EXHIBIT K

FINAL ENVIRONMENTAL ASSESSMENT OF INSTALLATION DEVELOPMENT

AT JOINT BASE MCGUIRE-DIX-LAKEHURST, NEW JERSEY

DEPARTMENT OF THE AIR FORCE

Prepared for:

Headquarters, Air Mobility Command and

Joint Base McGuire-Dix-Lakehurst

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3. AFFECTED ENVIRONMENT

This chapter describes the baseline environmental, cultural, and socioeconomic conditions of JB MDL. The potential direct, indirect, and cumulative impacts of the Proposed Action and No Action Alternative on each of the resource areas are addressed in Chapters 4 and 5. This IDEA evaluates the individual and cumulative impacts of the alternatives with respect to land use, airfields and airspace, air quality, noise, geologic resources, water resources, biological resources, cultural resources, infrastructure, materials and waste, human health and safety, and socioeconomics and environmental justice.

3.1 Land Use

3.1.1 Definition of the Resource

The term "land use" refers to real property classifications that indicate either natural conditions or the types of human activity occurring on a portion of land. USAF installation land use planning commonly use 12 general land use classifications: Airfield, Aircraft Operations and Maintenance, Industrial, Administrative, Community (Commercial), Community (Service), Medical, Housing (Accompanied), Housing (Unaccompanied), Outdoor Recreation, Open Space, and Water (USAF, 1998).

Two main objectives of land use planning are to ensure orderly growth and compatible uses among adjacent property parcels or areas. According to Air Force Pamphlet 32-1010, *Land Use Planning*, land use planning is defined as the arrangement of compatible activities in the most functionally effective and efficient manner (USAF, 1998). Compatibility among land uses fosters the societal interest of obtaining the highest and best uses of real property. Tools supporting land use planning within the civilian sector include written master plans/management plans, policies, and zoning regulations. The USAF comprehensive planning process also uses functional analysis, which determines the degree of connectivity among installation land uses and between installation and off-installation land uses, to determine future installation development and facilities planning.

In appropriate cases, the location and extent of a proposed action needs to be evaluated for its potential effects on a project site and adjacent land uses. The foremost factor affecting a proposed action in terms of land use is its compliance with any applicable land use or zoning regulations. Other relevant factors include matters such as existing land use at the project site, the types of land uses on adjacent properties and their proximity to a proposed action, the duration of a proposed activity, and its "permanence."

3.1.2 Existing Conditions

JB MDL is located in Central NJ, 18 miles southeast of Trenton, approximately 45 miles east of Philadelphia, 50 miles south of New York City, and 14 miles inland (west) from the Atlantic Ocean. JB MDL is surrounded by Burlington and Ocean Counties. Land use surrounding JB MDL is a mixture of residential, agricultural, open space, and conservation/preservation areas. The installation is surrounded by Manchester Wildlife Management Area, cranberry bogs, undeveloped forested land, Colliers Mills Wildlife Management Area, and Brendan T. Byrne State Forest. The installation is also surrounded by the following local municipalities: New Hanover Township, North Hanover Township, Pemberