (RA) has been taken and that "any additional remedial action found to be necessary after the date of such transfer shall be conducted by the United States;" and (3) "a clause granting the federal government access to the property for remedial action."

The DoD has adopted specific policies that apply to radon, LBP, and asbestos at BRAC properties, as described in detail in Subchapter 4.10. These policies define the obligation of the Navy with respect to addressing radon, LBP, and asbestos at installations prior to their demolition, transfer, or disposal. Compliance with these policies would ensure that there would be no impacts related to radon, LBP, or asbestos upon transfer of NAWCAD property.

5.2 University/Institutional Alternative

Implementation of this alternative would result in many of the same impacts in the areas of traffic, air quality, noise, cultural resources, and hazardous substances as were previously described for the proposed Reuse Plan. Executing the same proposed mitigation measures under the University/ Institutional Alternative would reduce or eliminate potential impacts.

5.3 Residential Alternative

Implementation of this alternative would result in many of the same impacts in the areas of traffic, air quality, noise, cultural resources, and hazardous substances as were previously described for the proposed Reuse Plan. Executing the same proposed mitigation measures under the Residential Alternative would reduce or eliminate potential impacts.

5.4 Aviation Alternative

Implementation of this alternative would also result in many of the same impacts in the areas of traffic, air quality, noise, cultural resources, and hazardous substances as were previously described for the proposed Reuse Plan. Executing the same proposed mitigation measures under the Aviation Alternative would reduce or eliminate specific impacts.

6 RELATIONSHIP OF THE PROPOSED ACTION TO FEDERAL, STATE, AND LOCAL PLANS, POLICIES, AND CONTROLS

Disposal and reuse of NAWCAD would comply with existing federal regulations and with state, regional, and local policies and programs. The federal acts and executive orders with which the proposed action must demonstrate compliance include:

- NEPA;
- RCRA, CERCLA, and SARA;
- Clean Water Act;
- Clean Air Act;
- Endangered Species Act;
- National Historic Preservation Act;
- Coastal Zone Management Act;
- Toxic Substances Control Act;
- Executive Order 11990, Protection of Wetlands;
- Executive Order 11988, Floodplain Management; and
- Executive Order 12898, Environmental Justice; and
- Executive Order 13045, Protection of Children From Environmental Health Risks and Safety Risks.

For preparation of this EIS, communication was undertaken with relevant state, regional, and local authorities to determine which existing policies and programs apply to the proposed disposal and reuse.

6.1 National Environmental Policy Act

This EIS has been prepared in accordance with the CEQ regulations implementing NEPA (40 CFR Part 1500-1508) and Navy NEPA procedures (OPNAVINST 5090.1B). Executive Order 11991 of May 24, 1977 directed the CEQ to issue regulations for procedural provisions of NEPA; these are binding for all federal agencies. The Navy invited comments on the Draft EIS (January, 1997). These comments are addressed and responded to by the Navy in this Final EIS.

6.2 RCRA, CERCLA, SARA, and CERFA

The Resource Conservation and Recovery Act (RCRA) was passed in 1976 and continued earlier provisions relating to solid waste and resource recovery, including hazardous waste. It sets standards for hazardous waste treatment, storage, and disposal facilities.

In 1980, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) was passed to provide for cleanup of sites with uncontrolled releases of hazardous substances. This program was continued in the Superfund Amendments and Reauthorization Act (SARA) of 1986. Section 211 of SARA provides continued authorization for the DoD Environmental Restoration Program and the Defense Environmental Restoration Account. Major responsibilities for monitoring compliance with these acts rests with the USEPA. The Navy is conducting all remedial activities in accordance with CERCLA and the National Contingency Plan.

The Navy recognizes its responsibilities for control and management of hazardous substances and wastes in compliance with federal, state, and local requirements. These responsibilities are defined in Chapter 3 of the Navy's Environmental and Natural Resources Protection Manual (US Navy, 1994). Studies and some remedial actions have already been undertaken by the Navy at NAWCAD to identify problem areas related to petroleum and hazardous substances. The Navy will make further assessments regarding cleanup and disposal as required by DoD guidelines.

The Community Environmental Response Facilitation Act (CERFA), Public Law 102-425, requires the identification of all uncontaminated real property, or parcels thereof, at installations undergoing closure or realignment. In accordance with CERFA, the Navy conducted an Environmental Baseline Survey (EBS) that included visual inspections, interviews, and review of plans, logs, maps, aerial photographs, records, and reports. The findings of the EBS were included in a CERFA report (US Navy, 1994) and summarized in Subchapter 3.10 of this EIS. The report also addressed CERCLA requirements to identify parcels on which hazardous substances in quantities greater than or equal to their reportable quantity were stored for more than one year, known to be released, or disposed of on the property.

6.3 Clean Water Act

The Clean Water Act of 1977, which amends the Federal Water Pollution Act of 1972, and subsequent amendments were designed to assist in restoring and maintaining the chemical, physical, and biological integrity of the nation's waters. This covers discharge of pollutants into navigable waters, wastewater treatment management, and protection of relevant fish, shellfish, and wildlife. Section 402 of this act requires a NPDES permit for discharges into navigable waters. Congress also passed the Water Quality Act of 1987 to address excessive levels of toxic pollutants still found in some waters.

Depending on the ultimate site development plan, implementation of project alternatives could result in the loss of jurisdictional wetlands under Section 404 of the Clean Water Act (the amount of wetlands filled would be dependent upon the specific reuse that was selected). The alternative analysis for any proposed project under the Reuse Plan that could potentially affect wetlands must first consider avoiding impacts to wetlands. Only after wetland impacts have been avoided to the greatest extent practicable, should other mitigative measures be considered. Other mitigation measures, as per Pennsylvania Department of Environmental Protection guidelines, would involve both consideration of area and wetland function. Should wetlands be impacted, authorization from the US Army Corps of Engineers and the Pennsylvania Department of Environmental Protection would be required prior to construction.

Since proposed construction would encompass an area greater than five acres (two hectares), compliance with the USEPA and the Commonwealth of Pennsylvania stormwater management regulations would be required, including acquisition of NPDES permits.

6.4 Clean Air Act

The Clean Air Act (CAA) of 1955 and subsequent amendments specify regulations for control of the nation's air quality. Federal and state ambient air standards have been established for each criteria pollutant. The 1990 amendments to the act require federal facility compliance with all applicable substantive and administrative requirements for air pollution control.

Any demolition of buildings or materials associated with reuse activities must comply with established emission and ambient air standards, especially for removal of asbestos materials. This removal would meet the National Emissions Standards for Hazardous Air Pollutants. The asbestos removal contractor would use a landfill approved for asbestos disposal after removing the asbestos-containing materials.

The USEPA has published final rules on general conformity (40 CFR Part 51 in Federal Register, November 30, 1993) that apply to federal actions in areas designated nonattainment for any of the criteria pollutants under the CAA. The rules do not apply to implementation of the reuse alternatives, as the Navy will not retain control of the property after it is disposed.

6.5 Endangered Species Act

The Endangered Species Act of 1973 and subsequent amendments provide for the conservation of threatened and endangered species of animals and plants, and the habitats in which they are found. Based on available documentation, there are no known threatened or endangered species of animals or plants on the NAWCAD site.

6.6 National Historic Preservation Act

This act was passed in 1966 to provide for the protection, enhancement, and preservation of any property that possesses significant architectural, archaeological, historical, or cultural characteristics. Executive Order 11593 of 1974 further defined the obligations of federal agencies concerning this act. Under the regulatory program implementing the National Historic Preservation Act (NHPA), a federal agency must determine if the subject property is eligible for listing in the National Register of Historic Places (NRHP).

The Reuse Plan proposes that the inertial guidance laboratory (Bldg 108) and centrifuge (Bldg 70) continue in their historic usage, and that the ejection tower (Structure 361) remain and be used as an antenna tower. The proposed disposal of NAWCAD by the Navy results in a finding of adverse effect on all three historic structures. To mitigate this effect, the Navy will place restrictive deed covenants on each of the individual buildings prior to property transfer. Mitigation for this adverse effect is specified in the Programmatic Agreement of December 1998 (Appendix G).

6.7 Coastal Zone Management Act

The Coastal Zone Management Act of 1972 provides assistance to states, in cooperation with federal and local agencies, for developing land and water use programs for the coastal zone. This includes the protection of natural resources and management of coastal development. Policy is implemented by the respective state coastal zone management program. Since the proposed action would have no effect on the coastal zone, the Coastal Zone Management Act does not apply.

6.8 Toxic Substances Control Act

The Toxic Substances Control Act of 1976 (TSCA) was enacted to "regulate commerce and protect human health and the environment by requiring testing and necessary use restrictions on certain chemical substances." Unlike many of the existing environmental laws, TSCA regulates not only the end products of manufacturing or processing activities, but also provides for regulating the manufacture of substances not yet developed, the permitted use of these chemicals, and allowable manufacturing quantities. The act also requires manufacturers to test substance(s), submit reports, and maintain records on their health and environmental effects. TSCA, therefore, regulates chemicals or substances during their entire lifetime.

6.9 Executive Order 11990, Protection of Wetlands

This order of May 24, 1977 directs federal agencies to take action to protect wetlands on their property and mandates review of proposed actions on wetlands through procedures established by NEPA. Depending on the ultimate site development plan, implementation of project alternatives could result in the loss of jurisdictional wetlands under Section 404 of the Clean Water Act (the amount of wetlands filled would be dependent upon the specific reuse that was selected). As mentioned in Subchapter 6.3, the alternatives analysis for any proposed project under the Reuse Plan that could potentially affect wetlands must first consider avoiding impacts to wetlands. Only after wetland impacts have been avoided to the greatest extent practicable, should other mitigative measures be considered.

6.10 Executive Order 11988, Floodplain Management

This order sets forth federal agency responsibilities for reducing the risk of flood loss or damage to personal property, minimizing the impact of flood loss, and restoring the natural and beneficial functions of floodplains. This order was issued in furtherance of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. Plans or proposals for actions of the Navy in floodplain areas would be submitted for public review. Because NAWCAD does not lie within the 100-year or 500-year floodplain, the proposed Reuse Plan would have no impact on floodplains.

6.11 Executive Order 12898, Environmental Justice

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," was signed on February 11, 1994. It directs all federal departments and agencies to incorporate environmental justice in achieving their mission. Each federal department and agency is to accomplish this by conducting programs, policies, and activities that substantially affect human health or the environment in a manner that does not exclude communities from participation in, deny communities the benefits of, or subject communities to discrimination under such actions because of their race, color, or national origin.

As evaluated in accordance with Executive Order 12898, the direct and indirect effects of the proposed disposal and reuse are not expected to cause adverse environmental or economic impacts specific to any groups or individuals from minority or low-income populations residing in the study area. Neither would any persons be displaced as a result of proposed disposal and reuse of the former NAWCAD site.

In addition, the wide mailing and the publication of the newspaper notice announcing availability of the original DEIS and FEIS would allow the general public (including minority and low-income individuals and populations) the opportunity to comment on the proposed reuse. During the scoping hearing, there were no groups identified that represented minority or low-income individuals.

6.12 EO 13045, Protection of Children From Environmental Health Risks and Safety Risks

EO 13045 addresses risks attributable to products or substances that a child is likely to come in contact with or ingest. The proposed project would not introduce substances that would create health and safety risks and therefore would not pose environmental health and safety risks to children.

6.13 State and Local Plans and Policies

The Navy pursues close and harmonious planning relations with local and regional agencies and planning commissions of adjacent cities, counties, and states for cooperation and resolution of mutual land use and environment-related problems. In addition, coordination may be made with state and regional planning clearing houses as established by Executive Order 12372 of 1982.

In preparing this EIS, relevant state, regional, and local agencies were contacted for information on the impact of the proposed disposal and reuse of NAWCAD. Execution of the proposed Reuse Plan would require financial incentives, additional public investment, and an appropriate governance structure to control and implement the proposed development.

7 UNAVOIDABLE ADVERSE EFFECTS

The disposal and reuse of NAWCAD pursuant to the proposed Community Reuse Plan would result in the following unavoidable adverse effects:

- **Transportation:** The additional trips generated by the proposed action would create considerable traffic delays at all study area intersections, since the existing street network offers limited residual capacity. Under the Reuse Plan alternative, all intersections would operate at unacceptable levels (LOS "F") during the peak hours. Mitigation for transportation impacts, which would be at the discretion of the FLRA is described in Chapter 5.

- **Noise:** While most hourly L_{eq} noise increases would not be significant, during some early morning hours (5 am to 7 am) noise levels increases would be noticeable (e.g., four- and five-decibel increases). However, in general, the noise-level monitoring program established that existing noise levels are already high and are typical of a suburban neighborhood.

- **Natural Resources:** Implementation of the proposed Reuse Plan could potentially impact freshwater wetlands, with the amount dependent upon the ultimate site configuration. The alternative analysis for any proposed project under the Community Reuse Plan that would affect wetlands must consider avoiding impacts to wetlands. Only after wetland impacts have been avoided to the greatest extent practicable, should other mitigative measures be considered. Mitigative measures for these potential impacts (which would be implemented by the FLRA or an applicant proposing redevelopment) are described in Chapter 5.

- **Cultural Resources:** As a result of the Navy's disposal of NAWCAD, there will be adverse effects on the three properties that are eligible for the National Register of Historic Places (Bldg 108 [Inertial Guidance Laboratory], Bldg 70 [Centrifuge], and Structure 361 [Ejection Tower]). To mitigate this effect, the Navy will place restrictive deed covenants on each of the individual buildings prior to property transfer. Mitigation for this adverse effect is specified in the Programmatic Agreement of December 1998 (Appendix G).

8 RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF THE ENVIRONMENT AND THE ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Positive consequences of implementing the proposed Reuse Plan would include the replacement of employment opportunities for job losses that have occurred as a result of the closure of NAWCAD. The level of economic activity formerly generated by the facility would be recaptured and the conditions that would be essential to competitive enterprise of the future would be created. As such, the proposed action is intended to enhance long-term productivity in the Bucks County region.

During the proposed construction and demolition phases of the disposal and reuse of NAWCAD, there would be some short-term adverse impacts on the environment. These would include some vehicular traffic disruptions, increased noise levels associated with construction activities, and diminution of air quality due to fugitive dust and vehicular emissions.

Longer-term negative impacts would include increases in traffic volumes and consequent air quality and noise impacts. The proposed Reuse Plan could also result in significant generation of sewage, water usage, and energy consumption. None of the impacts, however, would be expected to adversely affect the long-term productivity of the site (e.g., in terms of economics, demographics, natural resources, etc).

9 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

While the disposal and reuse of the NAWCAD property would bring benefits to Bucks County, nonrenewable resources would be consumed during the design, construction, and implementation of the proposed action. Since the reuse of these resources is impossible, they must be considered irreversibly and irretrievably committed to the development of the proposed project. The finite resources that would be irretrievably committed by implementation of the proposed reuse are the expendable materials such as steel, concrete, and glass; fuel and other forms of energy utilized during construction activities; and the supplies and energy resources (in the form of water for steam and gas and electricity expended in heating and cooling new facilities) necessary to operate and maintain new facilities after construction.

If construction in wetlands occurs, it would result in the loss of wetlands as a natural resource. Measures could be implemented, however, to offset this loss (see Chapter 5).

Private funds committed to the design, construction, and operation of the proposed redevelopment are not available for the use of other projects. Additionally, the disposal of construction debris, including asbestos and lead-based paint, would also result in an irreversible and irretrievable commitment of landfill or other solid waste disposal capacity.

The public services that would be provided in connection with new development at NAWCAD (e.g., police and fire protection services) also constitute resource commitments that might otherwise be used for other programs or projects, although the proposed reuse components would also generate tax revenues to provide additional public funds for such activities. The human labor expended for development and operation of the proposed reuse scheme would also be considered irrevocable.

10 PUBLIC REVIEW PROCESS AND RESPONSE TO COMMENTS

Public involvement in the review of DEISs is stipulated in 40 CFR Part 1503 of the CEQ's regulations implementing NEPA, and in OPNAVINST 5090.1B. These regulations and guidance provide for active solicitation of public comment via scoping meetings, public comment periods, and public hearings. This chapter is prepared to respond to the specific questions and comments raised by individual commentors during the public comment period on the *Draft Environmental Impact Statement for Disposal and Reuse of NAWCAD Warminster.*

10.1 Public Review Process

10.1.1 Filing and Distribution of the Draft Environmental Impact Statement

The formal Notice of Intent (NOI) to prepare an EIS for disposal and reuse of NAWCAD Warminster was published in the *Federal Register* on September 25, 1995. The scoping meeting was held on October 12, 1995 in Warminster, Pennsylvania.

On December 20, 1996, the DEIS, along with a copy of the public hearing notice, was distributed to agencies and officials of federal, state, and local governments, citizen groups, and private citizens. Copies of the DEIS were also on display at the Bucks County Library and the Warminster Library.

10.1.2 Public Review Period and Public Hearing

Public review and comment on the DEIS occurred from December 20, 1996 through February 24, 1997. During that period, a public hearing was held on January 28, 1997 at the Warminster Township Building, Henry and Gibson Streets, Warminster, Pennsylvania. A complete transcript of the hearing is also available from:

Mr. Kurt Frederick
Department of the Navy
Northern Division, Naval Facilities Engineering Command
10 Industrial Highway
Mail Stop #82
Lester, PA 19113-2090

10.2 Receipt of Comments

Comments on the DEIS were received in three forms: letters, written statements delivered at the hearing, and oral statements made at the hearing. In most cases, oral statements were summaries or verbatim readings of written statements submitted at the hearing or of letters that were sent to the Navy. All substantive comments are reviewed and addressed in this chapter.

10.2.1 Identification of Comments

Each submission received, whether written or contained only in the transcript of the public hearing, was assigned one of the following letter codes:

F - Federal agencies and officials;
S - State agencies and officials;
R - Regional agencies and officials;
L - Local agencies and officials;
G - Groups and associations;
P - Public (Individuals); and
O - Oral (comments delivered at the January 27, 1997 public hearing).

These labels were assigned for the convenience of readers and to assist in the organization of this document; priority or special treatment was neither intended nor given in the responses to comments. Within each of the categories, each submission was assigned a number, in the order that it was received and processed, such as F-1, S-1, and so on. In addition, each separate comment was assigned a separate sub-number. Thus, if an agency or citizen made three different comments, they are designated as F-1.1, F-1.2, F-1.3 or as P-1.1, P-1.2, P-1.3, etc.

Due to the lengthiness of the written hearing transcript, the transcript is not reprinted in this document, but has been made available as noted at Subchapter 10.1.2. However, all oral comments were coded, summarized, and responded to in Table 10-1, Comment Response Index.

All written submissions have been included in Appendix F to this EIS. The alphanumeric code associated with each written submission is marked at the top of the first page of each letter; the sub-numbers of the individual comments are marked in the left margin. Comment letters or statements are reprinted in numerical order.

10.2.2 Locating Response to Comments

Comment Index

The Comment Index (Table 10-1), following this text, contains a complete listing of all commentors and responses to comments. The listing allows readers to find answers to specific questions they have raised. The index provides the following information:

- The first column lists the names of all commentors, according to type (federal, state, regional, local, group, private citizen, oral commentor);
- The second column identifies the alphanumeric file code assigned to each comment and indicates whether comments were written or oral;
- The third column provides a summary of the comment; and
- The fourth column indicates the response to the comment.

In a few instances, a commentor may appear in the Comment Index more than once, because he/she sent different letters, sent letters different from oral statements, or made different oral statements. If an individual spoke for a group and then wrote a letter in his/her own name (or vice-versa), the submissions were coded separately and each appears in the Comment Index.

It was not always clear if a commentor intended to represent an organization/group or simply himself/ herself. The reader is advised to examine both the G (Group) listing for the name of the group, firm, or association used on the letterhead of a written submission and the P (Public) list for his/her own name.

Kinds of Responses

Responses to comments include the types described below:

- Specific Response to Comment - The comment is answered in the index.
- Reference to Final EIS - Modifications have been made to specific sections of the FEIS. The chapter headings and section numbers are the same as or similar to those in the DEIS. For example, this type of reference typically states: Refer to FEIS Subchapter 2.7, or other appropriate section number.

Table 10-1
Comment Response Index

Name/Agency	Comment Code	Comment	Response
Federal Government Comments			
USEPA	F-1.1	Requests explanation of the extent to which the Navy has corrected any environmental/ health issues and its future responsibility for correcting existing problems both before and after the reuse of the site.	Subchapters 3.10 and 4.10 have been updated with respect to hazardous waste remediation measures at NAWCAD to address these concerns. Investigations are continuing to determine the suitability of NAWCAD for transfer. The BRAC Cleanup Team (BCT) is coordinating with the FLRA in addressing the environmental issues related to transfer parcels scheduled for reuse. Department of the Navy Policy Memorandum 95-02, *Consideration of Future Land Use in Determining Cleanup Standards for Base Realignment and Closure Property* (August 17, 1995), applies to cleanup of NAWCAD. In addressing the cleanup levels, the BCT gives consideration to future land use as identified in the proposed Reuse Plan.
USEPA	F-1.2	Requests information on the conditions of the unnamed tributaries of the Little Neshaminy and Pennypack Creeks into which treated effluent and stormwater drain, and the relation to the increased usage proposed in Reuse Plan (evaluate impacts on the stormwater sewer system and creeks).	There has been no identified reduction in water quality in either unnamed tributary. The existing stormwater system is considered inadequate for a two-year storm event because of the small size of the existing lines. Some flooding has occurred for storms in excess of a two-year event. Subchapter 4.7 was revised to reflect the FLRA's indication that a comprehensive stormwater management plan for the entire site would be prepared at later stages of reuse plan implementation (ERA, 1995). New stormwater facilities would be developed in accordance with municipal regulations governing such systems.

Name/Agency	Comment Code	Comment	Response
USEPA	F-1.3	Farmland in the study area should be described. Prime and unique farmland should be delineated. Impacts to prime and unique farmland should be avoided.	Subchapter 3.9 was revised to reflect that the extreme eastern portion of the site, in Northampton, is currently cleared and generally devoted to agricultural use in corn cropping. Two soils located in this area, Readington and Landsdale, are on the list of soil mapping units that qualify as prime farmland. This area is part of a much larger area that is being transferred to the US Department of Interior via a public benefit conveyance.
USEPA	F-1.4	Retitle Subchapter 3.10.2, "Hazardous Waste Remediation" to "Hazardous Substance and Petroleum Remediation."	The title of this subchapter was changed as indicated.
USEPA	F-1.5	The Navy is currently conducting significant additional activities addressing hazardous and petroleum substances as part of the ongoing EBS process. The nature of this work should be described.	Subchapters 3.10 and 4.10 have been updated with respect to hazardous waste remediation measures at NAWCAD.
USEPA	F-1.6	Revise text to reflect current status of Installation Restoration Program.	Subchapters 3.10 and 4.10 have been revised and updated to reflect the current status of the Installation Restoration Program at NAWCAD.
USEPA	F-1.7	The references to a newly identified Area 9 should be deleted.	Text in Subchapter 3.10 has been updated.
USEPA	F-1.8	Revise Table 3.10-1 to include information and status of activities regarding disposed waste or soil, and that final remedies for groundwater contamination must still be selected.	Table 3.10-1 was revised as indicated.
USEPA	F-1.9	Reevaluate well-sampling results which suggest that Area B and Sites 4 and 8 (Area C) are potential contaminant sources; EPA states neither Sites 4 or 8 are potential sources, but contaminants were released within Area C.	Subchapter 3.10 was updated as appropriate.

Name/Agency	Comment Code	Comment	Response
USEPA	F-1.10	Under Compliance Program Status with respect to PCBs, note that additional investigations planned would confirm cleanup has met TSCA standards.	Subchapter 3.10 was updated as appropriate.
USEPA	F-1.11	Provide more thorough description of loss of 975 gallons of oil at Bldg 16.	This was clarified in Subchapter 3.10 to state that records from 1986 could not account for the delivery of the fuel to the UST at Bldg 16. A soil and groundwater investigation was conducted to ensure that there was no leakage. No evidence of contamination was observed during that investigation.
USEPA	F-1.12	FEIS should identify any plans for remediation of elevated levels of radon in Buildings 2, 3, 4, and 80 and, of primary interest, Bldg 108.	DoD policy is to ensure that any available and relevant radon assessment data pertaining to BRAC property being transferred shall be included in the property transfer documents. DoD policy is not to perform radon assessment and mitigation prior to transfer of BRAC property unless otherwise required by applicable law.
USEPA	F-1.13	FEIS should define true extent of LBP present in buildings (beyond Buildings 1, 2, 3, 4, 7, and 16); provide information regarding condition of potential LBP; recommends Navy address its responsibility.	DoD policy does not require a LBP survey except in residential housing assets. DoD policy is not to perform measures to mitigate exposure to LBP in a non-residential setting.
USEPA	F-1.14	The sites of the former aircraft gun ranges and the outdoor small arms firing range should be described and any planned investigation and/or mitigation measures should be cited.	These sites were evaluated further as Phase II EBS review items.
USEPA	F-1.15	Regarding the two identified NPL sites in the vicinity of NAWCAD, indicate basis for determination of no impact on NAWCAD.	These sites are not likely to have an impact on NAWCAD due to the nature and extent of contamination, groundwater flow, and distance from NAWCAD.
USEPA	F-1.16	Table 2-4 (property taxes) is the wrong table reference. Section 4.2.3 is the wrong section reference.	This table no longer exists and reference to it has been deleted. Reference to a Section 4.2.3 was deleted.

Name/Agency	Comment Code	Comment	Response
USEPA	F-1.17	Identify on a map the proposed location for multi-use recreation facility to be integrated with Munro and Werner town parks.	As described in Chapter 1, there is a new preferred Reuse Plan, which renders this discussion no longer relevant. Subchapter 4.3 has been revised to reflect the new Reuse Plan.
USEPA	F-1.18	It should be noted that Section 120 (h)(3) of CERCLA addresses only those cases where RA consists of long-term pumping and treating of groundwater.	Comment noted and Chapter 4.10 clarified.
USEPA	F-1.19	It should be made clear that those portions of NAWCAD where a hazardous substance release has been documented are part of the CERCLA NPL list site and that studies are underway to fully determine the extent of the affected property. The requirements of CERCLA apply to all NAWCAD property targeted for transfer.	Subchapter 4.10 was clarified as follows: Section 120 (h) of CERCLA addresses property transferred by federal agencies and specifies the contents of deeds to transfer such property. The deeds must contain the following three parts: (1) information regarding the type and quantity of release of hazardous substances and the description of RA taken; (2) a covenant warranting that RA has been taken and that "any additional remedial action found to be necessary after the date of such transfer shall be conducted by the United States"; and (3) "a clause granting the federal government access to the property for remedial action." Completion of RA does not necessarily have to take place prior to property transfer. If the construction and installation of an approved remedial design has been completed, and the remedy has been demonstrated to the USEPA to be operating properly and successfully, the property could be transferred prior to complete remediation.

Name/Agency	Comment Code	Comment	Response
USEPA	F-1.20	Clarify statement that USEPA has no enforceable agreement with the Navy regarding CERCLA remedial actions; cite Federal Facility Agreement of 9/20/90.	Subchapter 4.10 was revised to clarify that the Federal Facility Agreement for NAWCAD, signed on September 20, 1990, provides the EPA an opportunity to comment on any CERCLA remedial investigation or action and provides a mechanism for resolving any dispute between the Navy and the EPA regarding the nature of such activities.
USEPA	F-1.21	Reference the 1997 BRAC Cleanup Plan in the FEIS.	A discussion on the 1997 BRAC Cleanup Plan has been added to Subchapter 4.10.
USEPA	F-1.22	The environmental impact of the reuse of NAWCAD property on the local and regional water supply has not been considered. In the case of leasing or transferring property with contaminated groundwater, provisions would be incorporated in lease/deed that water treatment may be required.	The impact to the local and regional water supply was addressed in Subchapter 4.7 - Infrastructure. With respect to the potential for contaminated groundwater, investigations are continuing to determine the suitability of NAWCAD for transfer, as is described in Subchapter 4.10. Various sites are undergoing investigation consistent with the FLRA's proposed Reuse Plan. The BRAC Cleanup Team is coordinating with the FLRA in addressing the environmental issues related to transfer parcels scheduled for reuse. Department of the Navy Policy Memorandum 95-02, *Consideration of Future Land Use in Determining Cleanup Standards for Base Realignment and Closure Property* (August 17, 1995), applies to the cleanup of NAWCAD.
USEPA	F-1.23	FEIS should address cumulative impacts associated with increases in traffic volumes, air quality, and noise.	Cumulative impacts have been taken into consideration throughout this EIS, as appropriate, on a discipline-by-discipline basis. Regional growth factors were used in the traffic, air quality, and noise analyses, and demographic projections for the study area.
USEPA	F-1.24	The DEIS notes that traffic volume will increase substantially with the Reuse Plan; however, it does not address remedies to roadways in need of improvement.	Recommended roadway improvements are presented in Chapter 5 - Mitigation Measures.

Name/Agency	Comment Code	Comment	Response
USEPA	F-1.25	It may be worth collecting air monitoring data to be used in future projections. It is not certain whether the air monitoring data collected for the city of Philadelphia is an accurate benchmark.	A valid background CO monitoring program would require obtaining continuous hourly measurements over a long winter season (three to six months) in order to reduce uncertainty of meteorological conditions. Therefore, background monitoring is generally not required for an EIS. Since the background data collected from Philadelphia (an urban site) is relatively conservative as compared to the Warminster neighborhood, the overall CO levels predicted in this EIS are conservative. When predicted conservative levels are below the NAAQS, it can be concluded that the more realistic project impact would be below the NAAQS.
USEPA	F-1.26	FEIS should address noise impacts related to proposed reuse alternatives.	The methodology for predicting future noise levels is based on the assumption that existing noise levels are dominated by, and are a function of, existing traffic volumes, and that future noise levels can be determined based on the proportional increase in traffic (on a logarithmic basis) associated with a project.

Name/Agency	Comment Code	Comment	Response
USEPA	F-1.27	On what basis can it be assumed that noise levels would increase by only one decibel - this seems to be a low figure.	Changes in noise levels due to implementation of the Reuse Plan were determined by adding the noise attributable to development-generated traffic to noise levels previously calculated for the No Action Alternative. The hourly L_{eq} analysis shows that with the exception of a few hours of the day, noise levels would increase less than or equal to one decibel from the No Action Alternative to the Reuse Plan. Noise increases equal to or greater than three dBA for the Reuse Plan are: Site 2, increases of three decibels between 5 am and 6 am; Site 3, increases of five decibels between 5 am and 6 am and three decibels between 6 am and 7 am; Site 4, increases of five decibels between 5 am and 6 am and three decibels between 6 am and 7 am; Site 6, increases in noise levels of four decibels between 5 am and 6 am and three decibels between 6 am and 7 am.
USEPA	F-1.28	The DEIS references various buildings and roads that were not indicated on a map. Their location depicted on a map would be helpful in developing a clearer picture of potential impacts.	Individual subsections of the EIS contain figures that show buildings and roads that pertain to the text. A map which showed all building numbers in a legible fashion would be too large to place into the current format of this document. A large fold-up map that legibly shows all building numbers can be provided under separate cover.

Name/Agency	Comment Code	Comment	Response
Department of the Army, Philadelphia District Corps of Engineers	F-2.1	Presence and extent of wetlands must be identified if any activities associated with Reuse Plan would impact these resources.	Existing background information, coupled with a field reconnaissance, indicates that a small acreage of freshwater wetlands (approximately one to five acres [0.4 to two hectares]) occurs on site. The proposed Reuse Plan provides a broad planning framework for NAWCAD that would serve to guide future development; therefore, there are no detailed site plans at this time. The exact impacts of the reuse on wetlands would depend on specific site development in the future. All disturbances to wetlands would require a permit from the US Army Corps of Engineers and the PA Department of Environmental Protection
US Dept of the Interior	F-3.1	Recommends a reference that the identified park and recreation acreage would be assigned to NPS under Section 203(k)(2) of the Federal Property and Administrative Services Act (FPASA) for further conveyance to a State or local agency for public park and recreation purposes in perpetuity.	Chapter 2 has been expanded to include said reference.
US Dept of the Interior	F-3.2	The DEIS cannot accurately determine the impacts to fish and wildlife resources under any alternative without an accurate wetland delineation.	The exact impacts of the reuse on wetlands would depend on specific site development in the future. The proposed Reuse Plan provides only a broad planning framework for NAWCAD that would serve to guide future development. There are, therefore, no detailed site plans at this time.

Name/Agency	Comment Code	Comment	Response
State Government Comments			
Pennsylvania Department of Environmental Protection	S-1.1	Agrees with findings that disposal and reuse of facility is located outside of PA's coastal zones and will not impact them. Other DEP review and permits may still pertain.	Any pertinent DEP review and permits will be obtained.
Local Government Comments			
Bucks County Planning Commission	L-1.1	Concurs with the general assessment of potential impacts: Lowest impact = Residential Alt. Medium impact = Reuse Plan Highest impact = Aviation Alt.	Comment noted; presentation of these alternatives was to demonstrate a range of reuse impacts.
Bucks County Planning Commission	L-1.2	Concurs that the Reuse Plan and Residential Alternatives are compatible with existing on-base and surrounding land uses. Also concurs that the Aviation Alternative would raise issues of compatibility with surrounding residential land uses.	Comment noted; the alternatives presented were to show a range of reuse impacts. Some alternatives may be more practicable than others; all were chosen through an intensive planning process that involved the community (e.g., local officials, private individuals, public meetings).
Bucks County Planning Commission	L-1.3	Although no mitigation measures are recommended regarding land use, individual municipalities must be prepared to address upcoming comprehensive planning, land use, and zoning issues.	Comment noted. During the NEPA process, every effort is made to keep all interested parties informed. One potential benefit of this is that municipalities, due to their role in reuse planning, are aware ahead-of-time of potential issues such as planning, land use, and zoning.
Bucks County Planning Commission	L-1.4	Evaluation of alternatives against No Action Alternative for socioeconomic impacts should be in terms of net increases of new homes, additional population, new jobs, and total earnings, and not gross increases.	The EIS assesses project-induced development against the No Action Alternative.

Name/Agency	Comment Code	Comment	Response
Bucks County Planning Commission	L-1.5	Recommends economic impact analysis to assess economic benefits of each alternative on each community.	A fiscal impact assessment of the Reuse Plan is provided in Subchapter 4.2. Table 4.2-6 projects property taxes from the direct redevelopment of the base. Substantial new tax revenues are projected for the localities associated with the redevelopment of NAWCAD. However, it is beyond the scope of the EIS to project net fiscal impacts for all potentially affected communities that may host an unknown number of induced worker households.
Bucks County Planning Commission	L-1.6	It was noted that projections in the *Bucks County Continuum* were done before the Reuse Plan and did not account for the potential impacts of the Reuse Plan. The number of project units should be reevaluated.	The Reuse Plan represents a guidance document with a maximum buildout potential but is fundamentally subject to the interest of the market place. Few, if any, specific developers are identified in the Reuse Plan. Table 4.2-1 in the EIS is based on the Reuse Plan's assumption of a development schedule with 50 percent of the growth occurring in the first five years, although the text indicates that this appears optimistic and is inherently uncertain. Moreover, aside from the proposed housing on the former base, the residential location of induced workers is an unknown.
Bucks County Planning Commission	L-1.7	Questions the assumption that the new students expected to be generated by each alternative would be assimilated at an even annual pace, and questions the assumed distribution among the three school districts. Recommends that the assumptions and projected numbers regarding community facilities be reviewed by the respective school district administrators and municipal managers; include a fiscal impact analysis for each municipality.	Projections of the children associated with the induced new households are all ascribed to central Bucks County school districts, but could include districts elsewhere in the county, as well as out of the county. These conservative assumptions provide a context within which to assess the "maximum" likely allocation of service burdens, particularly education. It is appropriate that the school districts be kept informed of anticipated growth at the NAWCAD site, and this is noted in Subchapter 5.3.1. Also see response to comment L-1.5.

Name/Agency	Comment Code	Comment	Response
Bucks County Planning Commission	L-1.8	Notes that the DEIS uses a background annual growth rate of one percent for the traffic analysis, and recommends the use of a two percent growth rate.	The one percent growth rate was used after consultation with local and regional traffic planners. Other traffic studies conducted in this area (McMahon Associates, Inc., 1993) have also used a one percent growth rate.
Bucks County Planning Commission	L-1.9	Notes that the reuse alternative that can accommodate the highest level of internal trips would have the least impact on the surrounding network.	Comment noted. The reuse alternative that generates the fewest trips would have the least impact on the surrounding network.
Bucks County Planning Commission	L-1.10	Recommends that the site be developed in a manner that is conducive to sustaining the use of public transportation.	Comment noted. NAWCAD is well-served by public transportation. Under the No Action Alternative, use of public transportation to access the site would decrease. All of the action alternatives are conducive to continued use of public transportation.
Bucks County Planning Commission	L-1.11	The last paragraph on page 5-1 should identify the first intersection as Bristol Road and *Hatboro* Road, not Bristol Road and Jacksonville Road.	Comment noted and correction made.
Bucks County Planning Commission	L-1.12	Regarding water supply, recommends adding statement on Pennsylvania Safe Drinking Water Act; establish a wellhead protection program.	Comment noted and Subchapter 4.7 was revised appropriately.
Bucks County Planning Commission	L-1.13	Recommends adding a statement that any stormwater management system adhere to the local stormwater management plan.	Comment noted and Subchapter 4.7 was revised appropriately.
Bucks County Planning Commission	L-1.14	Municipalities should request of FEMA an update of the FIRM maps to include NAWCAD property.	Comment noted; the transfer of the property should ultimately result in the site's inclusion on FIRM maps.
Bucks County Planning Commission	L-1.15	Change narrative on page 3.9-3 so it states that the Little Neshaminy Creek Watershed Stormwater Management Plan is the official plan for the eastern portion of the NAWCAD site.	Comment noted and Subchapter 3.9 was revised appropriately.

Name/Agency	Comment Code	Comment	Response
Leonard J. Stebulis, Councilman, Ivyland Borough	L-2.1	Area enclosed by Jacksonville, Newtown, Bristol, and Kirk Roads are not Ivyland but are in Warminster Township.	The Reuse Plan figure that is being referred to was presented in the DEIS (and at the Scoping Hearing) as it appeared in the FLRA document (with updated changes in the proposed reuses as directed by the FLRA). Since it was the FLRA's plan, it was presented in the DEIS essentially verbatim, and their same base map was used for the two other developed alternatives (the Residential and the Aviation Alternatives). Neither the FLRA's Reuse Plan nor the plan as depicted in the DEIS show municipal boundaries, nor did they intend to. The municipality names are not critical to the figures and are presented for general reference only; the purpose of the figures was to illustrate the elements of the different reuse plans.
Leonard J. Stebulis, Councilman, Ivyland Borough	L-2.2	The property zoning within Ivyland Borough has been changed to R-2.	Figure 3.1-4 in Subchapter 3.1 was revised. Text in Subchapter 3.1 was updated appropriately. Analyses and related text were revised in Subchapters 4.1, 4.2, and 4.3.
Leonard J. Stebulis, Councilman, Ivyland Borough	L-2.3	In Subchapter 5.1.4, the intersection of Bristol and Jacksonville Roads is incorrectly identified as a T-intersection.	The analysis presented was for the intersection of Bristol Road and *Hatboro* Road) not Jacksonville Road (see comment L.1-11).
Township of Warminster	L-3.1	Utilize highest-possible cleanup standards.	The Navy will continue to honor its commitment to fulfilling all of its duties regarding cleanup of the NAWCAD property prior to transfer.
Township of Warminster	L-3.2	Reiterate support of the revised Reuse Plan; recommend its approval from review agencies; use as the foundational plan for any future studies or reviews.	The "revised Reuse Plan" is presented as the preferred alterative in the FEIS.
Council Rock School District	L-4.1	District has expressed interest in acquiring 38-acre site at northwest corner of Hatboro and Bristol Roads to construct an elementary school.	Such interest should be expressed directly to the FLRA.

Name/Agency	Comment Code	Comment	Response
Group and Association Comments			
Pennoni Associates, Inc.	G-1.1	Include a discussion on projected stormwater runoff generated; discuss whether existing municipal stormwater systems accommodate flow; provide cost estimate for new system if existing system is inadequate.	The proposed Reuse Plan provides a broad planning framework for NAWCAD that would serve to guide future development; therefore, there are no detailed site plans at this time. The impacts of the reuse with respect to stormwater runoff would depend on specific site development in the future. Construction activities associated with development of the Reuse Plan would be subject to the NPDES permit program. Stormwater pollution prevention plans, including elements addressing sedimentation basins, would need to be prepared prior to a formal approval for permit coverage. The permit would need to include applicable components of the local sediment and erosion control site plan standards, site permits, and stormwater management site plans.
Pennoni Associates, Inc.	G-1.2	Address impact of increased stormwater on the hydraulic capacity of Little Neshaminy and Pennypack Creeks.	As noted in the response above, there are no detailed site plans for the Reuse Plan as it serves as a broad planning framework. Construction activities associated with specific development projects would be subject to the NPDES permit program. Stormwater pollution prevention plans, including elements addressing sedimentation basins, would need to be prepared prior to a formal approval for permit coverage. The permit would need to include applicable components of the local sediment and erosion control site plan standards, site permits, and stormwater management site plans. Adherence to these plans would minimize impacts to these creeks.
Pennoni Associates, Inc.	G-1.3	Discuss improvements to key traffic intersections in Warminster to safely absorb additional traffic.	Recommended improvements to these intersections are presented in Chapter 5 (Mitigation Measures).

Name/Agency	Comment Code	Comment	Response
Pennoni Associates, Inc.	G-1.4	Recommends actual air monitoring of the key receptors around Westminster.	See response to comment F-1.25.
Pennoni Associates, Inc.	G-1.5	Requests determination of how CO levels can improve given that the level of service for key intersections on local roadways would deteriorate under reuse plan.	CO levels would be higher in general when traffic conditions worsen; however, this is true only if the comparison is made for the same year. Federally enforced transportation programs would improve vehicular emissions year after year and it is predicted (from use of the Mobile 5a model) that the CO emission factors would be substantially lower during 2010 than existing conditions. Therefore, the proposed traffic increases would not offset the impact reduction.
Pennoni Associates, Inc.	G-1.6	Asks if the traffic study considered increases in traffic in the year 2010.	The traffic analysis does consider increases in traffic in the year 2010.
Pennoni Associates, Inc.	G-1.7	Questions the accuracy of the 1.5 million gallons of reserve at the wastewater treatment plant for future development. Recommends to revise per capita sanitary flow from 35 gpd to 75 gpd; evaluate whether Warminster Wastewater Treatment Plant can be expanded.	According to the FLRA (ERA, 1995), the 1.5 million gallon figure is accurate. The majority of the 7,600 people that the Reuse Plan would generate would be employees and not residents. The 35 gpd per capita estimate is an accepted estimate for employees. As already discussed in Subchapter 4.7, a representative of the Warminster Municipal Authority has expressed interest in providing service for the Reuse Plan. The FLRA has indicated that additional study of capacity would be required at later stages of Reuse Plan implementation.
Pennoni Associates, Inc.	G-1.8	Provide impact analysis of Ivyland population increase on municipal services (schools, police, fire dept, etc).	The impacts of the Reuse Plan on community services are described in Subchapter 4.3.
Pennoni Associates, Inc.	G-1.9	Five lots to the acre is considered to be high given dwelling unit price.	Comment noted. This figure comes directly from the FLRA's Reuse Plan (ERA, 1995).
Pennoni Associates, Inc.	G-1.10	Recommends open space areas between residential phase and industrial/business areas.	This is the FLRA's Reuse Plan; comments of this nature need to be directed to the FLRA.

Name/Agency	Comment Code	Comment	Response
Pennoni Associates, Inc.	G-1.11	Discuss responsibility for implementing Remedial Action Work Plan and long-term monitoring of the site after cleanup; discuss impact of Site 8 on residential land use; provide inventory of private wells that could be impacted by lead.	See response to comment F-1.1. Investigations are continuing to determine the suitability of NAWCAD for transfer. The BRAC Cleanup Team (BCT) is coordinating with the FLRA in addressing the environmental issues related to transfer parcels scheduled for reuse. Department of the Navy Policy Memorandum 95-02, *Consideration of Future Land Use in Determining Cleanup Standards for Base Realignment and Closure Property* (August 17, 1995), applies to cleanup of NAWCAD. In addressing the cleanup levels, the BCT gives consideration to future land use as identified in the proposed Reuse Plan.
Pennoni Associates, Inc.	G-1.12	Address impacts of the proposed potable water increase on the Warminster water supply system.	Subchapter 4.7 indicates that the FLRA has investigated how some of the existing wells at NAWCAD might be incorporated into the adjacent municipal authority systems (ERA, 1995). It was noted that a great deal of additional study would be required for such consideration (ERA, 1995); see Subchapter 4.7.
Pennoni Associates, Inc.	G-1.13	Conduct a needs analysis to determine documented need for industrial use.	This is the FLRA's Reuse Plan; comments of this nature need to be directed to the FLRA.
Pennoni Associates, Inc.	G-1.14	The industrial usage under the Residential Alternative is not considered in the total earnings of $101.5 million.	Subchapter 4.2 was revised to include the estimated total earnings projected for the industrial usage of the Residential Alternative. This would bring total earnings from $101.5 million to over $133 million.
Pennoni Associates, Inc.	G-1.15	Notes wide discrepancy between the proposed housing unit costs and the mean income of project-induced workers.	The FLRA's Reuse Plan (ERA, 1995) presumes the average home prices presented in the DEIS. Comments of this nature need to be addressed to the FLRA. However, it would appear that the residential component is not necessarily targeted at providing housing for induced workers.

Name/Agency	Comment Code	Comment	Response
Pennoni Associates, Inc.	G-1.16	Asks if land uses of the Reuse Plan are compatible with the Master Plan and zoning of the municipalities that are impacted.	Subchapter 4.1 describes the compatibility of the Reuse Plan with surrounding land uses and zoning.
Pennoni Associates, Inc.	G-1.17	Asks if the DoN has solicited comments on the DEIS from municipalities that are not directly impacted by the proposed Reuse Plan.	Chapter 10 describes the process of soliciting comments on the DEIS. Every effort was made to inform all interested parties of this document and of the NEPA process as it relates to the disposal and reuse of NAWCAD. For example, Appendix A provides the DEIS distribution list of agencies, officials, citizen groups, and private citizens. The DEIS was mailed to all parties who expressed an interest, and was displayed in the Bucks County and Warminster Libraries.
Pennoni Associates, Inc.	G-1.18	Requests clarification as to what the new additional student population will be as a result of the new Reuse Plan.	Subchapter 4.3 was revised to clarify the projected number of school children under the Reuse Plan.
Pennoni Associates, Inc.	G-1.19	Notes that the DEIS assesses the impact of the Reuse Plan on the three school districts, but not individual schools within each district. Requests that this be provided.	Table 4.2-1 in the EIS is based on the Reuse Plan's assumption of a development schedule with 50 percent of the growth occurring in the first five years, although the text indicates that this appears optimistic and is inherently uncertain. Moreover, aside from the proposed housing on the former base, the residential location of induced workers is an unknown. Under these conditions, the assessment of impacts must be hypothetical and is based on a series of explicit assumptions and models presented in the EIS, but which will inevitably be subject to change as specific opportunities occur over the projected 20-year buildout period and are taken up by the FLRA and county and local municipalities. As a result, it would not be appropriate to provide the level of detail requested in this comment (i.e., the increase in specific schools).

Name/Agency	Comment Code	Comment	Response
Pennoni Associates, Inc.	G-1.20	Requests clarification as to why existing noise measurements were monitored over a two-hour period, and projected noise levels are presented for a one-hour period.	Existing noise measurements are monitored for a two-hour period in order to obtain measurements over defined "peak periods." The projection of noise impacts is accomplished through use of a noise model, which takes into account the projected number of vehicular trips during a one-hour period and the existing noise measurements over a peak period. This is a standard and acceptable method of projecting future noise impacts.

Name/Agency	Comment Code	Comment	Response
Oral Comments (NOTE: These oral comments were given at the January 27, 1997 Public Hearing. They have been summarized from the hearing's transcript, and are presented in the order they were received.)			
Pat Stephens, Warminster Township Supervisor	O-1.1	The golf component of the Residential Alternative is inappropriate given a local golf course already exists.	The alternatives presented were chosen through a planning process that involved the public and responded to the desires expressed by the community (e.g., local officials, private individuals, etc). Additionally, the alternatives are presented to represent a reasonable range of development intensities; some alternatives, or parts thereof, may be more practicable than others.
P. Stephens, Warminster Township Supervisor	O-1.2	Has many concerns regarding environmental cleanup process.	Regarding environmental cleanup, see response to Comment F-1.1.
Bill Goldsworthy, Warminster Township Board of Supervisors	O-2.1	Supports FLRA and Reuse Plan, with modifications by the Warminster Township Board of Supervisors.	Suggestions for change to the Reuse Plan should be addressed to the FLRA. See Comment L-3.2.
B Goldsworthy Warminster Twsp Board of Supervisors	O-2.2	Concerned about the estimates of traffic volume increase.	See responses to Comments F-1.24, G-1.3. Recommended improvements to potentially affected intersections are presented in Chapter 5.
B Goldsworthy Warminster Twsp Board of Supervisors	O-2.3	Does not support Aviation Alternative.	Comment noted. The Aviation Alternative, as with the other alternatives, is presented to demonstrate a reasonable range of development intensities. It generally represents the highest potential impacts.
B Goldsworthy Warminster Twsp Board of Supervisors	O-2.4	Any reuse alternative would need a stormwater management plan..	Comment noted. See response to Comment F-1.2.
B Goldsworthy Warminster Twsp Board of Supervisors	O-2.5	Concerned about water and air quality issues.	Temporary impacts to air quality due to construction/demolition for the Reuse Plan would be alleviated by common construction management practices. Water quality would not be affected by implementation of the Reuse Plan.

Name/Agency	Comment Code	Comment	Response
B Goldsworthy Warminster Twsp Board of Supervisors	O-2.6	Concerned about the existing quality of residential wells.	The existing quality of residential wells was not within the scope of this EIS, and is outside of the Navy's jurisdiction.
B Goldsworthy Warminster Twsp Board of Supervisors	O-2.7	Concerned about public safety issues (specifically fire and police protection).	Redevelopment of NAWCAD would present a potential increase in demands on public safety and emergency services. Discussions with township representatives indicated no problems in meeting this future demand (Hess, January 26, 1996; McClellan, January 5, 1996). Warminster and Ivyland are both considering expansion of fire and police services.
B Goldsworthy Warminster Twsp Board of Supervisors	O-2.8	Concerned about environmental remediation process.	See response to Comment F.1-1.
Albert Ricciardi, Pennoni Associates	O-3	Comments the same as listed above from Pennoni Associates (G-1.1 - G-1.21)	See responses to Comments G-1.1 - G-1.21.
Sam Horn	O-4.1	Concerned about the increase in traffic that the Reuse Plan would generate.	See responses to Comments F-1.24, G-1.3. Recommended improvements to potentially affected intersections are presented in Chapter 5.
Sam Horn	O-4.2	Concerned about costs related to the regrowth of Warminster when the Navy vacates.	Comment noted. No significant socioeconomic impacts have been identified; address concern to FLRA.
Walter Ochsner	O-5	Concerned about the increases in traffic and possible solutions.	See responses to Comments F-1.24, G-1.3. Recommended improvements to potentially affected intersections are presented in Chapter 5.
Beverly Blackway	O-6	Concerned about the increases in traffic and the potential costs associated with possible solutions.	See responses to Comments F-1.24, G-1.3. Recommended improvements to potentially affected intersections are presented in Chapter 5.

ACRONYMS

ACM	Asbestos-containing material
AIL	Aeronautical Instrument Laboratory
ALS	Advanced Life Support
AMAL	Aviation Medical Acceleration Laboratory
ASO	Aviation Supply Office
AST	Above Ground Storage Tank
AV	Assessed Value
AVO	Average Vehicle Occupancy
BCP	Base Realignment and Closure Cleanup Plan
BCT	BRAC Cleanup Team
BEA	Bureau of Economic Analysis
Bldg(s)	Building(s)
BLS	Bureau of Labor Statistics
BRAC	Base Closure and Realignment Act
CAA	Clean Air Act
CAAA	Clean Air Act Amendments of 1990
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERFA	Community Environmental Response Facilitation Act
CFC	Chlorofluorocarbon
CFR	Code of Federal Regulations
CO	Carbon Monoxide
COE	Corps of Engineers (US Army)
dB	Decibel
dBA	Decibel (A Scale)
DEIS	Draft Environmental Impact Statement
DNL	Day-night Average Sound Level
DoD	Department of Defense
DoN	Department of the Navy
DRMO	Defense Reutilization and Marketing Office
EBS	Environmental Baseline Survey
EDA	Economic Development Administration
EIS	Environmental Impact Statement
EO	Executive Order
ERA	Economic Research Associates
ETR	Employee Trip Reduction

FAA	Federal Aviation Administration
FBO	Fixed-Base Operators
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map
FIC	Federal Interagency Committee
FLRA	Federal Lands Reuse Authority
FONSI	Finding of No Significant Impact
FOSL	Finding of Suitability to Lease
FOST	Finding of Suitability to Transfer
FPASA	Federal Property and Administrative Services Act
FS	Feasibility Study
FTZ	Foreign Trade Zones
FY	Fiscal Year
GA	General Aviation
GIS	Geographic Information System
gpm	Gallons Per Minute
HAP	Hazardous Air Pollutants
HT	High Tension
HUD	Department of Housing and Urban Development
ICSP	Industrial Communities Site Program
IO	Input Output Matrix
IRP	Installation Restoration Program
ITE	Institute of Transportation Engineers
kv	Kilovolts
kw	Kilowatts
L_{dn}	Day-Night Sound Level
L_{eq}	Equivalent Sound Level
LBP	Lead-based Paint
LOS	Level of Service
MCL	Maximum Contaminant Level
MH/MR	Mental Health and Retardation
MOA	Memorandum of Agreement
mph	Miles Per Hour
MR	Military Reservation

NAAQS	National Ambient Air Quality Standards
NAMU	Naval Aircraft Modification Unit
NAS	Naval Air Station
NAVFACENGCOM	Naval Facilities Engineering Command
NAWCAD	Naval Air Warfare Center Aircraft Division
NEPA	National Environmental Policy Act
NO_2	Nitrogen Dioxide
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
O_3	Ozone
O&M	Operations and Maintenance
OU	Operable Unit
PASS	Pennsylvania Archaeological Site Survey
Pb	Lead
PCB	Polychlorinated Biphenyl
PECO	PECO Energy
PEM	Palustrine Emergent Wetlands
PENNDOT	Pennsylvania Department of Transportation
PILOT	Payment in Lieu of Taxes
PIP	Planned Industrial Park
PL	Public Law
PM	Particulate Matter
PNDI	Pennsylvania Natural Diversity Inventory
ppm	Parts per Million
RA	Remedial Action
R&D	Research and Development
RDT&E	Research, Development, Test, and Evaluation
RFP	Request for Proposal
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RIMS	Regional Input/Output Model System
RONA	Record of Non-applicability
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SEL	Sound Exposure Level
SEPTA	Southeastern Pennsylvania Transportation Authority
SHPO	State Historic Preservation Officer
SICC	State Industrial Classification Codes
SIP	State Implementation Program
SO_2	Sulfur Dioxide
sq ft	Square Feet
sq m	Square Meters
SWMU	Solid Waste Management Unit

TAMS	TAMS Consultants, Inc.
TSCA	Toxic Substances Control Act
TIF	Tax Increment Financing Districts
tpy	Tons Per Year
TSP	Total Suspended Particulates
ULI	Urban Land Institute
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
UST	Underground Storage Tank
VFR	Visual Flight Rules
VOC	Volatile Organic Chemicals
vph	Vehicles Per Hour
XRF	X-ray Flourescent Analysis

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LIST OF PREPARERS

This Environmental Impact Statement was prepared by:

TAMS Consultants, Inc.
655 Third Avenue
New York, New York 10017

NAVY COORDINATORS

Robert Ostermueller, Head, Environmental Planning Team, US Navy, Northern Division, NAVFACENGCOM: has 28 years experience with the Navy. Northeastern University, 1970, BS, Civil Engineering.

Kurt Frederick, Environmental Planner, US Navy, Northern Division, NAVFACENGCOM: has 12 years experience in facilities planning/engineering with the Department of Defense. Virginia Military Institute, 1981, BS Civil Engineering.

TAMS CONSULTANTS

Steven M. Bedford, Architectural Historian: 15 years of experience in providing historic architecture expertise including historical research and preservation planning, and preparing historic research surveys. Rensselaer Polytechnic Institute, 1976, BS, Building Science; Columbia University, MA, 1979, Art History; 1994, PhD, Architectural History.

Helen Chernoff, Senior Scientist: 12 years of experience performing ecological and human health risk assessments, environmental impact analyses, and various types of hazardous waste investigations (CERCLA/RCRA). State University of New York at Binghamton, 1982, BS, Biology; Florida State University, 1985, MS, Biology.

Karen M. Coghlan, Community Relations Specialist: 27 years of experience in project management, public involvement, and business communication. Douglass College, Rutgers, the State University of New Jersey, 1965, BA, English.

James J. Coyle, Principal Environmental Engineer: 30 years of experience in environmental management, environmental impact studies, air quality and noise analyses, and hazardous waste management. Columbia University, 1968, BS Chemical Engineering; Hunter College, 1972, MA, Urban Affairs; New York University, 1973, MS, Applied Mathematics.

Julia O. Domingue, Senior Cartographer: 14 years experience in designing and implementing geographic information systems and remote sensing applications for environmental impact studies. University of Illinois, 1975, BA, Geography; 1979, MS, Geography.

Victor P. Frankenthaler, Senior Environmental Planner: 16 years of experience as an environmental planner specializing in water and coastal resource planning, field investigations, and preparation of environmental impact studies. Rutgers University, 1981, BS Environmental Planning and Design; 1991, MS, Geography.

Frank A. Frega, Principal Transportation Engineer: 24 years of experience in transportation planning, traffic engineering and highway design. Manhattan College, 1971, BCE; Polytechnic Institute of Brooklyn, 1972, MS, Transportation Planning.

Gary D. Logston, Airport Planner: 21 years of experience in administration of all aspects of airport planning, environmental studies, and related community relations activity. Eastern Kentucky University, 1973, AB Regional Planning; University of Tennessee, 1975, MSP.

Geraldine O'Brien, Wetland Ecologist: 10 years of experience in conducting wetland delineations, vegetation surveys, and threatened and endangered species searches. Stockton State College, 1986, BA, Environmental Science.

A. Michael Pappalardo, RPA, Senior Archaeologist: Ten years of experience in cultural resource analysis and preservation planning in the northeastern United States. Experienced in database management, computerized data collection, graphical data analysis, and use of GPS surveying equipment. New York University, 1988, BA, Anthropology; State University of New York, Binghamton, 1992, MA, Anthropology.

R. Andrew Parker, Senior Planner/Economist: 22 years of experience in urban planning and economic analysis. University of London, 1970, BS, Sociology; Hunter College, CUNY, 1972, MUP; Columbia University, 1979, PhD, Urban Planning.

Dawn S. Roderique, Senior Planner: 30 years of experience in environmental impact assessment, land use planning, regulatory policy analysis, and solid and hazardous waste management. Potsdam College, State University of New York, 1974, BA Geology; Rensselaer Polytechnic Institute, 1975, MS, Urban and Environmental Studies.

Christine M. Ross, Ecologist: 13 years of experience in designing and coordinating ecological investigations and biological monitoring programs, and preparing wetland mitigation plans. Stockton State College, 1985, BS, Marine Science.

Andrew J. Sarcinella, Acoustical Specialist: 20 years of experience as regional planner/acoustical specialist responsible for noise monitoring and impact analyses. Fordham University, 1973, BA, Urban Planning; New York University, 1981, MUP, Regional Planning.

Edward F. Sitler, Transportation Engineer: 10 years of experience in engineering and planning analyses for transportation facilities including design and analysis of highway, intersection, transit, and pedestrian systems. Stevens Institute of Technology, 1987, BE, Civil Engineering.

Fang Yang, Air Quality Scientist: 8 years of experience in preparing air quality portions of environmental impact assessments for stationary and mobile source impacts. Fudan University, 1982, BS Physics; New York University, 1988, MS, Atmospheric Science.

APPENDIX A

DISTRIBUTION LIST

Federal Agencies and Elected Officials

The Honorable Arlen Specter
United States Senate
Washington, DC 20510-3802

The Honorable Rick Santorum
United States Senate
Washington, DC 20510-3803

The Honorable James C. Greenwood
U. S. House of Representatives
Washington, DC 20515

Pete Krause and Peter Johnson
Congressman Greenwood's Office
69 East Oakland Avenue
Doylestown, PA 18901

Council on Environmental Quality
Washington, DC 20006

David Larson
Captain
Department of Defense
400 Army Navy Drive, Suite 200
Arlington, VA 22202

Defense Technical Information Center
DTIC Customer Service Help Desk
8725 John L. Kingman Road, Suite 0944
Ft. Belvoir, VA 2060-6218

General Services Administration
Office of Property Disposal
Washington, DC 20405

National Park Service
Regional Historian
Philadelphia, PA 19106

Office of Economic Adjustment
Department of Defense
Arlington, VA 22202-2884

Mr. Donald Kilma
Director, Eastern Office of Review
Advisory Council on Historic Preservation
Washington, DC 20004

US Army Corps of Engineers
Philadelphia District
Philadelphia, PA 19107

US Department of Justice
Environment and Natural Resources Division
Washington, DC 20530

US Department of Commerce
Economic Development Administration
Washington, DC 20230

US Department of Health & Human Services
Region III
Philadelphia, PA 19104

US Department of Housing & Urban Development
Office of Intergovernmental Relations
Washington, DC 20410

US Department of Housing & Urban Development
Region III
Philadelphia, PA 19107-3380

US Department of Interior
Division of Acquisition & Property Management
Washington, DC 20240

US Department of Transportation
Office of Environmental Quality
Washington, DC 20590

US Environmental Protection Agency
Office of Federal Activities, 2251
Washington, DC 20460

US Environmental Protection Agency
Region III
Philadelphia, PA 19107

US Fish & Wildlife Service
Environmental Coordination Branch
Department of Interior
Washington, DC 20240

US Department of the Interior
Natural Resources Management
Office of Environmental Policy and Compliance
Washington, DC 20240

US Public Health Service
Washington, DC 20201

Mr. Al McDonough
Federal Aviation Administration
Eastern Region
Jamaica, NY 11430

State/Regional Agencies and Elected Officials

The Honorable Thomas Ridge
Governor of Pennsylvania
Harrisburg, PA 17120

The Honorable David W. Heckler
PA Senate
4 West Oakland Avenue
Doylestown, PA 18901

The Honorable Thomas Druce
PA House of Representatives
1410 W. Street Road, Suite B
Warminster, PA 18974

The Honorable Roy Reinard
PA House of Representatives
PO Box 6, Main Capitol Building
Harrisburg, PA 17120-0028

The Honorable Roy W. Cornell
PA House of Representatives
19 Byberry Avenue
Hatboro, PA 19040

Secretary of Commerce
Pennsylvania Department of Commerce
Harrisburg, PA 17120

Pennsylvania State Historic Preservation Officer
Pennsylvania Historical Museum Commission
Harrisburg, PA 17108-1026

Ms. Nina Huizinga
PA Dept. of Environmental Protection
Office of Policy, EIS Coordinator
Harrisburg, PA 17105

Pennsylvania Attorney General
Harrisburg, PA 17120

Secretary of Transportation
Pennsylvania Department of Transportation
Harrisburg, PA 17120

Pennsylvania Human Relations Commission
Harrisburg, PA 17105-3145

Mr. Scott Bair, Director
Office of Economic Policy, Planning and Research
Commonwealth of Pennsylvania
Department of Commerce
Harrisburg, PA 17120

Ms. Sarah Pantelidou
PA Dept. of Natural Resources
Southeast Regional Office
Conshohocken PA 19428

Mr. Khervin Smith
Bureau of Water Quality Management
Division of Wetlands Protection
PA Dept. of Environmental Protection
Harrisburg, PA 17105-8554

Mr. Larry Toth
PA Dept. of Environmental Protection
Bureau of Land and Water Conservation
Division of Coastal Programs
Harrisburg, PA 17105-8555

Local Agencies and Elected Officials

Stanley W. Krout
Mayor, Ivyland Borough
1240 Jacksonville Road
Ivyland, PA 18974

Benjamin F. Casole
Supervisor, Chairperson
Warminster Township
1020 Louis Drive
Warminster, PA 18974

Frank S. Surstein
Supervisor, Warminster Township
770 Lingo Drive
Warminster, PA 18974

William Goldsworthy
Supervisor, Warminster Township
Henry and Gibson Avenues
Warminster, PA 18974

Patricia K. Stephens
Supervisor, Warminster Township
669 Cheryl Drive
Warminster, PA 18974

Tish Troshak
Chief Administrative Officer
Warminster Township
Henry and Gibson Avenues
Warminster, PA 18974

D. Bruce Townsend
Township Manager, Northampton Township
55 Township Road
Richboro, PA 18954-1592

James E. Kinney
Chairperson, Supervisor
Northampton Township
32 Willowbrook Drive
Churchville, PA 18966

Charles H. Martin
Chairperson
Bucks County Commissioners
Administration Building
Doylestown, PA 18901

Sandra A. Miller
Bucks County Commissioners
Administration Building
Doylestown, PA 18901

Michael Fitzpatrick
Bucks County Commissioners
Administration Building
Doylestown, PA 18901

Frederick S. Groshens
Director, Public Information
Bucks County
Administration Building
Doylestown, PA 18901

Lawrence Mayer
Warminster Heights Homeowners Association
75 Downey Drive
Warminster, PA 18974

Federal Lands Reuse Authority Board

Robert J. Finley
Vice Chairperson
Logistics Consultants
35 Jacqueline Circle
Richboro, PA 18954

Kathleen Dominick
Chairperson
57 Joshua Drive
Richboro, PA 18974

Harry Barford, Jr.
Carroll Engineering
949 Easton Road, Suite 100
Warrington, PA 18976

Joseph Butch
Warminster Municipal Authority
PO Box 2279
Warminster, PA 18974

Robert T. Hasty
Electrician's Local # 98
1818 Hazel Avenue
Bristol, PA 19007

Norman Kelly
127 Lincoln Avenue
Ivyland, PA 18974

Bernard O'Neill
50 Dorsett Circle
Warminster, PA 18974

Francis B. J. Branagan
Branagan & Company
1442 Bristol Pike
Morrisville, PA 19067

Richard Goldberg, Esq.
Ballard, Spahr, Andrews & Ingersoll
51 Floor, 1735 Market Street
Philadelphia, PA 19103-7599

Victor J. Lasher
Administration Building
443 Centennial Road
Warminster, PA 18974

Anthony F. Visco, Esq.
Montgomery, McCracken, Walker, & Rhoads
123 South Broad Street
Philadelphia, PA 19109

Steven Rockwell (2 copies)
Executive Director
FLRA
PO Box 3049
Warminster, PA 18974

James Linksz
Treasurer, FLRA
President
Bucks County Community College
Bucks County Community College Swamp Road
Newtown, PA 18940

FLRA Community Advisory Working Group

Gretel Bleich
159 North Traymore Avenue
Ivyland, PA 18974

Joan Marie Brown
264 Chapel Drive
Holland, PA 19066

Fred W. Busch
225 Estelle Lane
Warminster, PA 18974

Harry Davis
2454 Croydon Court
Bensalem, PA 19020

Vincnet J. Deon
1250 Spenser Road
Ivyland, PA 18974

Darren R. Eppley
191 Valley Road
Warminster, PA 18966

Jack Eyth, Jr.
120 Vista Drive
Warminster, PA 18966

Don George
158 Watergate Drive
Langhorne, PA 19053

Michael Green
55 Dutch Drive
Holland, PA 18966

Joanne M. Hambleton
305 Foxcroft Drive
Ivyland, PA 18974

Michael P. Labonoski
1206 Jacksonville Road
Ivyland, PA 18974

Robert J.Lawler
10 Par Drive
Ivyland, PA 18974

Frank J. Loprest, PhD
590 Beverly Road
Holland, PA 18966

James R. Snow
765 Lillian Lane
Warminster, PA 18974

Stanley R. Williams
763 Newtown Road
Warminster, PA 18974

FLRA Environmental Working Group

Patrick DiGangi
CKS Engineers
88 S. Main Street
Doylestown, PA 18901

Thomas Pullar
American Resource Consultants
3080 Knightsway
Doylestown, PA 18901

Albert Wills
Bucks County Health Department
Neshaminy Manor Center
Doylestown, PA 18901

Anthony Bartolomeo
Pennoni Associates, Inc.
1600 Callowhill Street
Philadelphia, PA 19130

W. David Fennimore
Earth Data
916 Springdale Drive
Exton, PA 19341

Dennis Livrone
Bucks County Planning Commission
Neshaminy Manor Center
Doylestown, PA 18901

Ernest Rocker
Luftrol, Inc.
550 Concord Road
Warminster, PA 18974

Mark Showmaker
HAZMAT Coordinator
Bucks County Emergency Management
50 N. Main Street
Doylestown, PA 18901

Private Citizens

Dr. Dick Scott

Mr. Al Bruno, Jr.

Ms. Beverly Blackway

Ms. Kristy Westley

Ms. Tina Patel

Mr. Lou Krause

Mr. Abe Kern

Libraries & Media

Bucks County Library
150 South Pine Street
Doylestown, PA 18901

Warminster Library
1076 Emma Lane
Warminster, PA 18974

Fred C. Schmidt
Documents Department - KS
The Libraries
Colorado State University
Fort Collins, CO 80523-1019

Courier Times
Newsroom
8400 Route 13
Levitown, PA 19057

Intelligencer
333 North Broad Street
Doylestown, PA 18901

APPENDIX B

FEASIBILITY OF CIVIL AVIATION REUSE

B.1 Introduction

As part of the EIS being prepared by the US Navy for the disposal and reuse of NAWCAD, it is necessary to evaluate the reasonableness of continued aviation use of the facility in the alternatives analysis. A multi-step process was used to assess the alternative and is described below.

B.2 Climate of Businesses and Manufacturers Near NAWCAD

The first step in this evaluation is to assess the types of businesses and manufacturers that exist in the vicinity of NAWCAD, particularly in Bucks and Montgomery Counties. The NAWCAD site is located in Bucks County and is approximately one mile (1.6 kilometers) from the border between Bucks and Montgomery Counties. These counties would potentially be the most directly affected by the operation of an airport at NAWCAD.

Several organizations were contacted to obtain information regarding the use of aviation in the local economy. These organizations included local chambers of commerce and industrial and manufacturing development boards, etc. From the information received, the regional business and manufacturing climate is attractive and healthy. The local economy is diverse and has a highly skilled labor force.

Between April 25 and May 1, 1996, interviews were conducted with managers and owners of seven local businesses and industries. These interviews verified the general economic information and provided a perspective on the existing and potential demand for an airport at NAWCAD. These companies were asked a series of questions to determine interest or need for additional aviation services in the North Philadelphia area. Copies of these are included at the end of Appendix B (in Attachments section).

From these interviews, businesses and manufacturers in the immediate vicinity of NAWCAD indicated that good commercial air passenger service is available. Although similar comments were provided about air cargo service, several of the smaller firms stated that NAWCAD could offer an attractive alternative for shipments of their finished goods and/or raw materials in lieu of using Philadelphia International Airport.

Aviation services are available to these companies at smaller general aviation airports in the area (i.e., charter passenger service, on-demand or unscheduled shipment of goods/parts, etc.). These services are used to some extent, but not extensively. Few reasons were given for this.

B.3 Analysis of Existing and Future Aviation Demand and Capacity of the Region

An evaluation of the feasibility of converting NAWCAD to a civilian use airport was conducted. This evaluation considered Warminster as a potential addition to Philadelphia's regional airport/airspace system. The analysis considered several issues, including:

- Airspace constraints with existing commercial service, commuter and military airports;
- Existing and future demand at regional airports;
- Instrument approach capability;
- Future airport sponsorship;
- Interest in airline or operator investment; and,
- Reasonable role in the regional aviation system for Warminster.

An inventory of commercial passenger demand, freight/cargo activity, and general aviation demand was conducted to establish baseline conditions for evaluating the feasibility of reusing NAWCAD as a future civilian airport. Local governments and regional aviation planners were contacted to obtain current information on the regional perspective and on an individual airport basis.

The most recent study obtained was the *2020 Regional Airport System Plan for the Delaware Valley* (RASP), published in August 1995 by the Delaware Valley Regional Planning Commission (DVRPC). The Delaware Valley RASP provided the most comprehensive information regarding the demand and capacity of the region's existing aviation facilities. Users (airlines) of these facilities and fixed base operators (FBOs) were also contacted. In addition, nine agencies or companies were interviewed and were asked to verify or supplement the database with demand/capacity information.

B.3.1 Potential Sponsorship for Warminster

The Delaware Valley Region is a major center for general aviation activity in the US. However, it is experiencing a severe crisis for accommodating general aviation activity from the lack of municipal facilities and imminent closures of existing privately-owned, public-use airports. Across the US, privately-owned, public-use airports are subject to development pressures, particularly those facilities best suited to serve as relievers to primary airports.

A key consideration is the local, municipal or state sponsorship of these airports, or their designation as reliever airports, which enables their eligibility for FAA funding. In order for NAWCAD to function effectively as a regional system airport, it must have a public sponsor. However, interviews conducted with local officials indicated that no interest in public sponsorship of NAWCAD exists.

B.3.2 Existing Aviation Demand/Capacity

Table B-1 summarizes the current aviation demand and capacity of local airports in the vicinity of NAWCAD. These airports represent those facilities that could potentially be affected either geographically or in terms of their aviation role, if another public-use airport were constructed at Warminster.

Based on the data in Table B-1, the local general aviation airports show a strong demand for additional facilities for based aircraft in the area. Interviews with fixed base operators and airport managers revealed that many pilots are on waiting lists to either hangar or tie-down their planes. Two regional air carrier facilities, Northeast Philadelphia and Philadelphia International, are currently operating at 79 percent and 77 percent of their annual service volumes, or capacity levels, respectively. Figure B-1 shows the relationship of NAWCAD to these and several other regional airports.

B.3.3 Projected Aviation Demand/Capacity

Table B-2 summarizes the projected aviation demand and capacity of airports in the vicinity of Warminster as forecast by existing studies. Once again, those airports identified are those that could potentially be affected either geographically or in terms of its aviation role in the region.

As shown in Table B-2, Doylestown and Pennridge will reach about 40 percent of their annual service volume in terms of operating capacity by 2020. In fact, Doylestown shows a 123-percent increase in the percentage of total operating ASV being utilized between 1994 and 2020. Overall, the annual service volumes of the selected airports indicate that excess operating capacity exists among these eight airports.

Storage capacity is another significant problem at these airports unless major improvements or additional facilities are developed in the near future. These eight airports are projected to experience a major increase in the number of their based aircraft over the next several years. Pennridge, Buehl Field and Wings Field are airports that are projected to experience the greatest growth in based aircraft in the region, with increases of approximately 55 percent, 39 percent and 38 percent, respectively, between 1994 and 2020. However, the ability of these airports to accommodate this growth will fall far short of meeting the demand for storage space. The significant lack of aircraft

Table B-1

Existing (1994) Aviation Demand/Capacity
Individual/Regional Airports Perspective

Airport	Demand [1] (operations)		Capacity [2]		1994 Current Based Aircraft [1]
	Commercial & Cargo	GA	ASV	% of ASV	
Doylestown	--	41,272	30,000	17.9%	128
Buehl Field	--	6,888	N/A		36
Northeast Philadelphia	--	182,244	30,000	79.2%	218
Philadelphia International	345,000	70,000	480,000	86.5%	50
Trenton-Mercer	4,000	146,101	N/A		158
Wings Field	--	34,336	N/A		94
Perkiomen Valley	--	40,412	N/A		95
Pennridge	--	29,700	94,400	31.5%	55
TOTAL					834

Notes: N/A = Not Available; GA = General Aviation; ASV = Annual Service Volume
Sources: [1] Delaware Valley Regional Planning Commission's RASP, Tables V-6 and V-7; 1994 base year data. [2] Airport Master Plans, where available.

Airports in NAWCAD Region

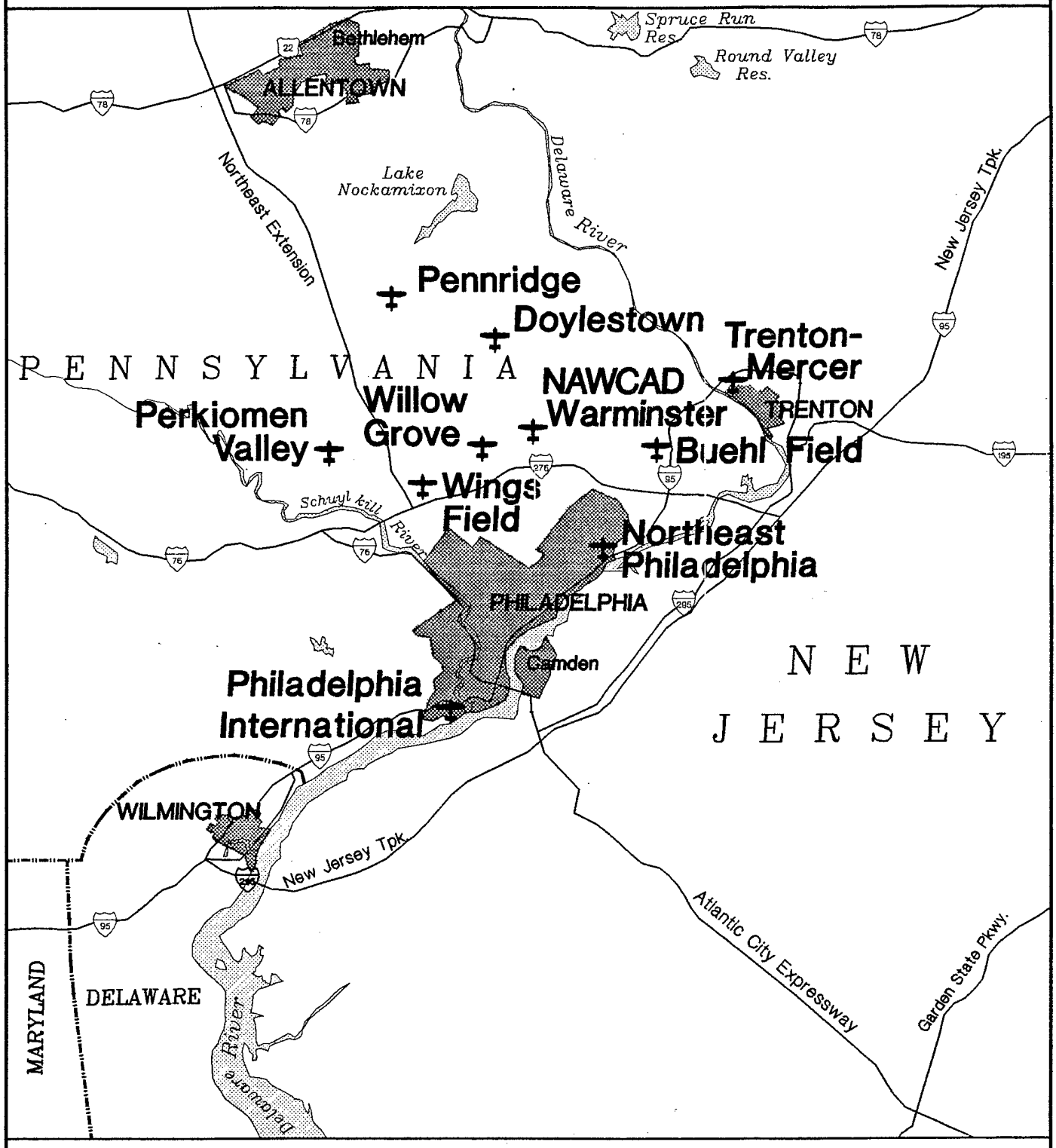


Figure B-1

Table B-2

Projected (2020) Aviation Demand/Capacity
Individual/Regional Airports Perspective

Airport	Demand [1] (operations)		Capacity [2]		2020 Projected Based Aircraft [1]
	Commercial & Cargo	GA	ASV	% of ASV	
Doylestown	--	85,000	230,000	40.0%	170
Buehl Field	--	35,000	N/A		50
Northeast Philadelphia	--	200,000	230,000	87.0%	245
Philadelphia International	547,367	80,000	560,000	112.0%	50
Trenton-Mercer	8,452	196,000	N/A		190
Wings Field	--	55,000	N/A		130
Perkiomen Valley	--	45,000	N/A		105
Pennridge	--	40,000	94,400	42.4%	85
TOTAL					1,025

Notes: N/A= Not available; GA = General Aviation; ASV = Annual Service Volume
Sources: [1] Delaware Valley Regional Planning Commission's RASP, Tables V-6 and V-7. [2] Airport Master Plan Reports, where available.

storage space facing the region is such an important factor that the DVRPC has made it the Number 2 goal of its 14 goals and objectives for the 2020 RASP, ahead of projects to increase operating capacity or decrease airspace conflicts.

Table B-3 summarizes existing and projected operations per based aircraft for 2010 and 2020 (based upon DVRPC figures) for each of the regional airports that could be affected by an aviation facility at NAWCAD. Data for Year 2010 are interpolations.

B.3.4 Potential Aviation Role of Warminster

Every airport has a unique and dynamic relationship with every other airport in its *vicinity*. Depending upon the service level and type of aviation activity of a facility, the definition of vicinity can be local or global. For example, air passenger activity at Philadelphia International Airport (PHL) is highly dependent upon the frequency and scheduling of flights, service, and airfares. For the most part, PHL's major competitor within the Philadelphia region for providing domestic air carrier service is Newark International Airport.

In terms of international air passenger service from Philadelphia, alternative airports used by passengers in the Philadelphia region for international travel differ from alternatives used for domestic travel. Similarly, alternative regional airports providing air cargo and general aviation service are different as well. Each type of air transport service offered has a distinct interrelationship with other airports providing similar services. Given the type of operational activity, air passenger, air cargo or general aviation, the interrelationships among airports change.

Air Passenger Service

Forecasts of potential air passenger activities at NAWCAD requires consideration of the feasibility for such services in the region. Air service feasibility must consider the demand for such service and its cost.

Currently, two primary airports provide air carrier passenger service for the North Philadelphia region. These airports are Philadelphia International and Trenton-Mercer Airports. Philadelphia International Airport is located approximately 50 minutes average travel time from NAWCAD and offers frequent, non-stop domestic and international service to many destinations.

Trenton-Mercer also provides commercial air service to destinations such as Baltimore, MD and Washington, D.C., although the service is infrequent and the air access provided to other airports is largely service by smaller commuter aircraft such as the Beech 1900. More recently, this airport has

Table B-3

Existing & Projected Number of Operations
Per Based Aircraft at Area Airports

Airport	1994	2010	2020
Doylestown	322	422	500
Buehl Field	191	425	700
Northeast Philadelphia	836	824	816
Philadelphia International	1,400	1,520	1,600
Trenton-Mercer	925	989	1,032
Wings Field	365	400	423
Perkiomen	425	427	428
Pennridge	540	496	471
Source: Delaware Valley Regional Planning Commission's RASP, based on figures in Tables V-6 and V-7.			

been providing limited commercial scheduled service and charter service on B-737 aircraft flown by Eastwind Airlines to varying destinations. The Trenton-Mercer Airport is located approximately 35 minutes average travel time from NAWCAD.

Due to sufficient air carrier service in the Philadelphia area provided by PHL and Trenton-Mercer, the demand for commercial air carrier commercial passenger service at NAWCAD would be limited and would most likely never occur. Two air carriers were interviewed regarding airline interest in locating at Warminster. Neither airline expressed an interest in offering competitive service at Warminster because of the proximity to Philadelphia International Airport (PHL). While the Philadelphia region generates substantial numbers of origin and destination trips, most passengers use PHL because of its high level of service and frequency of scheduled flights. Based on similar studies conducted of new airports in other US metropolitan areas, it can be assumed that the potential for interest in an airline servicing or investing in a new airport is not likely to occur at Warminster. This assumption is further supported by the following issues and constraints:

- Airspace constraints with other airports, such as Naval Air Station Joint Reserve Basin (NASJRB), Philadelphia International, Northeast Philadelphia and Trenton-Mercer Airports;
- Lack of instrument approach capability at Warminster;
- Lack of public sponsorship;
- Lack of airline interest in investing in Warminster; and
- Limited overall approach capabilities.

The existence of regional commuter service at Trenton-Mercer Airport, which also serves the Warminster area, reduces the probability or need for another commuter facility. Factors to consider for regional airline service are similar to those for air carrier airlines with the exception of the aircraft type used by the regional airline. Often the aircraft used by a regional airline, especially if it is a turboprop aircraft, has a negative impact upon the air traveler. Currently, many regional airlines are upgrading fleets in an effort to phase out the smaller turboprops and convert fleets to mid-size jets. Obviously, in a smaller market, this action would require more enplanements or passengers for the airline to be profitable. Therefore, the lack of support or interest from the airlines and the lack of evidence that such commercial air service would be feasible or profitable supports the likelihood that passenger service would not be warranted for the Warminster site.

Air Cargo/Freight Operations

Air cargo/freight tonnage forecasts may depend on an array of factors that include: tariffs; frequency of service; security, type and value per unit weight; reliability and quality of service; and, most importantly, cost of operation at the airport. The Warminster air cargo forecast assumes a very small share of the PHL market.

Forecasts of scheduled cargo activity into and out of the North Philadelphia area and, in particular, the potential for this activity at NAWCAD was determined on the basis of a study jointly prepared by PENNDOT and the DVRPC in 1994, as well as statements made by several businesses and industries in the general vicinity of the site. The PENNDOT/DVRPC study stated that many of the products produced in the Philadelphia region and shipped by air are trucked to New York airports. Based on these studies and the on-time reliability required of scheduled services, there is little potential for scheduled air cargo services to develop at Warminster.

However, some of those interviewed did express interest in additional cargo services. There may be a potential for occasional, non-scheduled cargo flights to pick up or deliver goods on a limited basis, for example delivery of a machinery part. Therefore, the aviation forecast for Warminster does assume some occasional light air cargo service.

However, the possibility of using an airport at Warminster to ship cargo or freight on a consistent basis is limited by the same constraints described earlier for air passenger service. The existing airspace constraints would eliminate approach and departure tracks and severely constrain operations. Therefore, the probability of using Warminster as a scheduled, commercial cargo/freight facility is extremely unlikely.

General Aviation

A forecast of general aviation activity was prepared for the Warminster site, employing 1994 as the base year, 2000 as the short-term projection and 2010 as the planning horizon. These forecasts were developed for general aviation and for unscheduled, on-demand light air cargo/freight operations. The methodology used to derive the ranges of projected based aircraft and resultant operational forecasts presented below.

A conceptual analysis was conducted using the following assumptions and guidelines:

- A 30-minute average drive time delineates a typical service area for a general aviation airport (also used by the DVRPC). This 30-minute drive time is an industry accepted standard used for planning purposes. The number of aircraft registered to owners within a radius of 30 minutes from the Warminster site was identified by zip code using the US aircraft registry database published by Aircraft Technical Publishers (ATP). It was assumed that 100 percent of these registered general aviation (GA) aircraft owners could choose to base their aircraft at a GA airport in Warminster, if competitive service was provided by the fixed base operator (FBO).

- Previous studies of Delaware Valley regional airports and interviews with local sponsors resulted in identifying several local airports that may close in the next several years. Two of these facilities, Buehl Field and Wings Field, are located approximately 10 miles (16 kilometers) east and west, respectively, of the Warminster site. It was

assumed that as many as half of the registered owners of non-corporate aircraft (single and multi-engine piston) located within the service areas of these two airports would relocate to an aviation facility at the Warminster site.

- Half of the aircraft owners waiting to base at nearby Doylestown and Northeast Philadelphia Airports may decide to relocate their aircraft to Warminster because of proximity to homes or business or due to potentially lower hangar/service costs.

- The prospective market area for NAWCAD overlaps each of the four closest existing facilities' market areas. Since approximately 40 percent of all registered aircraft owners located in zip codes of nearby airports actually base their aircraft at airports located nearest to them, it was assumed that a similar percentage could be applied to Warminster. The 40 percent of all registered aircraft based at an airport is a reasonable expectation based on experience of ratios at similar-sized airports in other parts of the United States.

Table B-4 identifies the number of aircraft that could potentially operate out of NAWCAD. Although this table represents the total number of aircraft estimated to be located in the general vicinity of the site, not all aircraft would be candidates for basing at Warminster, such as turbojets, turboprops and owners of recreational aircraft that prefer to operate their aircraft in uncongested areas.

Table B-5 presents a range of forecast based aircraft. These forecasts were prepared to reflect a wide range of probable activity from the worst case (low) to the most likely case (mid) to the best scenario (high). Assumptions for forecast ranges are as follows:

- High: Equal to 100 percent of all registered aircraft owners in zip codes within a 30-minute average travel time from the site. This figure includes all aircraft registered to owners hangaring their aircraft at an aviation facility, those hangaring their aircraft on their own property, those who may have yet to build a kit aircraft or those who are storing a non-operative aircraft.

- Mid: Equal to 40 percent of the registered aircraft. This is the average percentage of the registered aircraft within the market areas of two nearby airports (Doylestown and Wings Field) that are actually based at these airports.

- Low: Equal to 24 percent of the registered aircraft. This is similar to the average percentage of the registered aircraft within the market area of Buehl Field actually based there.

Table B-4

1994 Baseline Inventory For Potentially Based Aircraft
at NAWCAD Airport Site

Aircraft Type (1)	No. of Aircraft Within 30 Minutes	No. of Aircraft from Airports Projected to Close (2)	No. of Aircraft from Nearby Airports (3)	Total Potential Based Aircraft
Single-Engine Piston	165	134	58	357
Multi-Engine Piston	10	14	6	30
Turboprop	4	--	2	6
Turbojet	1	--	1	2
Other (4)	24	24	18	66
TOTAL	204	172	85	461

Notes: 1. The typical aircraft in these categories are: Single-Engine Piston, Cessna 177; Multi-Engine Piston, Beech Baron 58P; Turboprop, Cessna Conquest 441; Turbojet, Lear 35; and Other, a mixture of light powered and unpowered airplanes.
2. This figure is based on 50% of the potential based aircraft (single engine piston, multi-engine piston, and other only) within the combined market areas of Buehl Field and Wings Field.
3. This figure is based on 50% of based aircraft on the combined waiting lists at Doylestown and Northeast Philadelphia Airports. It is also assumed that those aircraft on the waiting list would be approximately the same fleet mixture of aircraft types that are currently based at each airport.
4. Includes ultralights, gliders, helicopters, etc.

Table B-5

Range of Forecast Based Aircraft in 2000 and 2010
at NAWCAD Airport Site

Aircraft Type	2000			2010		
	High	Mid	Low	High	Mid	Low
Single-Engine	357	143	86	391	156	94
Multi-Engine	30	12	7	33	13	8
Turboprop	6	0	0	7	0	0
TOTALS	393	155	93	431	169	102

For modeling purposes, the mid-range forecasts are recommended. It should be noted that two important assumptions also have been made about the typical operation at the facility which affect forecasts. These are:

- The airport will not have instrument capability, therefore no turboprop or turbojet aircraft are anticipated to base at Warminster (although some activity by turboprop aircraft only is anticipated) -- corporate aircraft operate under extremely stringent insurance requirements and will usually not operate at an airport without instrument approach capability; and

- No training or recreational flying would be permitted due to airspace constraints. This means that no aircraft from the "other" category (helicopters, gliders, ultralights) will base at the facility.

Table B-6 summarizes forecast activity ranges of operations for Year 2000 and Table B-7 provides forecasts for Year 2010. A range of operations per based aircraft were assumed and are held constant for both forecast periods. These figures are 500, 275 and 200 operations per based aircraft for airports with a medium level of business activity, those with a low level of business activity and those with an occasional use by other operators of aircraft, respectively.

This range of operations per based aircraft is based not only upon an analysis of Table B-3 presented earlier, but is also based upon the envisioned usage of an aviation facility at NAWCAD and the constraints that would be inherent with it. In general, higher levels of activity are associated with airports that attract greater numbers of operations by aircraft that are not based at the airport. This assumes Warminster would attract some non-local light air cargo and business users, but that much of the activity would be generated by owners of based aircraft.

Peak hour operations at non-towered airports are difficult to estimate. Three of the four airports closest to NAWCAD (Northeast Philadelphia Airport excluded) are non-towered. Accordingly, research from other areas of the U.S. regarding typical peak hour operations at non-towered airports in metropolitan areas were used. Peak hour estimates were prepared based upon intensive research completed by the INDOT-Division of Aeronautics. Several factors borne out of this research, peak month and peak hour percentages, were used in this process of determining peak hour operational levels for non-towered airports. Table B-8 presents the peak hour operational levels for the two forecast periods.

Table B-6

Year 2000 Forecast General Aviation and Cargo Operations
at NAWCAD

AC Type	Medium Business Use			Low Business Use			Occasional Use		
	Total	Day	Night	Total	Day	Night	Total	Day	Night
SEP	178,500	176,700	1,800	39,300	38,900	400	17,200	17,050	150
MEP	15,000	14,800	200	2,900	2,850	50	1,300	1,300	0
TP	3,000	2,400	600	400	300	100	100	100	0
TOT	196,500	193,900	2,600	42,600	42,050	550	18,600	18,450	150
Note: All figures rounded to nearest 50 for noise estimation purposes.									

Table B-7

Year 2010 Forecast General Aviation and Cargo Operations
at NAWCAD Airport Site

AC Type	Medium Business Use			Low Business Use			Occasional Use		
	Total	Day	Night	Total	Day	Night	Total	Day	Night
SEP	195,500	193,500	2,000	42,900	42,450	450	18,800	18,600	200
MEP	16,500	16,300	200	3,000	2,950	50	1,400	1,400	0
TP	3,500	2,800	700	600	500	100	200	150	50
TOT	215,500	212,600	2,900	46,500	45,900	600	20,400	20,150	250
Note: All figures rounded to nearest 50 for noise estimation purposes.									

Table B-8

Peak Hour Operational Levels at a Non-Towered Airport
for Forecast Years 2000 and 2010

Forecast Year	Forecast Scenario		
	High	Mid	Low
2000	55	12	5
2010	60	13	6

B.4 Airspace Considerations

Several reports regarding airspace interactions in the North Philadelphia and greater Philadelphia area were prepared recently for the Delaware Valley Regional Planning Commission (DVRPC) by Samis & Hamilton. Interviews were conducted with managers of two nearby air traffic control towers to verify information contained within these reports.

The conclusion from the interviews and reports is that there is a good likelihood for airspace conflict during all-weather/IFR (Instrument Flight Rules) conditions with the Northeast Philadelphia and Trenton-Mercer Airports if NAWCAD had any type of instrument apprfoach. There are two major reasons for this conclusion. The first is that a portion (holding pattern) of the IFR-reserved airspace for the two existing airports' instrument approaches overlap. To introduce a third airport into this airspace with an additional instrument approach would mean more aircaft in this area.

The second reason is that NASJRB Willow Grove is located approximately four miles (six kilometers) west of NAWCAD. This area has major VFR (Visual Flight Rules) activity which would limit any consideration of an instrument runway to Runway 27, i.e., easterly approaches and departures only. Reports and interviews verified that concerns exist now regarding VFR aircraft entering Willow Grove's Class D airspace. Research also indicates that airspace conflicts and the complexity of integrating operations at NAWCAD could lead to traffic delays at NASJRB Willow Grove, particularly during IFR operations.

For these reasons, only a visual approach is potentially feasible at NAWCAD.

B.5 Findings

The results include a potential aviation demand and capacity shortfall in the vicinity of NAWCAD. However, airfield constraints, potential airspace conflicts with existing approach and departure procedures, and minimal public support would limit the use of the site to a Basic Utility (B-I) general aviation airport.

This class airport can accommodate light (less than12,500 pounds gross weight) single-engine and multi-engine piston aircraft. For planning purposes, the typical aircraft served by Basic Utility airport include the Cessna 177, Beech Baron 58 and the Cessna 414. The Cessna 414 is the largest aircraft anticipated to use the airport on a frequent basis, however. This aircraft falls within the FAA's Airplane Design Group B-I, which is this facility's critical aircraft. An airport's critical aircraft is used as the planning parameter for establishing airport design. Runway criteria associated with this type of aircraft is 3,800 feet (1,100 meters) in length and 60 feet (18 meters) in width.

Such an airport would be a VFR-only facility serving minimal on-demand air cargo aviation and general aviation activities. No commercial service passenger or scheduled air cargo operations would be feasible due to the complex and congested airspace system surrounding Philadelphia International Airport and NASJRB Willow Grove.

While an aviation demand forecast can be justified, several drawbacks were identified. The airspace around Warminster is a significant issue for consideration. There are overlapping approaches between Northeast Philadelphia and Trenton-Mercer Airports. The site falls within the Class D airspace of NAS Willow Grove to the west. The entire area falls within the extended airspace of Philadelphia International Airport which requires the use of a transponder, a device in an aircraft that indicates the aircraft's location and its direction of movement on a radar screen as a "blip." With the potential for airspace conflicts, aviation activity at Warminster would be limited to operations on one runway end. Both civil and military air traffic controllers believe that this site would adversely impact approach and departure procedures at existing airports.

Airspace and facility constraints would also limit general aviation and light air cargo activity to operations by small piston-type aircraft. Given the operational limitations and potential airspace conflicts, owners of this aircraft type may choose to avoid Warminster. No sensitivity analysis was performed regarding the willingness of such aircraft owners to operate under these conditions though it is reasonable to assume that some would not. Therefore, the low business use aviation activity forecast presented herein is the best case for potential aviation activity and the worst case for noise modeling.

Another significant drawback is the minimal level of municipal interest in sponsoring the Warminster site. Given the fact that many municipal airports are subsidized by local communities and this potential airport has some potential airspace constraints, it is unlikely that interest in sponsorship of

this facility would increase after further review. It is a finding of this analysis that strong local sponsorship is a prerequisite for an aviation facility at NAWCAD.

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ATTACHMENTS

Interview Form for Commercial/Industrial Firms

1. Name of firm _____

2. Firm's function _____

3. Contact person _____ Title _____

4. Telephone number _____ Fax number _____

5. Address _____
   _____
   _____

6. How many people employed by your firm live in the North Philadelphia area? _____

7. What is the total payroll of these individuals? _____

8. On average, how often do your employees travel by air:
   ___ 1-2 times per year?
   ___ 3-5 times per year?
   ___ 6-10 times per year?
   ___ _____ times per year?

9. When these employees travel by commercial carrier, what airports in the Philadelphia area do fly out on a regular basis? _____, _____, _____, _____, _____

   Approximate the percent split between multiple airports _____, _____, _____

10. Does your firm own/operate an aircraft for corporate use? Yes No
    If yes, how many? _____ Where is (are) it (they) based? _____
    How (are) they used? _____
    _____
    How often do employees fly in this (these) aircraft?
    __ 1-2 times per year?
    ___ 3-5 times per year?
    ___ 6-10 times per year?
    ___ _____ times per year?

11. How many tons of cargo and overnight packages are shipped approximately last year by your firm? _____ cargo _____ overnight pkgs.

12. What percent of this shipments were carried by:
___ your own aircraft?
___ scheduled commercial airlines?
___ integrated carriers (FedEx, UPS)?
___ chartered/FBO aircraft?

13. Of the tonnage sent by means other than air (truck, rail, etc.), how much would your firm shift to shipment by air if an airport capable of handling such goods was situated less than 30 miles from your place of operations? _____

14. If a new passenger/cargo facility were built at the NAWCAD-Warminster site in the next 5 years, would your firm use it if it were adequately sized and retrofitted to handle the region's demand? Yes No
If yes, how often would you use it:
___ 1-2 times per month?
___ 3-5 times per month?
___ 6-10 times per month?
___ _____ times per month?

15. Would your firm be one possibly interested in the investment strategies associated with such an undertaking (particularly knowing the positive effect of Public Benefit Transfers and conveyances)? Yes No
If yes, to what extent? _____
If no, what would prevent your firm from doing so? _____
_____

16. In what ways would a public-use aviation facility located at NAWCAD-Warminster be conducive to the development of the north Philadelphia area? _____
_____

17. In your mind, what would the maximum outlay the area's communities could bear for such a facility to help meet the unmet air commercial/cargo/general aviation needs?

___ $0-500,000?
___ $500,000-1,000,000?
___ $1,000,000-5,000,000?
___ $5,000,000 and greater?

Interview Form for Governmental Agencies

1. Name of agency _____

2. Agency's function _____

3. Contact person _____ Title _____

4. Telephone number _____ Fax number _____

5. Address _____
   _____
   _____

6. Based upon your understanding, is the *commercial passenger demand* being met adequately in the region today? Y N

   Will it be adequately met in the Year 2010? Y N In the Year 2020? Y N
   why/why not? _____.

7. Based upon your understanding, is the *air cargo demand* being met adequately in the region today? Y N

   Will it be adequately met in the Year 2010? Y N In the Year 2020? Y N
   why/ why not? _____.

8. Based upon your understanding, is the *general aviation demand* being met adequately in the region today? Y N

   Will it be adequately met in the Year 2010? Y N In the Year 2020? Y N
   why/why not? _____.

9. If the demand was such that a commercial passenger/cargo/general aviation facility was warranted at the NADC-Warminster site, what would this mean for the capacity of the region from your perspective? Would it be a welcome addition? Would it serve to limit capacity? Would it serve only a few at the expense of many? Would it _____?
   Why? _____.

10. A recent study published by the DVRPC indicates that because of the Delaware Valley region's complex airspace, the introduction of new aviation facilities would further complicate

the existing airspace interactions and therefore reduce overall system efficiency and safety. Is this your opinion as well? Y N If yes, why? _____.

If no, why? _____.

11. How would you rate the instrument capabilities/radar coverage in the general vicinity of the NADC-Warminster facility: Excellent? _____
Very Good? _____
Good? _____
Fair? _____
Poor? _____

12. If a commercial passenger/cargo/general aviation facility were located at the NADC-Warminster site and IFR airspace was reserved for this type of activity, to what extent would low-level arrivals and departures at surrounding airports be affected? _____
_____

13. When Wings Field offered commercial passenger service, ATC procedures at Philadelphia were adversely affected according to a recent DVRPC study. If commercial service activity were introduced at the NADC-Warminster, would this be the case as well in your opinion?
Y N W h y ?
_____.

14. A statement was made in this same DVRPC study that "a major increase in IFR operations at any satellite airport could affect traffic at PHL." Could the same be said of operations at an aviation facility located at NADC-Warminster? Y N Why? _____
_____

15. Could the statement made in this same DVRPC study that "an initiative to build a private use civilian facility... near Willow Grove, (is) a proposal which the control tower feels would lead to airspace conflicts." be made of a facility at the NADC-Warminster site? Y N Why or why not?_____

16. It has been estimated that by the Year 2000, 12 of the region's airports will close and thereby cut the region's aviation capacity in half. Would an aviation facility at NADC-Warminster help alleviate these anticipated losses in your opinion? Y N Why or why not? _____
_____

17. If the runway, navaids and other support network at an aviation facility at NADC-Warminster were found to be sufficient to accommodate sufficient all-weather capacity in the region,

would this be a good option? Y N Why or why not? _____

_____

18. Several airspace studies conducted for the DVRPC recently indicated that there are several locations within the regional airspace where congestion acts as a system design constraint. Would an aviation facility at the NADC-Warminster site be part of the solution or a part of the problem? _____ Why? _____

_____

19. The DVRPC says that the 25 regional airports have excess operating capacity. Is this true in your opinion? Y N Why? _____

Interview Form for Airport Users/FBOs

1. Name of firm _____

2. Firm's function _____

3. Contact person _____ Title _____

4. Telephone number _____ Fax number _____

5. Address _____
   _____
   _____

6. Based upon your understanding, is the *commercial passenger demand* being met adequately in the region today? Y N

   Will it be adequately met in the Year 2010? Y N In the Year 2020? Y N
   why/why not? _____.

7. Based upon your understanding, is the *air cargo demand* being met adequately in the region today? Y N

   Will it be adequately met in the Year 2010? Y N In the Year 2020? Y N
   why/why not? _____.

8. Based upon your understanding, is the *general aviation demand* being met adequately in the region today? Y N

   Will it be adequately met in the Year 2010? Y N In the Year 2020? Y N
   why/why not? _____.

9. If the demand was such that a commercial passenger/cargo/general aviation facility was warranted at the NADC-Warminster site, what would this mean for the capacity of the region from your perspective? Would it be a welcome addition? Would it serve to limit capacity? Would it serve only a few at the expense of many? Would it _____?
   Why? _____.

10. A recent study published by the DVRPC indicates that because of the Delaware Valley region's complex airspace, the introduction of new aviation facilities would further complicate the existing airspace interactions and therefore reduce overall system efficiency and safety. Is this your opinion as well? Y N If yes, why? _____.

If no, why? _____.

APPENDIX C

CORRESPONDENCE

RECORD OF NON-APPLICABILITY
DISPOSAL AND REUSE OF THE
NAVAL AIR WARFARE CENTER
AIRCRAFT DIVISION
WARMINSTER, PENNSYLVANIA

In accordance with the 1991 and 1995 decisions of the Base Closure and Realignment Commission, acting under the provisions of the 1990 Base Closure and Realignment Act, the Naval Air Warfare Center, Aircraft Division, Warminster (NAWCAD) will be closed. The proposed action is the disposal and reuse of the NAWCAD pursuant to the Reuse Plan for the *Naval Air Warfare Center, Bucks County, Pennsylvania* prepared for the Economic Adjustment Committee and Base Reuse Subcommittee of Bucks County (March 1995).

In accordance with 40 CFR 51.853,

(1) Transfers of ownership, interests, and titles in land, facilities, and real and personal properties, regardless of the form or method of transfer; and

(2) actions (or portions thereof) associated with transfers of land, facilities, title, and real properties through an enforceable contract or lease agreement where the delivery of the deed is required to occur promptly after a specific reasonable condition is met and where the Federal agency does not retain continuing authority to control emissions with the lands, facilities, title, or real properties are clearly *de minimis* with regard to the General Conformity Rule of the Clean Air Act.

Accordingly, it is my determination that the proposed action conforms to the applicable State Implementation Plan (SIP) and is exempt from the conformity requirements of the Clean Air Act General Conformity Rule.

4 Sep 96
Date

F. G. Trummer
Commander, CEC, U.S. Navy
Public Works Officer
By direction of the
Commanding Officer

Commonwealth of Pennsylvania
Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Post Office Box 1026
Harrisburg, Pennsylvania 17108-1026

6 May 1998

Robert K. Ostermueller, Head
Planning Branch B
Dept. of the Navy, Northern Division
Naval Facilities Engineering Command
10 Industrial Highway, Mail Stop #82
Lester, PA 19113-2090

Re: ER95-2473-017-E
DOD: Naval Air Warfare Center, Aircraft Division (NAWCAD)
Warminster Twp, Bucks County, PA

Dear Mr. Ostermueller:

This letter is written as a follow up to our 20 March 1998 meeting and site visit to the Naval Air Warfare Center, Warminster Twp, Bucks County. The purpose of this meeting was to tour the facility in order to better understand the alterations that occurred to the air base over its lifetime. The site visit was scheduled as a follow up to our letter of 4 April 1997 that said the base in its entirety was eligible for listing in the National Register of Historic Places as the NAWCAD Historic District. We have re-evaluated your report of December 1996 and factored in the alterations to the facility observed during our site visit

It is our opinion that the site as a whole is an important naval air installation. The Brewster Aeronautical Corporation was one of the Navy's three largest contractors during World War II, a designer and producer of two important aircraft types (diver and bomber) used to great Allied advantage. The plant's impact on the local wartime economy and labor are equally significant given the amount of attention and interference the facility received owing to the perceived labor problems. When constructed the plant was considered to be extremely modern in its design and the assembly and sub-assembly lines were ergonomically designed for women workers. In addition the runway was constructed using an innovative construction process that was faster and more cost effective. It is clear, the buildings related to the World War II period have been extensively altered both internally and externally; this is equally true for the runway as well. In addition many new facilities have been added throughout the base that have altered its pre-1945 character. Based on the BHP visit to the site, it is our opinion that the base does not have sufficient integrity to reflect its World War II associations and therefore is not eligible for listing in the National Register as an historic district associated with World War II.

It is our opinion, however, that the post-World War II (1944-1964) naval air research and testing programs and the facilities that supported that research and testing at the Center are nationally significant and are individually eligible for listing in the National Register of Historic Places. The period of significance may be later than 1963 (construction date of the Inertial Guidance Facility) because of the association of several or all of these buildings with Man in Space or Cold War contexts. The individually eligible buildings are as follows:

* Building 70 Centrifuge (1949)
* Building 108 Inertial Guidance Facility (1963)
* Structure 361 Seat ejector tower (ca. 1950's; moved 1970's)

We do not agree with your findings on the individual eligibility of the following buildings because of the loss of integrity:

* Building 87 Barn for Quarters B (19th century)
* Building 100 Quarters A (1817)
* Building 101 Quarters B (1787)
* Structure 367 Aircraft support tower (1979)

It is our opinion that these buildings do not have sufficient integrity to convey their individual significance for listing in the National Register.

If you have any additional questions, please contact Susan Zacher of this office.

Sincerely,

Brenda Barrett, Director

BB/dgd

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Suite 322
315 South Allen Street
State College, Pennsylvania 16801

September 14, 1995

Mr. Gerri O'Brien
TAMS Consultants, Inc.
300 Broadacres Drive
Bloomfield, NJ 07003

Dear Mr. O'Brien:

This responds to your letter of August 17, 1995 requesting information about federally listed and proposed endangered and threatened species within the area affected by the proposed disposal and reuse of the Naval Air Warfare Center located in Bucks County, Pennsylvania. The following comments are provided pursuant to the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) to ensure the protection of endangered and threatened species.

Except for occasional transient species, no federally listed or proposed threatened or endangered species under our jurisdiction are known to exist in the project impact area. Therefore, no Biological Assessment or further Section 7 consultation under the Endangered Species Act is required with the Fish and Wildlife Service. Should project plans change, or if additional information on listed or proposed species becomes available, this determination may be reconsidered. A compilation of federally listed species in Pennsylvania is enclosed for your information.

This response relates only to endangered or threatened species under our jurisdiction based on an office review of the proposed project's location. No field inspection of the project area has been conducted by this office. Consequently, this letter is not to be construed as addressing other Service concerns under the Fish and Wildlife Coordination Act or other legislation.

Requests for information regarding State-listed endangered or threatened species should be directed to the Pennsylvania Game Commission (birds and mammals), the Pennsylvania Fish and Boat Commission (fish, reptiles, and amphibians), and the Pennsylvania Department of Conservation and Natural Resources (plants).

Please contact Carole Copeyon of my staff at 814-234-4090 if you have any questions or require further assistance regarding endangered, threatened, or candidate species.

Sincerely,

Charles J. Kulp
Supervisor

Enclosure

FEDERALLY LISTED SPECIES IN PENNSYLVANIA

COMMON NAME	SCIENTIFIC NAME	STATUS*	DISTRIBUTION
FISHES			
Shortnose sturgeon**	*Acipenser brevirostrum*	E	Delaware River and other Atlantic coastal waters
REPTILES & AMPHIBIANS			
None			
BIRDS			
Bald eagle	*Haliaeetus leucocephalus*	T	Entire state. Recent nesting in Butler, Crawford, Dauphin, Forest, Lancaster, Pike, Tioga, Warren and York Counties
Peregrine falcon (American)	*Falco peregrinus anatum*	E	Entire state. Recent nesting in and around Philadelphia and Pittsburgh (Allegheny, Delaware, Philadelphia and Bucks Counties)
Piping plover	*Charadrius melodus*	E	Presque Isle (Erie County). Migratory. No nesting in Pennsylvania since mid-1950s
MAMMALS			
Indiana bat	*Myotis sodalis*	E	Summer range: possibly state-wide in suitable habitat. Only one known winter hibernaculum (south-central Pennsylvania)
MOLLUSKS			
Clubshell mussel	*Pleurobema clava*	E	French Creek and Allegheny River watersheds; Clarion, Crawford, Erie, Forest, Mercer and Venango Counties
Northern riffleshell	*Epioblasma torulosa rangiana*	E	French Creek and Allegheny River watersheds; Crawford, Erie, Forest, Venango and Warren Counties
PLANTS			
Northeastern bulrush	*Scirpus ancistrochaetus*	E	Current - Blair, Centre, Clinton, Cumberland, Dauphin, Franklin, Huntingdon, Lackawanna, Lehigh, Monroe, Perry and Union Counties. Historic - Northampton County
Small-whorled pogonia	*Isotria medeoloides*	T	Current - Centre and Venango Counties. Historic - Berks, Chester, Greene, Monroe, Montgomery, Philadelphia Counties

* *E = Endangered, T = Threatened*

Revised 7/13/95

** *Shortnose sturgeon is under the jurisdiction of the National Marine Fisheries Service*

U.S. FISH AND WILDLIFE SERVICE
315 SOUTH ALLEN ST., SUITE 322, STATE COLLEGE, PA 16801

FEDERALLY LISTED SPECIES THAT NO LONGER OCCUR IN PENNSYLVANIA*

COMMON NAME	SCIENTIFIC NAME	STATUS**	FORMER DISTRIBUTION
MAMMALS			
Delmarva Peninsula fox squirrel	*Sciurus niger cinereus*	E	mature forests of southeastern PA (Delaware and Chester Co.)
Eastern cougar	*Felis concolor couguar*	E	state-wide
Grey wolf	*Canis lupus*	E	state-wide
MOLLUSKS			
Dwarf wedge mussel*	*Alasmidonta heterodon*	E	Delaware River drainage
Fanshell*	*Cyprogenia stegaria*	E	Ohio River drainage
Orange pimpleback*	*Plethobasus striatus*	E	Ohio River drainage
Pink mucket pearly mussel*	*Lampsilis abrupta*	E	Ohio River drainage
Ring pink mussel*	*Obovaria retusa*	E	Ohio River drainage
Rough pigtoe*	*Pleurobema plenum*	E	Ohio River drainage
INSECTS			
American burying beetle	*Nicrophorus americanus*	E	state-wide
Karner blue butterfly	*Lycaeides melissa samuelis*	E	pine barrens, oak savannas (wild lupine habitat) (Wayne Co.)
Northeastern beach tiger beetle	*Cicindela dorsalis dorsalis*	T	along large rivers in southeastern PA
PLANTS			
Eastern prairie fringed orchid	*Platanthera leucophaea*	T	wet prairies, bogs (Crawford Co.)
Sensitive joint-vetch	*Aeschynomene virginica*	T	freshwater tidal marshes of Delaware river (Delaware and Philadelphia Co.)
Virginia spiraea*	*Spiraea virginiana*	T	along Youghiogheny River (Fayette Co.)
Smooth coneflower	*Echinacea laevigata*	E	serpentine barrens (Lancaster Co.)

---

* *It is possible that remnant populations of some of these species (indicated with an *) may still occur in Pennsylvania, however, there have been no confirmed sightings of these species for over 70 years.*

** *E = Endangered, T = Threatened*

The following is a partial list of additional species that no longer occur in Pennsylvania: moose, bison, lynx, wolverine, passenger pigeon, Bachman's sparrow, common tern, lark sparrow, tiger salamander, mud sunfish, longjaw cisco, lake whitefish, butterfly mussel, precious underwing moth, American barberry, small white lady's-slipper, etc, etc.

U.S. FISH AND WILDLIFE SERVICE
315 SOUTH ALLEN ST., SUITE 322, STATE COLLEGE, PA 16801

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Suite 322
315 South Allen Street
State College, Pennsylvania 16801-4850

November 21, 1995

Commanding Officer, Northern Division
Naval Facilities Engineering Command
Attention: Kurt Frederick, Code 202
10 Industrial Highway
Lester, PA 19113

Dear Mr. Frederick

This responds to the Notice of Intent published in the Federal Register (Vol. 60, No. 185, dated September 19, 1995) to prepare an environmental impact statement for proposed disposal and reuse of the Naval Air Warfare Center Aircraft Division, Bucks County, Warminster, Pennsylvania. These comments provide technical assistance only and do not represent the review comments of the Department of the Interior on any forthcoming environmental statement.

We recommend that all fish and wildlife habitats be identified and mapped early in the process. Alternatives proposed for disposal and reuse should be selected based upon their ability to avoid or minimize adverse impacts to these resources. Compensation for unavoidable adverse impacts to terrestrial and aquatic resources should be addressed through the mitigation process.

Based upon a soil survey map review, hydric soils are found in this area. We believe that wetlands may occur in the undeveloped project area. However, this should be confirmed by a survey done by someone familiar with the 1987 Corps of Engineers Wetland Delineation Manual. If wetlands exist on this site and development would be planned in the wetland, federal and/or state permits would be required.

Endangered Species

An initial review of the proposed project study area shows that except for occasional transient species, no federally listed or proposed threatened or endangered species under our jurisdiction are known to exist in the project impact area. Therefore, no Biological Assessment or further Section 7 consultation under the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) is required with the U.S. Fish and Wildlife Service. Should the project plans change, or if additional information on listed or proposed species becomes available, this determination may be reconsidered. A compilation of federally listed endangered and threatened species in Pennsylvania is enclosed for your information.

This response relates only to endangered or threatened species under our jurisdiction based on an office review of the proposed project's location. No field inspection of the project area has been conducted by this office. Consequently, this letter is not to be construed as

addressing other Service or Departmental concerns under the Fish and Wildlife Coordination Act or other legislation.

Thank you for the opportunity to comment at this early stage of planning. If you have any questions about our comments, please direct them to Bonnie Stump of my staff.

Sincerely,

Charles J. Kulp
Supervisor

Enclosure

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COMMON NAME	SCIENTIFIC NAME	STATUS*	DISTRIBUTION
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BIRDS			
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Peregrine falcon (American)	*Falco peregrinus anatum*	E	Entire state. Recent nesting in and around Philadelphia and Pittsburgh (Allegheny, Delaware, Philadelphia and Bucks Counties)
Piping plover	*Charadrius melodus*	E	Presque Isle (Erie County). Migratory. No nesting in Pennsylvania since mid-1950s
MAMMALS			
Indiana bat	*Myotis sodalis*	E	Summer range: possibly state-wide in suitable habitat. Only one known winter hibernaculum (south-central Pennsylvania)
MOLLUSKS			
Clubshell mussel	*Pleurobema clava*	E	French Creek and Allegheny River watersheds; Clarion, Crawford, Erie, Forest, Mercer and Venango Counties
Northern riffleshell	*Epioblasma torulosa rangiana*	E	French Creek and Allegheny River watersheds; Crawford, Erie, Forest, Venango and Warren Counties
PLANTS			
Northeastern bulrush	*Scirpus ancistrochaetus*	E	Current - Blair, Centre, Clinton, Cumberland, Dauphin, Franklin, Huntingdon, Lackawanna, Lehigh, Monroe, Perry and Union Counties. Historic - Northampton County
Small-whorled pogonia	*Isotria medeoloides*	T	Current - Centre and Venango Counties. Historic - Berks, Chester, Greene, Monroe, Montgomery, Philadelphia Counties

* *E = Endangered, T = Threatened* *Revised 7/13/95*

** *Shortnose sturgeon is under the jurisdiction of the National Marine Fisheries Service*

U.S. FISH AND WILDLIFE SERVICE
315 SOUTH ALLEN ST., SUITE 322, STATE COLLEGE, PA 16801

FEDERALLY LISTED SPECIES IN PENNSYLVANIA

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* *E = Endangered, T = Threatened* *Revised 7/13/95*

** *Shortnose sturgeon is under the jurisdiction of the National Marine Fisheries Service*

U.S. FISH AND WILDLIFE SERVICE
315 SOUTH ALLEN ST., SUITE 322, STATE COLLEGE, PA 16801

Revised 6/14/94

PENNSYLVANIA NATURAL DIVERSITY INVENTORY
REVIEW RESPONSE

REQUESTER: Gerrie O'Brien
TAMS Consultants, Inc.
300 Broadacres Drive
Bloomfield, NJ 07003

PROJECT: Naval Air Warfare Center Reuse

QUADRANGLE: *Hatboro*

In response to your request of August 17, 1995 an area was reviewed for the presence of natural resources of special concern using the Pennsylvania Natural Diversity Inventory (PNDI) information system. We do not anticipate any impact on rare, threatened or endangered species at this location.

Chris Klinedinst Firestone — 9-22-95
Chris Klinedinst Firestone, PNDI Staff — Date

PNDI is a site specific information system which describes significant natural resources of Pennsylvania. This system includes data descriptive of plant and animal species of special concern, exemplary natural communities and unique geological features. PNDI is a cooperative project of the Department of Conservation and Natural Resources, The Nature Conservancy and the Western Pennsylvania Conservancy. This response represents the most up-to-date summary of the PNDI data files. However, an absence of recorded information does not necessarily imply actual conditions on-site. A field survey of any site may reveal previously unreported populations. PNDI is partially funded through contributions to the Wild Resource Conservation Fund.

Be advised that legal authority for Pennsylvania's biological resources resides with three administrative agencies. The enclosure titled PNDI Management Agencies, outlines which species groups are managed by these agencies. If you have questions concerning this response or the PNDI system, please contact our office at 717/787-3444 or write:

DCNR - Bureau of Forestry - PNDI
P.O. Box 8552
Harrisburg, PA 17105-8552

APPENDIX D

RESULTS OF NOISE MONITORING SURVEY

Table D-1
Site 1: 1430 Second Street Between Street Road and Bristol Road

	L_{eq}	L_{90}	L_{50}	L_{10}	L_1
AM Peak	65	55	64	68	74
Midday	64	53	61	68	72
PM Peak	65	55	62	68	73
Pre Mid	61	50	59	63	70

Table D-2
Site 2: 440 Bristol Road Between Whitney Road and Second Street

	L_{eq}	L_{90}	L_{50}	L_{10}	L_1
AM Peak	65	54	64	68	74
Midday	63	53	62	66	72
PM Peak	64	54	63	67	73
Pre Mid	60	49	58	63	69

Table D-3
Site 3: 236 Bristol Road Between Hatboro Road and Jacksonville Road

	L_{eq}	L_{90}	L_{50}	L_{10}	L_1
AM Peak	64	53	63	67	73
Midday	63	52	62	66	74
PM Peak	65	54	63	68	75
Pre Mid	62	50	60	64	71

Table D-4
Site 4: 1230 Jacksonville Road Between Bristol Road and Street Road

	L_{eq}	L_{90}	L_{50}	L_{10}	L_1
AM Peak	64	54	63	67	75
Midday	63	52	62	66	73
PM Peak	65	54	64	68	76
Pre Mid	63	50	60	66	73

Table D-5
Site 5: 375 Street Road Between Newton Road and Centennial Road

	L_{eq}	L_{90}	L_{50}	L_{10}	L_1
AM Peak	66	56	65	69	77
Midday	64	52	62	67	75
PM Peak	67	55	65	70	79
Pre Mid	64	62	63	68	76

Table D-6
Site 6: Intersection of Lowell Road and Street Road

	L_{eq}	L_{90}	L_{50}	L_{10}	L_1
AM Peak	65	55	64	68	76
Midday	63	53	62	66	74
PM Peak	65	65	64	69	77
Pre Mid	63	51	60	65	74

APPENDIX E

AIRCRAFT NOISE ANALYSIS ASSUMPTIONS

E.1 Aircraft Noise Analysis Assumptions

An assumption was made that operations at night (those operations occurring between 10:00 pm and 7:00 am) would be limited assuming the following percentages of total activity occurring at night:

- single-engine piston, 1 percent;
- multi-engine piston, 1.5 percent; and
- turboprop (including cargo), 20 percent.

It is assumed all turboprop activity is non-local since there are no forecast based turboprops. In addition, turboprop activity is assumed to be comprised almost entirely of on-demand cargo operations (90 percent cargo and 10 percent general aviation itinerant). All operational figures have been rounded to the nearest 50 for noise estimation purposes.

The FAA preferred computer model, Integrated Noise Model (INM, version 5.0), was utilized to predict the noise impact from the forecasted mid-range aircraft operations. INM was developed by the Federal Aviation Administration (FAA) as a planning tool for determining approximate aircraft noise levels at and around airport. The model incorporates a database of known sound levels from various aircraft and uses mathematical processes which consider the degradation of sound energy over distance.

The model requires inputs such as:

- annual average daily operational characteristics at airport, including the type of aircraft and the number of aircraft operations;
- runway(s) layout and its utilization rates;
- flight track(s) configuration and its usage.

The model output comes in the form of noise contour plots, graphs, and tabular information regarding the noise levels at specific receptor locations.

Flight track usage (Table E-1) and airport site-specific parameters (Table E-2) were incorporated in the modeling.

Table E-1

Assignment of Aircraft Operations By Type To Arrival & Departure Flight Tracks

Track No.	Aircraft % Usage
A1	SEP = 20%
	MEP = 40%
	TUR = 70%
A2	SEP = 40%
	MEP = 40%
	TUR = 20%
A3	SEP = 40%
	MEP = 20%
	TUR = 10%
Totals	SEP = 100%
	MEP = 100%
	TUR = 100%
D1	SEP = 30%
	MEP = 25%
	TUR = 40%
D2	SEP = 30%
	MEP = 25%
	TUR = 20%
D3	SEP = 20%
	MEP = 25%
	TUR = 20%
D4	SEP = 20%
	MEP = 25%
	TUR = 20%
Totals	SEP = 100%
	MEP = 100%
	TUR = 100%

Table E-2

NAWCAD Site Information

Information Needed	Finding
Temperature	53 Fahrenheit
Latitude	40.1981 N
Longitude	75.0754 W
Elevation	375 MSL
Average Headwinds	9.6 knots
Change in Average Headwinds	none
Displaced Thresholds	none
Glide Slope	3.5 degrees
Threshold Crossing Height	75 feet
Atmospheric Pressure	29.66

APPENDIX F

COMMENT LETTERS

(Comment summaries appear in Chapter 10)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
841 Chestnut Building
Philadelphia, Pennsylvania 19107-4431

MAR 07 1997

Mr. Kurt C. Frederick
Northern Division
Naval Facilities Engineering Command
10 Industrial Highway
Lester, PA 19113

Re: Disposal and Reuse of Naval Air Warfare Center Aircraft Division, Warminster, Pennsylvania

Dear Mr. Frederick:

In accordance with the National Environmental Policy Act (NEPA) of 1969 and Section 309 of the Clean Air Act, EPA has reviewed the Draft Environmental Impact Statement (DEIS) for the above referenced project. EPA has assigned this DEIS a rating of EC-2 (Environmental Concerns/Insufficient Information) based on the following comments. A copy of EPA's ranking system is enclosed for your information.

Of primary concern is the environmental and health impacts associated with the Naval Air Warfare Center Aircraft Division (NAWCAD) facility and any residual impacts that may affect reuse alternatives. EPA is interested in knowing the extent to which NAWCAD has corrected any environmental/health issues and its future responsibility for correcting existing problems both before and after reuse alternatives are implemented. The Final Environmental Impact Statement (FEIS) needs to clarify and specify the Navy's actions, intentions and responsibility in this endeavor. Therefore, the comments to follow focus on this main issue. (1)

- Page 3.7-2 and 3.7-3. The DEIS did not address the conditions of the unnamed tributaries of the Little Neshaminy and Pennypack Creeks where treated effluent and stormwater drains into and its relation to the increased demand/usage proposed in the Reuse Plan. Also, since the two main storm sewer systems at NAWCAD "...are considered inadequate for a two year storm event" and since there will be 340 acres of increased impervious surfaces, the impacts on the stormwater sewer systems and these creeks should be evaluated. (2)

- Page 3.9-1 and 4.9-1 state that "The extreme eastern portion of the site has not been developed or used by NAWCAD and is currently farmland." Any farmland in the study area should be evaluated and classified. Prime and unique farmland impacted by the project should be delineated regardless of the current state of cultivation. These efforts should be coordinated with the (3)

Soil Conservation Service. Impacts to prime and unique farmland should be avoided. However, if this is not possible, the FEIS should explain the implications of developing the prime and unique agricultural land with respect to the Farmland Protection Policy Act as well as describe the mitigation measures for those impacts.

(4) - Page 3.10-1. The heading of this subsection (Hazardous Waste Remediation) should more appropriately read "Hazardous Substance and Petroleum Remediation".

It is indicated that "...information contained in this subsection was based upon the Environmental Baseline Survey (EA Engineering, 1995), the Base Realignment and Closure Cleanup Plan (BRAC Cleanup Team and EA Engineering, 1995), and the CERFA report prepared for NAWCAD (US Navy, 1993)." While these documents provide certain information regarding the hazardous substance remediation activities at NAWCAD, there are voluminous additional documents which describe these activities in more detail. One source of these additional documents is the CERCLA Administrative Record for NAWCAD, which provides support documentation for CERCLA response actions being conducted at NAWCAD. The CERCLA Administrative Record Index should be referenced in the text of this section and included in the list of references. The index should be updated as needed to include any recent documents which have been released to the public (e.g., local municipalities or authorities) for review and comment. (5) In addition, the Navy is currently conducting significant additional activities addressing hazardous substances and petroleum as part of the ongoing Environmental Baseline Survey (EBS) process. The nature of this work should be described, e.g., work currently being performed for the Navy by EA Engineering.

- Page 3.10-2. The text in this section (Installation Restoration Program) should be revised to reflect the current status of this program. (As currently written, the description is over a year out of date.) For example, it should be noted that contaminant releases within an area defined as Area D have been determined to have contaminated groundwater and that (6) contaminated groundwater attributable to Area D and potential contaminant sources within Area D are currently being investigated as required by CERCLA. The location of Area D should be indicated on a figure and workplans describing ongoing investigations of Area D listed in the CERCLA Administrative Record Index which should be referenced in the FEIS.

(7) The references to a "newly identified Area 9" should be deleted. This is a reference to an area which is now part of Area D and is being investigated per workplans discussed above.

The status of IRP activities, as described in Table 3.10-1, is incomplete. The information appearing in this table under "Status" addresses only groundwater activities and includes no information regarding the status of activities addressing disposed waste or soil within these sites. The table should be revised to reflect the status of activities addressing these other media. It should also be indicated that final remedies must still be selected for all contaminated groundwater. (8)

- Page 3.10-2 states that "...the Navy initiated sampling of residential, municipal, and commercial wells in the vicinity of NAWCAD, at USEPA's request, to determine if any groundwater used by off-base properties may have been contaminated by past Navy waste disposal activities. The sampling results suggest that Area B and IRP Sites 4 and 8 (Area C) are potential contaminant sources along with an off-base source." In fact, the sampling results suggest that neither Sites 4 or 8 are a potential source and that there has instead been a contaminant release within Area C at a currently unknown location. (9)

- Page 3.10-4 (Compliance Program Status). Under Polychlorinated Biphenyls (PCBs), it should be noted that additional investigations are planned to confirm that cleanup of past PCB releases at NAWCAD have met TSCA cleanup standards. (10)

- Page 3.10-7 states that "...the UST at Building 16 was replaced following the loss of approximately 975 gallons of No. 2 fuel oil. A soil and ground investigation failed to identify any residual contamination." Considering the quantity of oil lost, a more thorough description of this incident should be disclosed in the FEIS. In particular, identify the location of Building 16 and the surrounding areas on a map, specify the date the leak was found, the date the investigation took place, and the type of investigation(s) undertaken. Of particular concern, is any potential impact to the wells. (11)

- Page 3.10-8 states that Buildings 2, 3, 4, 80, and 108 were identified as having elevated levels of radon. The FEIS should identify any plans for remediation. Of primary interest, is Building 108 which is intended to be kept intact and is currently leased by Penn State. (12)

- Page 3.10-8 states that Buildings 1, 2, 3, 4, 7, and 16 were tested for lead concentrations. "...some lead-based paint (LBP) was present in the buildings at NAWCAD, but insufficient data were available to define the true extent." To ensure that there are no negative health impacts, the true extent of LBP should be defined. Why were only a few buildings selected for testing and not all buildings? The DEIS also states that "A more detailed study was recommended, but LBP is not considered to be a hazard unless chipping, peeling, or dusting." However, there is (13)

no information provided regarding the condition of potential LBP and/or the extent of the deterioration of such paint. In addition, depending on the future of these buildings (reuse, renovation, demolition), the Navy should address its responsibility in this area.

The DEIS also states that "The mounds for the small arms range and one of the (two) aircraft ranges have been demolished. A trench exists at the site of the other aircraft range, allegedly formed by the action of projectiles penetrating the ground. These three sites, due to the nature of their past use, are suspected of containing potentially high levels of lead." These sites should be described fully and identified on a map as well as any planned investigation and/or mitigation measures sited. (14)

- Page 3.10-9 states "The two NPL sites, identified as Fisher & Porter and Raymark, and the three other CERCLIS sites are unlikely to have an impact on NAWCAD." The locations of these sites in relation to the NAWCAD facility should be noted on a map. Also, on what basis is it determined that these sites will not have an impact on NAWCAD? (15)

- Page 4.2-9 references Table 2-4 as showing the property taxes ascribed to some of the key elements of the proposed redevelopment in the Reuse Plan. Table 2-4 is the wrong table referenced. (16)

- Page 4.2-10 states "Assumptions used earlier in Section 4.2.3...". Section 4.2.3 is the wrong section referenced.

- Page 4.3-6 states that Warminster Township submitted a request for a multi-use recreation facility. This plan would be integrated with existing Munro and Werner town parks. These parks should be identified on a map as well as where the multi-use recreation facility is proposed. (17)

- Page 4.10-1 (Petroleum and Hazardous Substances - Reuse Plan). It is indicated that Section 120(h)(3) of CERCLA [more specifically, Section 120(h)(3)(B)], requires that, in the case of property which requires a remedial action to protect human health and/or the environment, that "...deeds to transfer must contain...a covenant warranting that approved remedial design has been completed and the remedy has been demonstrated to USEPA to be operating properly and successfully...". It should be noted that this section of CERCLA generally addresses only those cases where the remedial action consists of long-term pumping and treating of groundwater. (18)

In the case of other types of hazardous substance cleanup, Section 120(h)(3)(A)(ii)(I) of CERCLA requires the deed to contain a covenant warranting 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...". Significantly, the 1997 Defense Authorization Act has recently amended Section 120(h)(3) by adding Section 120(h)(3)(C), which provides that the requirement of Section 120(h)(3)(A)(ii)(I) at NAWCAD may be deferred by the EPA Regional Administrator, with the concurrence of the Governor, if certain conditions are met. This provision provides another scenario (in addition to the case of long-term pumping and treatment of groundwater) where a remedial action does not necessarily have to be completed prior to property transfer.

It is indicated that "...due to recent legislative changes, not all of NAWCAD is included in the CERCLA/SARA program...". It is not clear what the subject "legislative changes" are or what constitutes "the CERCLA/SARA program". These phrases should be clarified. It should be made clear that those portions of NAWCAD (19) where a hazardous substance release has been documented are part of the CERCLA National Priorities List (NPL) site and that studies are underway to fully determine the extent of the affected property. On the other hand, it should also be made clear that the requirements of Section 120(h)(3) of CERCLA apply to all NAWCAD property targeted for transfer and that the Navy plans to provide EPA an opportunity to comment on any Finding of Suitability Transfer for such property.

It is also indicated that "... the USEPA has no enforceable agreement with the Navy regarding the performance of remedial investigations or actions under CERCLA at those areas of NAWCAD (20) which are not included in the program...". This statement requires clarification. The Federal Facility Agreement for NAWCAD signed on September 20, 1990, provides the EPA an opportunity to comment on any CERCLA remedial investigation or remedial action which addresses all or part of the CERCLA NPL site and provides a mechanism for resolving any dispute between the Navy and the EPA regarding the nature of such activities.

It is indicated that "...the Navy is conducting all remedial activities in accordance with CERCLA and the National Contingency Plan...". Commitments to conduct CERCLA remedial actions to address hazardous substance releases of concern at NAWCAD are documented in CERCLA Records of Decision issued jointly by the Navy and the EPA. At this time, numerous CERCLA Records of Decision have yet to be issued and all necessary remedial actions have yet to be performed. Therefore, it is more appropriate to state that the "...the Navy plans to conduct..." such activities, if this is the case.

It is stated that "...CERCLA and/or RCRA cleanup requirements will be met prior to transfer...". Again, per the comments above, this may not necessarily be the case. Generally, unless the possibility of property transfer prior to cleanup can be completely ruled out, the report should reflect the potential for property transfer prior to completion of all necessary CERCLA remedial action. Given the conditions for "cleanup deferral" outlined in Section 120(h)(3)(A)(ii)(I) of CERCLA, this potential appears to be most significant in the case of contaminated groundwater which requires a remedial action. As a result, the report should at least recognize the possibility that, per CERCLA 120(h)(3), certain property may potentially be transferred prior to the implementation of a remedy, e.g., a remedy for contaminated groundwater under the property.

(21) The 1996 BRAC Cleanup Plan (BCP) is referenced and priorities in the BCP for 1996 identified. However, the 1997 BRAC Cleanup Plan is targeted for release by March 31, 1997. The 1997 BCP should be discussed and/or referenced in the FEIS.

It is indicated that "...while the most critical environmental problem at NAWCAD is the groundwater contamination, it is recognized that reuse can proceed concurrently with groundwater cleanup, primarily through leasing facilities...". Again, this statement should be clarified to reflect the fact that transfer of property could also potentially proceed prior to initiating or completing a remedy for groundwater under a parcel. It should be noted that in the case of leasing or transfer of property with contaminated groundwater, that provisions would have to be incorporated in a lease or deed as necessary to notify the lessee or new owner that treatment of the water may be required prior to use.

General Comments:

(22) - The environmental impact of the reuse, lease or transfer of NAWCAD property on local and regional water supply has not been considered. In addition, the environmental impact (e.g., impact on local and regional water supply) of transferring the property prior to the initiation or completion of remedial actions for contaminated groundwater attributable to NAWCAD has not been considered. These may be significant oversights in that reuse of NAWCAD property may result in new or increased use of groundwater on or adjacent to NAWCAD property. The migration of the subject contaminated groundwater to new or existing water supply wells cannot be ruled out. In addition, groundwater underlying Areas A and D and certain downgradient off-base property requires treatment prior to use to remove contaminants attributable to NAWCAD. At this time, neither containment nor

treatment of contaminated groundwater attributable to Areas A or D has been initiated and no decision has been made to restore (where practicable) the subject contaminated groundwater to beneficial use.

(23) - EPA is concerned with the cumulative impacts associated with increases in traffic volumes, air quality, and noise impacts on the neighboring communities as a result of the Reuse Plan.

(24) In particular, the DEIS projects that with the Reuse Plan, traffic volume will increase substantially. However, the DEIS does not adequately address remedies to those arteries already in need of improvement. The DEIS states that "The proposed Reuse Plan would also provide additional secondary access points to the site. In addition to the existing access along Jacksonville Road, new entrances along Bristol Road and Street Road are anticipated." Projected secondary access points should be identified as well as new entrances along Jacksonville, Bristol and Street Roads.

(25) Feeding on traffic use, is the quality of air resulting from increased traffic and idle exhaust emissions due to the poor traffic flow and projected increased volume. The EIS states that "Background CO levels at the project are not available." Considering the difference in traffic volume from existing to future conditions, it may be worth collecting air monitoring data to be used in future projections. Also, it is not certain whether the air monitoring data collected for the city of Philadelphia during 1993 is an accurate benchmark to have been used especially since the data was conservatively used.

(26) With regards to noise impacts, the DEIS seems to focus noise related impacts during the build years. Noise related to construction will be temporary, but what impacts will result from the proposed reuse alternatives (i.e. impacts to residential areas due to multi-business complex, industrial/business, stadium).

(27) The DEIS states that "...noise levels would increase less than or equal to one decibel from the no action to the Reuse Plan alternative." On what basis can it be assumed that noise levels would increase by only one decibel; this seems to be a low figure."

(28) - The DEIS references various buildings and roads that were not indicated on a map. Their location depicted on a map would be helpful in developing a clearer picture of potential environmental/health impacts. They are buildings 3, 4 - hangar, small warehouses and shop buildings, 7 - EM-CPO Club, 16 - medical clinic, 80, 87, 95, 99, 109 - unaccompanied enlisted personnel housing, 125, 138, 349 - recreational facilities, naval exchange buildings, Quarters A and B old farmhouse, 361 and 401.

The Roads which need to be identified are: Blair Mill, Davisville, Kirk, Lowell, Newtown, Orion, Whitney and York.

Thank you for the opportunity to review and comment on this project. If we can be of further assistance, please contact Karen Del Grosso at 215-566-2765.

Sincerely,

Roy E. Denmark, Jr.
NEPA Program Manager

Enclosure

COMMENTOR F-1

SUMMARY OF RATING DEFINITIONS AND FOLLOW UP ACTION*

Environmental Impact of the Action

LO--Lack of Objections
The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC--Environmental Concerns
The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

EO--Environmental Objections
The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU--Environmentally Unsatisfactory
The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the CEQ.

Adequacy of the Impact Statement

Category 1--Adequate
The EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2--Insufficient Information
The draft EIS does not contain sufficient information for the EPA fully assess the environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

Category 3--Inadequate
EPA does not believe that draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

*From EPA Manual 1640 Policy and Procedures for the Review of the Federal Actions Impacting the Environment.

COMMENTOR F-2

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
WANAMAKER BUILDING, 100 PENN SQUARE EAST
PHILADELPHIA, PENNSYLVANIA 19107-3390

REPLY TO
ATTENTION OF

Environmental Resources Branch

Mr. Kurt C. Frederick
Northern Division
Naval Facilities Engineering Command
10 Industrial Highway
Lester, Pennsylvania 19113

Dear Mr. Frederick:

This is in response to your January 3, 1997 memo regarding the Draft Environmental Impact Statement for the Disposal and Resuse of Naval Air Warfare Center Aircraft Division Warminster, Pennsylvania.

Under current Federal regulations (33 CFR Parts 320 through 330), a Department of the Army permit is required for work or placement of structures in navigable waters of the United States and/or the discharge of dredged or fill material into waters of the United States including wetlands. The Regulatory Branch will have concerns with any Resuse Plan that effects wetlands. Additional information detailing the nature of the activities in and around waters and wetlands would be required to determine if there is a significant effect on these resources. 1

If a Department of the Army Permit is necessary for this project, the Corps would be concerned with impacts of the proposed project to water resources, including water quality; impacts to wetlands, and potential alternatives that would minimize and/or eliminate wetlands involvement; proposed handling of excavated material in aquatic and wetlands areas; the occurrence, if any, of endangered species within the project area; and potential impacts to cultural resources within the project area.

Please be advised that the presence and extent of waters and wetlands must be identified if any activities associated with the Reuse Plan should impact these resources. If you have any questions regarding the jurisdiction and permitting procedures, please contact the Regulatory Branch at (215) 656-6733.

Please be aware that you should also contact the Pennsylvania Department of Environmental Protection to determine state permits that are needed.

If you have any questions regarding this letter or, have additional information to provide on this matter, please contact Nathan Dayan of the Environmental Resources Branch at (215) 656-6562 or Nathan=S=Dayan%pl-e%nap@vines.nap.usace.army.mil.

Sincerely,

for John A. Burnes

Robert L. Callegari
Chief, Planning Division

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
Custom House, Room 244
200 Chestnut Street
Philadelphia, Pennsylvania 19106-2904

IN REPLY REFER TO:

February 24, 1997

ER-97/0030

Mr. Robert K. Ostermueller, Head
Environmental Planning
Naval Facilities Engineering Command
10 Industrial Highway, Mail Stop #82
Lester, PA 19113-2090

Dear Mr. Ostermueller:

This is in response to the request for the Department of the Interior's (Department) comments on the Draft Environmental Impact Statement (DEIS) for Disposal and Reuse of Naval Air Warfare Center, Aircraft Division (NAWCAD), Warminster, Pennsylvania.

General Comments

The Reuse Plan identifies various parcels of the installation which would be appropriate for public park and recreational use and open space. These areas include over 246 acres for the development of active recreation areas and adjacent open space.

Specific Comments

Federal Lands-To-Parks Program

Certain portions of NAWCAD have been identified in the document as possessing potential for public park and recreational use. Under Section 203(k)(2) of the Federal Property and Administrative Services Act (FPASA) of 1949, as amended by Public Law 91-485, Federal real properties which have been determined to be surplus to the needs of the Federal government may be conveyed to State and local governments for park and recreational purposes. The Federal Lands-to-Parks Program, assists State and local governments in applying for property suitable for park and recreational purposes. These properties may be assigned to the Secretary of the Interior for further transfer by the National Park Service's (NPS) Federal Lands-To-Parks Program at up to 100 percent discount from fair market value. To ensure permanent protection of the resources, these properties must be dedicated in perpetuity for public park and recreational purposes.

(1) The Department recommends that the final environmental impact statement include a specific reference that the identified park and recreation acreage would be assigned to the NPS under Section 203(k)(2) of the FPASA for further conveyance to a State or local agency for public park and recreation purposes in perpetuity. The NPS will continue to assist the Townships of Warminster and Northampton or the Federal Lands Reuse Authority (whichever is the applicant) in applying for parkland through the Federal Lands-to-Parks Program.

Fish and Wildlife Resources

The DEIS indicates that a wetland delineation has not been performed. It further states that National Wetland Inventory (NWI) maps indicate "that a small acreage of wetlands (approximately one to five acres) exists on the site. A formal wetland delineation would be required to determine the exact acreage of on-site wetlands." It is important to note that NWI maps are not all-inclusive, and that only an on-the-ground wetland delineation can accurately quantify and describe existing wetlands. The DEIS cannot accurately determine the impacts to fish and wildlife resources under any alternative (except for the No Action (2) alternative) without an accurate delineation. Therefore, the Department requests that a formal on-the-ground wetland delineation, approved by the Army Corps of Engineers, be conducted. When this is done, Department can completely address impacts of the alternatives to fish and wildlife resources.

Fish and Wildlife Coordination Act

The DEIS indicates that Section 404 permits from the U.S. Army Corps of Engineers may be needed to conduct activities for project construction. In reviewing the application(s) for such a permit(s), the Fish and Wildlife Service (FWS) may concur, with or without stipulations, or object to the proposed work, depending on project effects on fish and wildlife resources which may be identified and evident at that time.

Further Coordination on Technical Issues

For information on the Federal Lands-To-Parks Program, please contact Mr. Bill Huie, NPS, Southeast Region, 100 Alabama Street, S.W., Atlanta, Georgia 30303 or telephone 404-562-3175. If you have any questions about the wetland delineation or Coordination Act issues, please contact Mrs. Maria Tur at the FWS's Eastern Pennsylvania Field Office at (717) 894-1275.

Thank you for the opportunity to review and comment on this project.

Sincerely,

Don Henne

Don Henne
Regional Environmental Officer

Pennsylvania Department of Environmental Protection

Rachel Carson State Office Building
P.O. Box 8555
Harrisburg, PA 17105-8555
January 21, 1997

Bureau of Watershed Conservation 717-787-2529

Mr. Kurt Frederick (Code 202)
Northern Division
Naval Facilities Engineering Command
10 Industrial Highway MSC 82
Lester, PA 19113

RE: DEP File No. CZ7:FDP

Dear Mr. Frederick:

The Pennsylvnaia Coastal Zone Management (CZM) Program has reviewed the information received in this office on January 8, 1997, concerning the Draft Environmental Impact Statement for the Disposal and Reuse of the Naval Air Warfare Center - Aircraft Division - Warminster, Pennsylvania (December 1996).

We concur with your findings that the disposal and reuse of this facility is located outside of Pennsylvania's coastal zones and will not impact upon them.

Please note that this determination pertains only to CZM federal consistency review requirements, and does not constitute a waiver of further Department of Environmental Protection's review or other Departmental permits.

Sincerely,

Lawrence J. Toth
Coastal Zone Management Section
Division of Watershed Support

COMMENTOR L-1

BUCKS COUNTY Planning Commission

Robert E. Moore, *Executive Director*

COUNTY COMMISSIONERS:
Chairman, CHARLES H. MARTIN
MICHAEL G. FITZPATRICK
SANDRA A. MILLER

PLANNING COMMISSION:
Chairman, Susanne McKeon
Vice Chairman, Harold W. Tesno, Sr.
Secretary, Robert H. Grunmeier
Daniel K. Cook
Alan R. Fetterman
Geryl D. McMullin
James J. Stoeckhert
Joseph G. Szafran, Jr.
Clifford J. Worthington

February 5, 1997

Kurt Frederick (Code 202)
Northern Division
Naval Facilities Engineering Command
10 Industrial Highway, MSC 82
Lester, PA 19113

RE: Comments on the Draft Environmental Impact Statement (DEIS), December 1996, for the Disposal and Reuse, Naval Air Warfare Center, Aircraft Division, Warminster, PA

Dear Mr. Frederick:

The following comments on the subject DEIS were prepared by the staff of the Bucks County Planning Commission (BCPC) and approved by the BCPC Board.

The Proposed Action and Alternatives: The Reuse Plan (Preferred Alternative) was formulated in March 1995 by the Federal Lands Reuse Authority (FLRA), the agency empowered to carry out the business of redeveloping NAWCAD (e.g., management, leasing, property improvements, future planning). The two other alternatives presented in the DEIS are the Residential Alternative and the Aviation Alternative. However, neither of those has a sponsor at this time. Based on the assumptions and the information provided in the DEIS, we concur with the following general assessment of potential impacts:

1

Lowest Impact:	Residential Alternative
Medium Impact:	Reuse Plan
Highest Impact:	Aviation Alternative

Summary Impact Matrix: Each evaluation parameter in the Summary Impact Matrix (SIM) and the corresponding report text was reviewed and, where appropriate, the following comments express our concerns for the subject parameter.

Land Use: We generally concur that both the Reuse Plan and the Residential Alternative are compatible with existing on-base and surrounding land uses. Both alternatives would, of course, create future impacts which, overall, would be more intensive than past uses because they would increase residential and industrial/business uses to higher than current levels. The Aviation Alternative would, as the narrative states, raise issues of compatibility with surrounding residential land uses.

2

As indicated on page 4.1-2, the No Action Alternative (i.e., a partially vacated facility with some remaining residential and industrial/business uses) "would not be consistent with existing land uses in central Bucks County and continued abandonment could have a blighting influence on the surrounding area." Although no mitigation measures are recommended in Section 5 regarding land use for any of the action alternatives, the individual municipalities need to be ready to address upcoming comprehensive planning, land use, and zoning issues which are sure to arise from any of the action alternatives.

3

Socioeconomics: The SIM presents an evaluation summary of each alternative compared against the No-Action Alternative (which is stated on page S-3 as "the future baseline condition against

which the impacts of the proposed action and its alternatives are measured"). The comparison is somewhat confusing because it shows the amount of new homes, additional population, new jobs, and total earnings in terms of additional gross figures rather than net increases (or decreases) when compared to what existed at the base prior to closure. 4

Also, in Section S.3.2 of the Executive Summary, the discussion of proposed new homes and new jobs indicates that for the Reuse and Residential alternatives the proposed increases "would be consistent with, and well within" the anticipated growth of "the region" (which is assumed from the context to be Bucks County). Such a statement can be misleading because, as is further explained in the body of the report, the most immediate impact of new homes and new jobs is expected to be in the immediately surrounding municipalities. For example, looking at Ivyland Borough, the BCPC estimates an increase of 18 homes and no population increase in the borough by 2010. However, the Reuse and Residential alternatives propose increases of up to 200 homes and up to 600 homes, respectively. We recommend that an economic impact analysis be conducted to assess the potential economic benefits of each alternative on the economy of each community. 5

It should be noted that the projections in the *Bucks County Continuum* were done before the Reuse Plan and did not account for the potential impacts of the Reuse Plan. Also, on Page S-14, the first paragraph under "Reuse Plan" states a number of 30,000 units. The number of projected units should be 30,000 for year 2000 and 60,000 for 2010. 3

Community Facilities: The SIM indicates that for any of the action alternatives there would be "no major adverse impacts . . . in meeting anticipated growth in demand for services" and "(b)enefits would be derived in the region from increased employment and income." While the second statement appears reasonable, we are not convinced by the first statement. 1

For example, the analysis of the potential impact on schools raises some concern. We recognize that predicting the distribution of school-age children among the three immediately adjacent school districts (Centennial, Central Bucks, Council Rock) is a challenge. Most of the assumptions made in the study analysis of school impacts appear to be sound. However, we question the assumption that the new students expected to be generated from each action alternative would be assimilated into the respective school districts at an even annual pace (e.g., 152 students into Centennial over 20 years equals 7.6 students per year, which appears to be a small impact). Another assumption that concerns us is the distribution percentages among the three school districts (presented as total numbers of students in Tables 4.3-3, 4.3-5, and 4.3-6) as follows:

	Reuse Plan	Residential Alternative	Aviation Alternative
Centennial	152 (11%)	218 (16%)	227 (11%)
Central Bucks	675 (49%)	615 (46%)	1,009 (49%)
Council Rock	552 (40%)	503 (38%)	824 (40%)

Section 5 of the report (page 5-1) states that "(n)o significant environmental impacts have been identified and therefore no mitigation is required." While this may be true, we recommend that the assumptions and the projected numbers regarding community facilities and services be closely reviewed by the respective school district administrators and municipal managers, and that their input be considered carefully before production of the final EIS. We also recommend that the EIS contain, or recommend, a fiscal impact analysis to further assess the impact of each alternative on the individual school districts and the other governmental service sectors in each municipality.

Transportation: It is obvious that roadway improvements would be necessary to mitigate the traffic impacts caused by any of the action alternatives. Even the No Action Alternative is not immune from continued traffic problems. In fact, the study findings indicated that "despite the closure of NAWCAD, background traffic growth and other nearby developments would cause further degradations in Level of Service (LOS) at the intersections studied."

We have the following specific comments regarding the transportation section of the Executive Summary text.

- Background Growth Rates -- According to the DEIS, an annual growth rate of one percent was assumed to account for general traffic growth in the area. However, according to traffic count information for the area roadways, the annual traffic growth rate ranges between two and three percent. Therefore, it is recommended that the DEIS utilize a background traffic growth rate of at least two percent. (8)

- Trip Generation – According to the DEIS, the projected trip generation for the site is projected to be as low as 18,051 daily trips for the Residential Alternative and as high as 27,044 daily trips for the Aviation Alternative. Furthermore, the study indicates that the impact on the local roadway network will be that levels of service for all intersections in the study area will fail no matter which alternative is chosen. However, from a transportation standpoint, we feet the best development alternative would be the option which would provide a range of uses at densities which would support public transit and also accommodate recreation, shopping and journey to work trips generated by uses within the site. Obviously, all alternatives will generate off-site traffic. However, the alternative which can accommodate the highest level of internal trips would have the least impact on the surrounding roadway network. (9)

- Public Transportation -- It is recommended that the site be developed in a manner that is conducive to sustaining the use of public transportation. With the integration of public transportation, amenities such as well-lit bus shelters, bike racks, and bus turnouts should be provided as the site is developed. Coordination and consultation with transit planners and operations engineers at SEPTA is strongly advised. (10)

(11) The last paragraph on page 5-1 should identify the first intersection as Bristol Road and *Hatboro* Road, not "Bristol Road and Jacksonville Road" as is written.

Infrastructure:

- Water Supply: We recommend adding the following statement: "The development of any new well(s) shall be done in accordance with the Pennsylvania Safe Drinking Water Act, as amended." Also, a wellhead protection program should be established for any new wells or for wells transferred to municipal ownership, consistent with the *Bucks County Water Supply Plan and Wellhead Protection Study* (1996). Specifically, such a program would require, as a minimum, municipal ownership of land within a radius of 100 feet of the wellhead; however, a radius of 400 feet is recommended. (12)

- Stormwater System: We recommend adding the following statement: "Any new stormwater management facilities shall be developed in accordance with municipal regulations governing such systems and, if applicable, in accordance with the requirements of the *Little Neshaminy Creek Watershed Stormwater Management Plan*." (13)

Natural Resources: Regarding the floodplain discussion on page 3.9-2, it should be noted that while the FIRM maps do not show any areas inside the boundaries of NAWCAD, FEMA's floodplain surveys and subsequent mapping stopped at the NAWCAD boundary because it was a military reservation. This does not necessarily mean that there are no floodplain areas on the site. Thus, the statements under "Floodplains" on pages 4.9-2, 4.9-3, and 4.9-4 may not be correct. The respective municipalities should request of FEMA an update of the FIRM maps for this area to include the former NAWCAD property. (14)

Because the site lies at the crest of two drainage areas, any future development of the NAWCAD property should be done with particular attention paid to preventing any new off-site stormwater management and flooding problems. For example, Ivyland Borough has had ongoing problems with flooding which could be exacerbated by new development on the NAWCAD property.

(15) The narrative at the top of page 3.9-3 should be changed to state that the *Little Neshaminy Creek Watershed Stormwater Management Plan* (approved by PaDEP, June 1996) is the official plan for the eastern portion of the NAWCAD site. The western portion of the site lies within the Pennypack Watershed for which there is no official stormwater management plan at this time.

If you have any questions, please contact Dennis Livrone, Senior Planner at 215-345-3422.

Sincerely,

Robert E. Moore
Executive Director

REM/DL/mw

CC: Michael G. Fitzpatrick, Esquire, Chairman, Board of Commissioners
Trish Troshak, Acting Manager, Warminster Township
D. Bruce Townsend, Manager, Northampton Township
Joseph Cyajkowski, Manager, Warwick Township
Paul G. Janssen, Jr., Manager, Upper Southampton Township
Deborah Krout, President of Council, Ivyland Borough

January 31, 1997

Leonard J. Stebulis, Councilman Ivyland Borough
20 W. Bristol Road
Ivyland, Pa. 18974

Mr. Kurt C. Frederick
Northern Division, Naval Facilities Engineering Command
10 Industrial Highway
Lester, Pa. 19113

Dear Mr. Frederick,

This letter is to point out the inaccuracies in the **DRAFT ENVIRONMENTAL IMPACT STUDY (DEIS)** for the **NAVAL AIR WARFARE CENTER, AIRCRAFT DIVISION (NAWC, AD,)** Warminster, Pa., dated December 1996 along with the mandate to announce and correct those errors.

(1) The most glaring error is the map for the reuse plans prepared by **Tams Consultants, Inc.** of 655 Third Ave., New York, NY 10017. Obviously the consultants never visited the area or checked the local maps. All the maps prepared by **Tams Inc.**, reflect the area enclosed by Jacksonville, Newtown, Bristol and Kirk Roads as "Ivyland." This is incorrect. This area is located entirely in Warminster Township. This is inexcusable.

(2) Also inexcusable is the incorrect information regarding the zoning for the property located within the actual boundaries of Ivyland Borough. The zoning for this property had been changed to R-2 residential prior to the publication of the **DEIS**, thus rendering all statistics and projections for the property published in the report invalid.

This error can be largely attributed to the errant information provided by Mr. Steven Rockwell, Executive Director of the FLRA. Mr. Rockwell failed to convey the discrepancies that were pointed out to him in several meetings with the Ivyland Borough Council. Mr. Rockwell frequently ignores the requests of the officials to suit is own purposes.

(3) The report also indicates, **in section 5.1.4.**, that the intersection of Bristol and Jacksonville Roads is a T-intersection. This is incorrect and inexcusable considering the proximity of the intersection to the **NAWC** and the greater than fifteen thousand vehicles per day finding need to utilize these basic two lane roads. This is reflected in the **LOS** figures, flawed as they may be.

This letter is an official request from an elected official of Ivyland Borough to have the study invalidated until the appropriate corrections have been made and the public record is corrected. Your response is awaited.

Respectfully,

Leonard J. Stebulis

Leonard J. Stebulis, Councilman
Ivyland Borough

Township Of Warminster

Township Building • Henry & Gibson Avenues • Warminster, Pennsylvania 18974 • (215) 443-5414 • Fax: (215) 443-2761

BOARD OF SUPERVISORS
Benjamin F. Casole, Chairman
Bill Goldsworthy, Vice Chairman
Tish Troshak, Sec./Treas.
Frank S. Burstein
Patricia K. Stephens

COMMENTOR L-3

February 24, 1997

Kurt Frederick
(Code 202) Northern Division
Naval Facilities - Engineering Command
10 Industrial Highway MSC 82
Lester, PA 19113

RE: DRAFT ENVIRONMENTAL IMPACT STATEMENT
DISPOSAL AND REUSE OF NAWC-AD WARMINSTER

Dear Mr. Frederick:

Per the guidelines outlined at the public hearing of January 27, 1997 please accept this letter and the technical response enclosure as Warminster Townships formal response to the draft EIS presented.

We would like also the oral statements made by two of our board members at the public hearing to form a part of this response.

Each item that was addressed is of extreme importance to the citizens of this community. As 600 acres of NAWC lie in Warminster Township, our community will bear the brunt of any impact generated. Our primary concern is the restoration of balance to the current environment. As the EPA and PA/DEP continue their efforts at the base it is imperative that the basis used for comparison be founded on the highest possible clean up standards. Anything less would be unacceptable to our citizens. (1)

As a board we must also reiterate our support of the revised Reuse Plan which was formally adopted by the FLRA-BC last week, This revision reflects the wishes of this community and will ultimately lessen the environmental impacts on this entire region. We ask that the revised plan be given prompt approval from all reviewing agencies and be the foundational plan for any future studies or reviews conducted. (2)

If there are any questions or problems on any of the enclosed materials, please feel free to contact me at the Township building during normal business hours.

Respectfully submitted,

Tish Troshak

Tish Troshak, Secretary-Treasurer
Chief Administrative Officer

Enclosures

COMMENTOR L-4

COUNCIL ROCK SCHOOL DISTRICT

ADMINISTRATION & BUSINESS OFFICES
301 TWINING FORD ROAD
RICHBORO, PA 18954-1897

DR. CHARLES A. SCOTT
SUPERINTENDENT OF SCHOOLS

TELEPHONE (215) 355-9901
FAX (215) 322-2185

February 14, 1997

Naval Facilities Engineering Command
Northern Division
10 Industrial Highway
Lester, PA 19113

Attention: Mr. Kurt C. Frederick

Subject: Draft Environmental Impact Statement (DEIS), Disposal and Reuse of Naval Air Warfare Center Aircraft Division; Warminster, PA; December, 1996

Gentlemen:

We attended the public hearing on January 28, 1997 and have reviewed the subject DEIS.

We offer the following comments:

The Council Rock School District has expressed strong interest in the 38 acre site at the northwest corner of the intersection of Hatboro and Bristol Roads in Northampton Township for purposes of construction of an elementary school. In that regard we have filed an application with the US Department of Education for sponsorship in acquiring the site. (1)

Currently, the site in question is designated a Congregate Care Facility site in your DEIS. It is our opinion that an educational use is more appropriate given the fact that presently we are using 43 temporary trailers for classrooms in Northampton Township and urgently need to build a new elementary school to replace these aging temporary classrooms.

An educational use for the site will benefit a minimum of 1,000 families each year for many years into the future.

Yours truly,

Charles C. Scott

Dr. Charles C. Scott
Superintendent of Schools

cc: Council Rock Board of School Directors
Mr. R. James, Dir. Secondary Ed. & Mr. C. Ogelby, Dir. Elementry Ed.
Mr. T. Ames, P.E., BRAC Environmental Coord., Naval Air Warfare Center
Mr. S. Rockwell, CED, Executive Director, FLRA

Pennoni Associates Inc.
515 Grove Street, Suite 2C, Haddon Heights, NJ 08035, Tel: 609-547-0505, Fax: 609-547-9174

WARM 9608.002.01

January 27, 1997
Revised February 20, 1997

Tish Troshak
Chief Administrative Officer
Warminster Township
Henry and Gibson Avenues
Warminster, Pennsylvania 18974

RE: Draft Environmental Impact Statement
Disposal and Reuse of Naval Air Warfare Center Aircraft Division
Warminster, Pennsylvania

Dear Ms. Troshak:

At the request of Warminster Township, Pennoni Associates Inc. ("Pennoni") has reviewed the Draft Environmental Impact Statement ("DEIS") for the Disposal and Reuse of Naval Air Warfare Center Aircraft Division, Warminster, Pennsylvania, dated December 1996 and offer the following comments regarding our findings of the DEIS. We plan to provide testimony to the Department of the Navy ("DON") on Tuesday, January 28, 1997 regarding our findings of the DEIS. We will submit written comments to the DON by February 24, 1997. Our comments will focus on the conceptual elements of identified alternatives and not site specific impacts that obviously will have to be addressed once an alternative is selected and implemented.

INTRODUCTION

Under the Defense Base Closure and Realignment Act ("BRAC"), the DON is proposing to close and dispose of the Naval Air Weapons Center Aircraft Division ("NAWCAD") partially located in Warminster, Bucks County, Pennsylvania. The site comprises 824 acres, of which 609 acres are in Warminster, 46 acres are within the Borough of Ivyland and 169 acres are within the Township of Northampton. NAWCAD's facilities comprise 214 buildings within 1,791,000 square feet of space with the primary six functions comprised of: research and development, airfield operations, industrial, administration, family housing and personnel support.

The NAWCAD will be slated for a major realignment to the Naval Air Warfare Center Aircraft Division at Patuxent River in Maryland. Only a few of the specialized and livable facilities would remain at Warminster including a dynamic flight simulator and the RDT & E Divisions. Military family housing would be retained at the Warminster site. All other tenants and commands would be re-established or relocated off the site.

With the closure and realignment of NAWCAD, the DON has evaluated alternative uses for the 824 acre site. The DEIS prepared by the DON evaluates four (4) alternatives: the Reuse Plan, the Residential Alternative, the Aviation Alternative and the No Action Alternative.

The Reuse Plan, which is the preferred alternative identified by the Federal Lands Reuse Authority (FLRA) Board, found that office, industrial, and recreational uses were all potentially appropriate and identified at least fifteen (15) specific reuse ideas for this facility. Two options under the Reuse Plan were considered. It appears that the major components of the Reuse Plan are a multi-business complex, reuse of Buildings 1, 2 and 3, industrial/business/offices, a new interior road, parks and recreation uses, university/institutional use, congregate care, hotel conference center, residential land and municipal land. The Reuse Plan anticipates that approximately 7600 jobs would be created over a fifteen (15) year period and the order of magnitude infrastructure cost estimates are approximately $21 million.

Three other alternatives that were considered include:

1. The No Action Alternative which assesses impacts after all military activities are relocated and the land is not disposed;

2. The Residential Alternative that evaluates the impact of 575 new dwelling units in addition to congregate housing plus any proposed McKinny housing; and

3. The Aviation Alternative which evaluates the potential for general aviation activities at Warminster with possibly some limited non-scheduled air cargo operation.

The DEIS is divided into ten major components:

1. Purpose and Need
2. Description of the Proposed Action
3. Effected Environment
4. Impacts of the Proposed Action and Alternatives
5. Mitigation Measures
6. Relationship of the Proposed Action to Federal, State and Local Plans, Policies and Controls
7. Unavoidable Adverse Effects
8. Relationship between Local Short-Term Uses of the Environment and the Enhancement of Long-Term Productivity
9. Irreversible and Irretrievable Commitments and Resources
10. Public Review Process in Response to Comments

Those concerns which were evaluated under Section 3 "Effected Environment" and Section 4 "Impacts of the Proposed Action and Alternatives" include land use and zoning, socioeconomics, community facilities and services, transportation, air quality, noise, infrastructure, cultural resources, natural resources and petroleum and hazardous substances.

COMMENTS

1. The infrastructure cost estimate noted in Table 2.2 on Page 2-14 does not make reference to stormwater management infrastructure that would be needed for the upgrading of local roadways and increased impervious coverage, resulting from this proposal. The site is located on a drainage divide between Little Neshaminy Creek and the Pennypack Creek so an extensive stormwater management system would be necessary if the existing municipal system cannot accommodate the additional stormwater. There is no discussion in the DEIS on the projected stormwater runoff that would be generated and whether the existing municipal stormwater system has the capacity to accommodate flows. There is no cost estimate for a new stormwater system if the existing system is inadequate. There is no discussion on upland areas that would be lost to accommodate stormwater facilities and the cost that would have to be allocated to construct such facilities.

2. The DEIS makes mention that with increased impervious coverage, there will be an increase in stormwater that is generated from this proposal. However, there has been no assessment on the impact of this increased stormwater on the hydraulic capacity of the Little Neshaminy and Pennypack Creeks. Since flooding is a well documented problem on both creeks and Warminster has adopted a Flood Water Control Plan, the DON should address this impact.

3. The Reuse Plan will generate significant volumes of traffic during the A.M. and P.M. peaks that will degrade the level of service throughout key intersections in Warminster. There is no discussion on any of the improvements that will be made to these intersections to absorb the additional traffic in a safe manner.

4. The Air Quality Section of the DEIS indicates that specific air monitoring data was not collected for key receptor locations around Warminster. The DEIS extracted carbon monoxide (CO) concentration from the City of Philadelphia during 1993 and for the one-hour and eight-hour monitoring background values, used 5 parts per million (ppm) and .3 ppm, respectively. These background levels appear to be extremely low for this evaluation and the DEIS should consider the worst case concentrations during 1993 for background levels. Given the magnitude of this project and the impact that it will have on the local traffic system, why hasn't there been actual air monitoring of the key receptors around Warminster.

5. In the Air Quality Section of the DEIS, the study concludes that the A.M. and P.M. CO levels for the Reuse Plan will be lower than the existing CO levels that are experienced on local roadways. Given that the level of service for key intersections will deteriorate under the Reuse Plan, how can CO levels improve.

6. The Air Study that was performed under the proposed Reuse Plan uses the year 2010 as the period of evaluation. Since the preparation of the air analysis requires a traffic study, did the traffic study consider the increased traffic that would be generated on local roadways in the year 2010.

7. It is noted in the DEIS that the Warminster Wastewater Treatment Plant has a maximum design capacity to treat 2 million gallons of sewage of which there is 1.5 million gallons of reserve for future development. This statement appears to be inaccurate. Also the DEIS makes mention that the per capita sanitary flow is estimated to be approximately 35 gallons per day (gpd). If this is for the residential phase, we disagree with this volume and feel a volume of 75 gpd should be used. Given a future population of 7600, 75 gpd per capita would increase sewage flows from 266,000 gpd to 570,000 gpd. No evaluation was made in the DEIS as to whether the Warminster Wastewater Treatment Plant can be expanded and still meet the NPDES surface water standards imposed by the Pennsylvania Department of Environmental Protection.

8. The proposed Reuse Plan shows the residential element of this proposal occurring in Ivyland and doubling of population in Ivyland. There has been no analysis on the impact that this population increase will have on municipal services including the school system, police, fire department and other community services that are offered.

9. A density of five (5) lots to the acre is significantly high given the price of homes which is projected to be approximately $225,000 per dwelling unit.

10. The proposed residential phase of the Reuse Plan is adjacent to the industrial/business area. We question whether from a compatibility perspective this is the most suitable location for residential uses or would it be better served if it were buffered from the industrial/business uses by the open space areas.

11. There are eight (8) sites identified within NAWCAD that are documented as having a hazardous material discharge. There is no discussion as to who will be responsible for the implementation of the Remedial Action Work Plan and long-term monitoring of the site after cleanup. There was no discussion on the impact that Site 8, which is the fire fighting training area, will have on the proposed residential land use designated for this site. Types of hazardous materials that were discharged at Site 8 include aviation fuel, lubricants and coolants. A Remedial Investigation ("RI") Report has been completed for Site 8 however it is not known whether the RI Report proposes cleanup to a level that is necessary under the Residential Soil Cleanup Standards. Additionally, it is noted that there is lead in the soil. While the DEIS does mention that there is potable water service for the area, there has been no inventory of private wells that could possibly be impacted by lead.

12. The assessment on infrastructure, specifically the water supply system, does not address the impacts of the proposed potable water increase on the Warminster potable water supply system. There is no discussion on the potential expansion of the potable water supply system and whether there are adequate ground water resources to meet the demand. There is no discussion on cost to upgrade the system to meet the additional flows.

13. The proposed Reuse Plan indicates that upon total build-out there will be approximately 65% impervious coverage. This is an extremely high coverage usually associated with commercial/industrial type uses and does not appear to be compatible with the current land use of the area.

14. The Residential Alternative anticipates that the estimated total annual earnings will be approximately $101,465,688 based on total earning of uses in Table 4.2-10. This value is wrong in that the table does not consider the $31,571,500 for proposed industrial usage. This section should be adequately revised to reflect the additional positive impact that the industrial component will have on the estimated total annual earnings.

15. The proposed Reuse Plan indicates that the average price for a home will be approximately $225,000. However, the estimated mean annual wage will range between $12,000 and $30,000 per year. Based on such a wide discrepancy between wage earners and housing unit costs, it appears that the proposed housing element will not be available to the added work force that will be moving into this area.

16. Given that the proposed Reuse Plan has an industrial element, has anyone performed a needs analysis to determine whether there is a documented need for industrial use in this area.

17. Is the proposed land use of the Reuse Plan compatible with the Master Plan and zoning of the municipalities which are impacted by this proposal?

18. What efforts have been made by DON to actively solicit comments on the DEIS from municipalities that are not directly impacted by the proposed Reuse Plan, but may be the recipient of secondary or cumulative impacts.

19. In Section 4.2.2 of the DEIS, it is noted that the Reuse Plan proposes 150 - 200 new homes. With 2.8 persons per household, the new population generated under the Reuse Plan would be 400 - 600. In Section 4.3.2, it is noted there will be 1,778 new students. Table 4.3.3 notes 1,379 new students. Can a better explanation be provided as to what the new additional student population will be as a result of the Reuse Plan.

20. The DEIS has not adequately assess the impact of the added student population generated from the Reuse Plan on each of the schools within the three sending districts. The inventory section of the DEIS identifies the student population of each school. The assessment section only addresses the additional students within each district.

21. In the noise section of the DEIS, why are the existing sound levels evaluated over a 2-hour period and the predicted noise levels, a 1-hour period. What are the impacts of this discrepancy.

I hope the enclosed comments address some of the immediate concerns of Warminster. Should you have any comments or concerns, please provide them to me so they can be incorporated into my future letter to the DON on February 24, 1997.

Very truly yours,

PENNONI ASSOCIATES INC.

Albert W. Ricciardi

Albert W. Ricciardi
Senior Environmental Scientist

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APPENDIX G

PROGRAMMATIC AGREEMENT

PROGRAMMATIC AGREEMENT

AMONG:
THE DEPARTMENT OF THE NAVY,
PENNSYLVANIA STATE HISTORIC PRESERVATION OFFICER,
AND
THE ADVISORY COUNCIL ON HISTORIC PRESERVATION

FOR:
THE DISPOSAL OF SURPLUS PORTIONS OF
THE FORMER NAVAL AIR WARFARE CENTER AIRCRAFT DIVISION
WARMINSTER, PA

October 29, 1998

WHEREAS the United States Navy (Navy) is responsible for implementation of applicable provisions of the Base Closure and Realignment Act of 1990 (P.L. 101-510 [1990]); and

WHEREAS the Navy is proceeding with realignment of functions and units, closure of installations and disposal of excess and surplus property in a manner consistent with the "Reports(s) of the President's Commission on Base Realignment and Closures", dated July 1, 1991; and

WHEREAS the Navy has determined that interim leasing, and licensing, and/or transfer of excess portions of the former Naval Air Warfare Center Aircraft Division Warminster, Pennsylvania (NAWCAD) will have an effect upon properties that are eligible for listing in the National Register of Historic Places (hereinafter referred to as "historic properties"), and has consulted with the Pennsylvania State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation (Council) pursuant to 36 CFR Part 800, regulations implementing Section 106 of the National Historic Preservation Act (16 U.S.C., Section 470f), Section 110(f) of the same Act (16 U.S.C., Section 470h.2[f]), and Section 111 of the same Act (16 U.S.C., Section 470h.3); and

WHEREAS the historic properties include areas of archeological sensitivity and those structures (Attachments 1 and 2), as determined eligible or potentially eligible for listing in the National Register of Historic Places (NRHP) through consultation and agreement between the SHPO and the Navy; and

WHEREAS appropriate restrictive devices have been prepared to protect these properties in the event of a transfer or sale (Attachments 3 and 4); and

WHEREAS there is an agreed upon mechanism for the amendment of this document as future circumstances may require (Administrative Clause XII); and

WHEREAS interested members of the public and the various local governments have been provided an opportunity to comment on the effects this Transfer action may have on historic properties at the former Naval Air Warfare Center Aircraft Division Warminster through the National Environmental Policy Act; and

NOW, THEREFORE, the Navy, the SHPO, and the Council agree that the undertaking shall be implemented in accordance with the following stipulations to take into account the effect of the undertaking on the historic properties.

STIPULATIONS

The Navy will ensure that the following stipulations are implemented:

I. Interim Protection

A. The Navy shall ensure that any historic property that is vacated pending transfer is maintained pursuant to the Secretary of the Interior's *Standards for Rehabilitation and the Guidelines for Rehabilitating Historic Buildings* and *NAVFAC MO-913, Historic Structures Preservation Manual* (collectively referred to as "standards") to minimize deterioration.

B. The Navy shall submit annual reports to the SHPO that list historic properties transferred out of Navy jurisdiction until all surplus historic properties have been transferred. The first report shall be submitted twelve months after Council acceptance of this agreement. Subsequent reports shall be submitted every twelve months thereafter.

C. While an historic property remains under the Navy's jurisdiction, the Navy will ensure that the SHPO has the opportunity to review and comment on any undertaking affecting such property, except those exempted in Stipulation II, before the undertaking is initiated. If the undertaking involves demolition of the property, or if the SHPO determines that the undertaking does not meet the Standards referenced in Stipulation I.A. above, the Navy will contact the Council and review will proceed pursuant to 36 CFR Part 800.

D. The Navy will give full consideration to interim protection of properties through the execution of interim leases or management agreements pursuant to Section 111 of the National Historic Preservation Act of 1966, as amended (Act). Except for activities exempted in

Section II, prior to any construction, alteration, rehabilitation, demolition, disturbance of the ground surface, or any other action affecting historic properties or districts, the lessee or sublessee (Lessee) or licensee or other authorized occupant (Licensee) shall submit plans and specifications for the proposed action to the Navy for review and, following consultation pursuant to Stipulation I(c), approval. The language attached as Attachment 5 shall be incorporated into any lease for historic properties.

II. Exempt Activities

Pending the transfer of historic properties out of Navy ownership, the following activities proposed by the Navy, or any of its lessees or licensees, are specifically exempt from review by the SHPO:

A. Activities involving non-historic properties which will have no impact upon historic properties.

B. In-kind[1] street, sidewalk, curbing and parking area resurfacing, and in-kind repair or replacement of site improvements including but not limited to fences, retaining walls and landscaping where no additional right-of-way is required within a historic district.

C. Removal of dead or unsalvageable trees.

D. Modifications to interiors of non-contributing buildings.

E. Modifications to interiors of contributing buildings when no structural alteration is involved and when the visual character of the property shall not be effected such as:

1. Plumbing rehabilitation/replacement including but not limited to pipes and fixtures.
2. HVAC system rehabilitation/replacement including but not limited to furnaces, pipes, ducts, radiators or other HVAC units.
3. Electrical wiring: including but not limited to switches and receptacles.
4. Interior surface treatments (floors, walls, ceilings, decorative plaster, woodwork): provided the work is limited to repainting, in-kind patching, refinishing, re-papering or replacing carpet or vinyl floor materials.

[1] For the purposes of this agreement, the phrase "in-kind" is defined as using the *same material*, form and design OR compatible substitute material if the form and design as well as the substitute material convey the same visual appearance of the existing feature.

5. Interior feature treatments including but not limited to doors, moldings, fireplaces and mantels provided the work is limited to in-kind repair, patching, repainting and refinishing.
6. Insulation provided it is restricted to ceilings and attic spaces.

F. Minor, in-kind repair or replacement of building or site features, elements or materials of non-contributing buildings.

G. Minor, in-kind repair or replacement of building or site features (contributing or non-contributing) as part of emergency repair, or routine maintenance not part of a larger project.

H. Minor, in-kind modifications to exteriors of contributing buildings such as:

1. Caulking, weather-stripping, re-glazing, scraping and/or repainting.
2. Flat or shallow pitch roof repair/replacement (shallow pitch is understood to have a rise-to-run ratio equal to or less that 3" to 12".
3. Storm windows and doors provided that they conform to the shape and size of the historic windows and doors. The meeting rail of storm windows must coincide with that of the existing sash. Color should match trim, mill finish aluminum is not acceptable.
4. In-kind repair/replacement of exterior features. The new features/items will duplicate the material, dimensions and detailing of the original. Features include:
   (a) Porches, railings, posts/columns, brackets, cornices, steps, flooring, and other decorative treatments, and
   (b) Roofs, and
   (c) Siding, and
   (d) Exterior architectural details and features, and
   (e) Cellar/bulkhead doors.
   (f) Doors.
   (g) Gutters and downspouts.
5. Masonry repair using material, mortar composition, color, joint profile and width, which match the historic materials.

I. Environmental restoration and remediation of hazards, which pose a threat to human health and the environment, but do not have the potential to affect historic property(ies).

III. Further Archaeological Investigations

The Navy is conducting additional archaeological investigations to refine sensitivity in the areas where the Navy is planning conveyance outside the federal government. As these investigations are not complete, this agreement pertains to all of the sensitive areas defined in the original cultural resource survey of June 1996 (Attachment 2). If, subsequent to the execution of this agreement, the area of sensitivity areas is reduced by a consensus agreement between the Navy and the SHPO, this agreement may be modified in accordance with Section XII.

IV. Recordation of Historic Properties

The Navy will be responsible for the recordation of historic properties, buildings, structures, and districts prior to the demolition, alteration, or rehabilitation, which results in an adverse effect while the United States of America continues to remain as the owner of the property. The Navy will also cause the recordation of historic properties, buildings, structures, and districts prior to the transfer of such property except where the deed covenants in the Attachments are included in the conveyance. A decision on recordation will be based on review pursuant to Stipulation I(c), on any contributing building or structure within the properties of NAWCAD. Provided that property is still under the jurisdiction of the Navy, the Navy shall consult with the SHPO to determine what level of documentation is required to record the property to be affected.

V. Late Discovery

While the United States of America continues to remain as the owner of the property, the Navy shall avoid or preserve in place any archaeological resources found during ground disturbing activities. When this is not feasible, the Navy will consult with the SHPO in accordance with 36 CFR Part 800, and a treatment consistent with applicable SHPO, Council and National Park Service guidelines will be developed and implemented.

VI. Burials

While the United States of America continues to remain as the owner of the property, the Navy shall consult in accordance with 36 CFR Part 800, the Council's September 27, 1998 resolution and the Native American Graves Protection and Repatriation Act of 1990 to ensure proper treatment of any human remains or grave associated artifacts that may be encountered.

VII. Environmental Remediation and Emergency Undertakings

A. The Navy may treat and/or demolish historic properties that are an immediate threat to health and safety due to: unsafe conditions of the structure; contamination by hazardous, toxic, and/or radiological (HTR) substances; natural disasters; and will notify the SHPO and Council prior to treatment or demolition and the SHPO shall provide a response within seven (7) working days. The Navy shall consult with the SHPO in the development of plans for the treatment of other historic properties which require remediation due to hazardous circumstances, as they arise.

B. Emergency undertakings shall be handled in accordance with 36 CFR 800.12.

VIII. Transfers of Property

A. The Navy shall transfer parcels at NAWCAD which contain historic properties as may be necessary or appropriate to meet the goals and objectives of the applicable legislation. Transfers involving structures eligible for listing on the National Register of Historic Places or archaeologically sensitive areas will include the appropriate covenant as set forth in Attachments 3 and 4.

ADMINISTRATIVE CLAUSES

IX. Dispute Resolution

Should the SHPO object within thirty (30) days to any proposed action pursuant to this Agreement as it relates to Licensees, Lessees, or the Navy as caretaker, the Navy shall consult with the SHPO to resolve the objection. If the Navy determines that the objection cannot be resolved, the Navy shall forward all documentation relevant to the dispute to the Council. Within 30 days after receipt of all pertinent documentation, the Council will either: (1) provide the Navy with recommendations, which the Navy will take into account in reaching a final decision; or (2) comment pursuant to 36 CFR Part 800.6(b). Any Council comments provided shall be taken into account by the Navy in accordance with 36 CFR Part 800.6(c)(2) with reference only to the subject of the dispute. The Navy's responsibility to carry out all actions under this Agreement that are not the subject(s) of the dispute will remain unchanged.

X. Anti-Deficiency Act

A. All requirements set forth in this Agreement requiring the expenditure of Navy funds are expressly subject to the availability of appropriations and the requirements of the Anti-

Deficiency Act (31 U.S.C. Section 1341). No obligation undertaken by the Navy under the terms of this Agreement shall require or be interpreted to require a commitment to expend funds not appropriated for a particular purpose.

B. If the Navy cannot perform any obligation set forth in this Agreement due to the unavailability of funds, the Navy, the SHPO, and the Council intend the remainder of the Agreement to be executed. Any obligation under the Agreement, which cannot be performed due to the unavailability of funds, must be re-negotiated between the Navy, the SHPO, and the Council.

XI. Periodic Review

For each of the first three years after the execution of this agreement, and biannually thereafter until all historic property within NAWCAD has been transferred out of Navy jurisdiction, the Navy will host a meeting of the parties to this agreement with other interested parties, to review implementation of Stipulations set forth in this document, and determine whether additional measures are needed to protect the character and integrity of the historic properties. The Navy will ensure that any measures agreed upon are implemented for so long as the property remains under Navy jurisdiction.

XII. Amendments

Any party to this Agreement may request that it be amended, whereupon the parties will consult in accordance with 36 CFR Part 800.13 to consider such amendment.

EXECUTION of this Agreement and implementation of its terms evidence that the Navy has afforded the Council an opportunity to comment on the transfer of portions of the former Naval Air Warfare Center Aircraft Division Warminster, Pennsylvania, and its effects on historic properties, and that the Navy has taken into account the effects of the undertaking on historic properties.

FOR THE DEPARTMENT OF THE NAVY:

By: _____ Date: 11/2/98

FOR THE PENNSYLVANIA STATE HISTORIC PRESERVATION OFFICER:

By: _____ Date: 11/16/98

FOR THE ADVISORY COUNCIL ON HISTORIC PRESERVATION:

By: _____ Date: 12/9/98

CONCUR:

By: _____ Date: _____

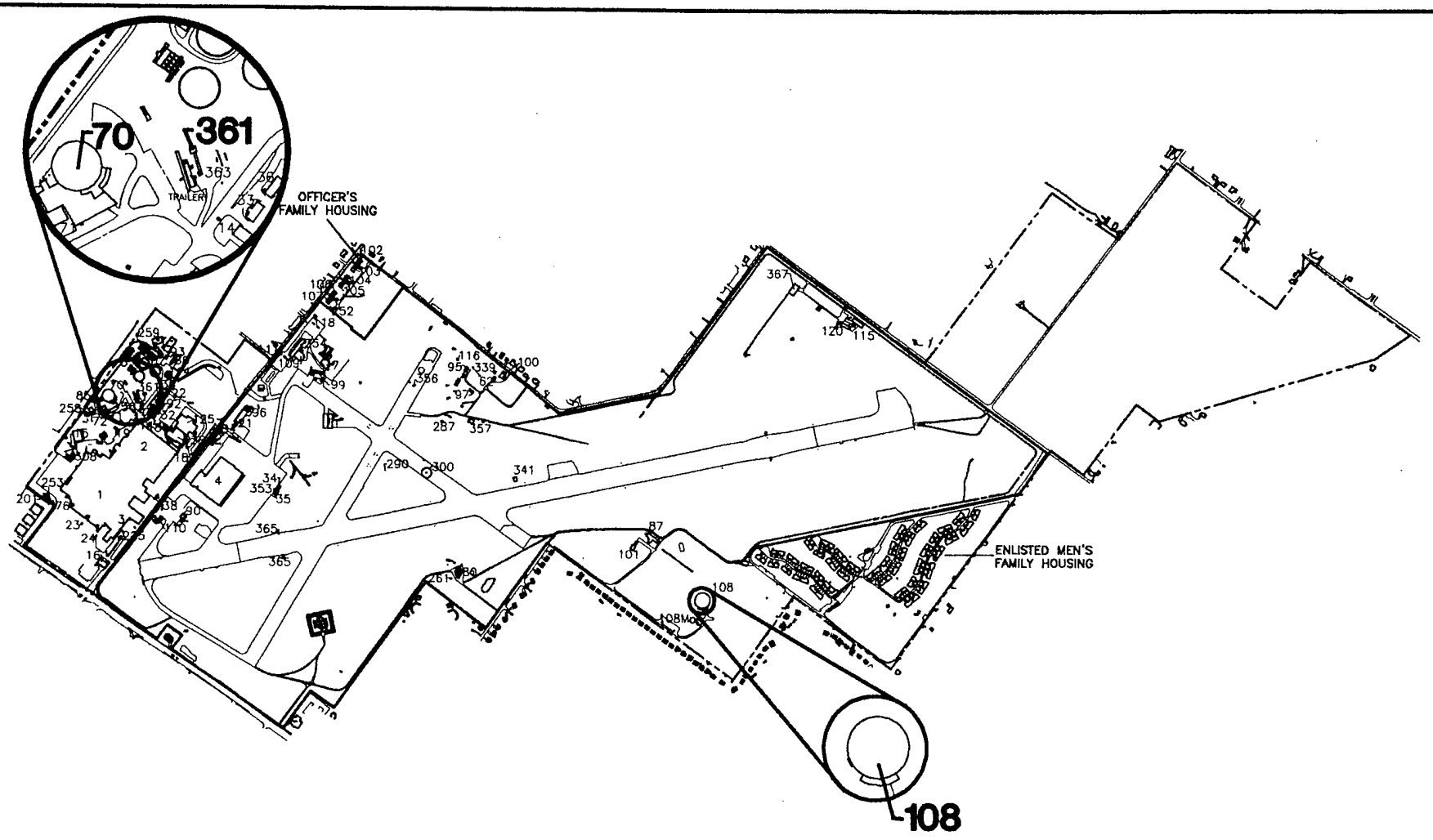
Local Reuse Authority

ATTACHMENT 1

HISTORIC STRUCTURES

Attachment 1 is comprised of Figure 7-1 from the Naval Air Warfare Center Aircraft Division (NAWCAD) Warminster, PA Cultural Resource Survey dated June 1996 modified to reflect the result of consultation with the Pennsylvania State Historic Preservation Officer. It identifies Buildings 70, 108, and 361, the three structures eligible for listing on the National Register of Historic Places at NAWCAD Warminster.

National Register Eligible Properties at NAWCAD



Note: Inset scale is 1"= 400'.

16 **Building and Number**

100 **Eligible Structure**

Property Boundary

1600 800 0 800 1600
Scale in Feet

400 0 400
Scale in Meters

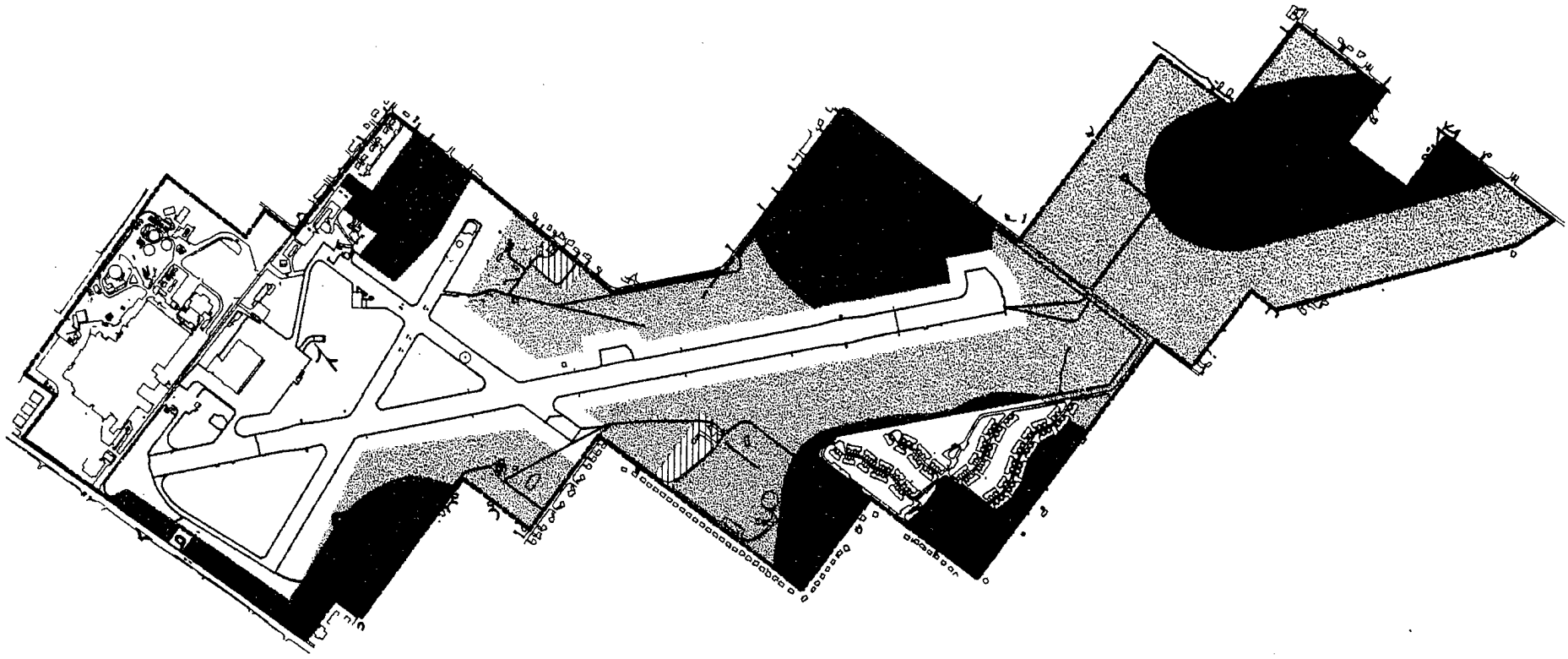
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ATTACHMENT 2

ARCHEOLOGICAL SENSITIVITY

Attachment 2 is comprised of (a) Section 7-2 from the Naval Air Warfare Center Aircraft Division (NAWCAD) Warminster, PA Cultural Resource Survey (CRS) dated June 1996 that identifies areas of archaeological sensitivity, which may be eligible for listing on the National Register of Historic Places at NAWCAD Warminster; and (b) Maps A1 and A2 from the Naval Air Development Center Warminster Historic and Archaeological Resources Protection Plan of August 1991 (which are referenced in the June 1996 NAWCAD CRS).

NAWCAD Warminster Archaeological Sensitivity



High Archaeological Sensitivity for Historic Resources

Moderate Archaeological Sensitivity for Prehistoric Resources

Moderate to Low Archaeological Sensitivity for Historic and Prehistoric Resources

Property Boundary

1500 0 1500
Scale in Feet

500 0 500
Scale in Meters

N

ATTACHMENT 3

STANDARD ARCHEOLOGICAL COVENANT

In consideration of the conveyance of the real property that includes the (*name of area of archeological sensitivity/archaeological site (whichever is appropriate)*) located in Bucks County, State of Pennsylvania, which is more fully described as: *(Insert legal description)*, the Grantee hereby covenants on behalf of himself/herself/itself, his/her/its heirs, successors and assigns at all times to the Pennsylvania State Historic Preservation Officer (PA SHPO) to maintain and preserve the (*name of area of archeological sensitivity/archaeological site (whichever is appropriate)*) as follows:

1. No disturbance of the ground surface shall be undertaken or permitted to be undertaken on (*name of area of archaeological sensitivity/archeological site (whichever is appropriate)*) which would affect the physical integrity of (*name of area of archaeological sensitivity/archeological site (whichever is appropriate)*) without the express prior written permission of the PA SHPO, signed by a fully authorized representative thereof. Should the PA SHPO require, as a condition of the granting of such permission, that the Grantee conduct archeological data recovery operations or other activities designed to mitigate the adverse effect of the proposed activity on the (*name of area of archaeological sensitivity/archeological site (whichever is appropriate)*), the Grantee shall at his/her/its own expense conduct such activities in accordance with the Secretary of the Interior's Standards and Guidelines for Archeological Documentation (48 FR 447344-37).

2. The Grantee shall make every reasonable effort to prohibit any person from vandalizing or otherwise disturbing the (*name of area of archaeological sensitivity/archaeological site*) and shall promptly report any such disturbance to the PA SHPO.

3. The Grantee will allow the PA SHPO or his/her designee, upon reasonable advance notice to the Grantee, an annual inspection of (*name of area of archaeological sensitivity/archaeological site (whichever is appropriate)*) in order to ascertain whether the Grantee is complying with the conditions of this covenant.

4. In the event of a violation of this covenant, and in addition to any remedy now or hereafter provided by law, the U.S. Government or upon 60 days prior notice to the U.S. Government the PA SHPO may, following reasonable notice to the Grantee, institute a suit to enjoin said violation or to require the restoration of (*name of area of archaeological sensitivity/archaeological site (whichever is appropriate)*).

5. The failure of the U.S. Government or the PA SHPO to exercise any right or remedy granted under this covenant shall not have the effect of waiving or limiting the exercise by the U.S. Government or the PA SHPO of any other right or remedy or the use of such right or remedy at any other time.

6. This covenant is binding on Grantee, his/her/its heirs, successors and assigns in perpetuity. The restrictions, stipulations, and covenants contained herein shall be inserted by Grantee, its successors and assigns, verbatim or by express reference in any deed or other legal instrument by which he/she/it divests himself/herself/itself of either the fee simple title or any other lesser estate in (*name of area of archaeological sensitivity/archaeological site (whichever is appropriate)*), or any part thereof.

7. This covenant shall be binding servitude upon the real property that includes (*name of area of archaeological sensitivity/archaeological site (whichever is appropriate)*) and shall be deemed to run with the land. Execution of this covenant shall constitute conclusive evidence the Grantee agrees to be bound by the foregoing conditions and restrictions and to perform to obligations herein set forth.

(end of Attachment 3)

ATTACHMENT 4

STANDARD PRESERVATION COVENANT

In consideration of the conveyance of the real property that includes the (*name of property*) located in Bucks County, State of Pennsylvania, the Grantee hereby covenants on behalf of itself, its successors and assigns, to the Pennsylvania State Historic Preservation Officer (PA SHPO) to preserve and maintain (*name of property*), in a manner that preserves and maintains the attributes that contribute to the eligibility of the (*name of property)*, of which said real property is a part, for listing on the National Register of Historic Places. Such attributes include exterior features (including facades and fenestration, scale, color, materials, and mass), interior features determined significant in consultation with the PA SHPO, and views from, to, and across the property.

1. The [*name of property*] will be preserved and maintained in accordance with The Secretary of Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings (National Park Service). No construction, alteration, rehabilitation, remodeling, demolition, disturbance of the ground surface, or other action shall be undertaken or permitted to be undertaken on (*name of property*) that would materially affect the integrity or the appearance of the attributes described above without prior approval of the PA SHPO and a record of such.

2. Upon acquisition of the property, the Grantee will take prompt action to secure the property from the elements, vandalism, and arson, and will undertake any stabilization that may be required to prevent deterioration. The Grantee will be responsible for this security and stabilization to the same extent required of the Grantor, the United States of America, at the time of deed transfer. The Grantee will make every effort to retain or reuse, to the extent practicable, the historic structures.

3. In the event that archeological materials are encountered during construction or ground-disturbance activities, work shall cease in the immediate area until the PA SHPO is consulted and provides written permission to recommence work. Should the PA SHPO require, as a condition of the granting of such permission, that the Grantee conduct archeological survey data recovery operations or other activities designed to mitigate the potential adverse effect of the proposed activity on the *archeological resources* the Grantee shall at his/her/its own expense conduct such activities in accordance with the Secretary of the Interior's Standards and Guidelines for Archeological Documentation (48 FR 447344-37).

4. The Grantee will allow the PA SHPO or his/her designee, upon reasonable advance notice to the Grantee, an annual inspection of (*name of property*) in order to ascertain whether the Grantee is complying with the conditions of this covenant.

5. The Grantee will provide the PA SHPO with a written summary of actions taken to implement the provisions of this preservation covenant within one (1) year after the effective date of the transfer of (*name of property*).

6. In the event of a violation of this covenant, and in addition to any remedy now or hereafter provided by law, the U.S. Government or upon 60 days prior notice to the U.S. Government the PA SHPO may, following reasonable notice to the Grantee, institute suit to enjoin said violation or to require the restoration of (*name of property*).

7. The failure of the U.S. Government or the PA SHPO to exercise any right or remedy granted under this covenant shall not have the effect of waiving or limiting the exercise by the U.S. Government or the PA SHPO of any other right or remedy or the use of such right or remedy at any other time.

8. This covenant is binding on the Grantee, his/her/its heirs, successors and assigns, in perpetuity. The restrictions, stipulations and covenants contained herein shall be inserted by the Grantee, its successors and assigns, verbatim or by express reference in any deed or other legal instrument by which he/she/it divests himself/herself/itself of either the fee simple title or any lesser estate in (*name of property*), or any part thereof.

(end of attachment 4)

ATTACHMENT 5

STANDARD LEASE LANGUAGE

Text to appear in the body of any Lease for historic property:

" The Leased Premises is potentially eligible for listing on the National Register of Historic Places. Lessee and any sublessee shall ensure compliance with Section 106 of the national Historic Preservation Act (16 U.S.C. 470f) in the operation, maintenance and improvement of the Leased Premises."

"ALTERATIONS.

1. No additions to, or alterations of, the Leased Premises, including the related personal property, shall be made without the prior written consent of the Government's Authorized Contracting Officer or his authorized representative, which consent shall not be unreasonably withheld. Requests for additions or alterations shall be completed and submitted to the Government in accordance with the "Procedures for Government Review of Proposed Additions, Alterations or Improvements to Leased Premises by Lessee or Sublessee" ("Exhibit "E"). The Government shall respond in writing to such submission, which shall include an explanation of such response based on the following schedule: 1) within thirty (30) days of receipt of the submission for projects with a total value of $100,000 or less; and 2) within sixty (60) days of receipt of the submission for projects with a total value of more than $100,000. Should the Government fail to provide a written reply within the time frames described above: a) the silence shall be deemed a rejection of the proposed alterations or additions pending a formal written response from the Government; and b) at Lessee's request, the Government shall meet with the Lessee within a reasonable period of time to discuss its reasons.

The Lessee shall not construct, or make or permit its sublessees or assigns to construct or make, any substantial alterations, additions, or improvements to, or installations upon, or otherwise modify or alter the Leased Premises in any way which may adversely affect the cleanup, human health, the environment or, the historical character without the prior written consent of the Government. Such consent may involve a requirement to provide the Government with a performance and payment bond satisfactory to it in all respects and other requirements deemed necessary to protect the interest of the Government. For construction or alterations, additions, modifications, improvements or installations (collectively "work") in the proximity of operable units that are a part of a Navy Installation Restoration Program, such consent may include a requirement for written approval by the Government's Remedial Project Manager. Upon termination, revocation, or surrender of this lease, in whole or in part, the Lessee shall, at the option of and to the extent directed by the Government, either:

1.1 Promptly remove all alterations, additions, modifications, improvements, and installations, including, but not limited to, Lessee's or sublessee's trade fixtures, made or installed on the Designated Facility(ies) subject to the termination, revocation or surrender, and restore the same including related personal property to the same or as good condition as existed on the date the respective sublease as reflected in the Joint Inspection Report, subject, however, to ordinary wear and tear; or

1.2 Abandon such additions or alterations to the Designated Facility(ies), subject to the termination, revocation, or surrender in place, at which time title to said alterations, improvements, and additions shall vest in the Government.

2. Notwithstanding anything set forth herein to the contrary, Lessee or its sublessee may, at its (or their) sole discretion, remove any of its (or their) equipment or trade fixtures installed on the Designated Facility(ies) subject to termination, revocation, or surrender, or attached to the Leased Premises, provided, however, it (they) shall restore the Leased Premises to the condition that existed on the date of the respective sublease, as reflected in the Join Inspection Report, subject, however, to ordinary wear and tear."

Summary of Exhibit "E" titled "*Procedures for Government Review of Proposed Additions, Alterations, or Improvements Leased Premises by Lessee or Sublessee*":

The lessee or sublessee submits written documentation to the Navy at the planning or pre-design stage. Subsequent submittals are required as necessary, depending on complexity and potential impact of alterations. The information required in the alteration documentation includes (as appropriate): description of proposed construction; description of the (intended) type of use; documentation of compliance with applicable building codes or other laws; description of new material to be stored on premises; and, number of additional persons that will occupy the premises.

(end of Attachment 5)

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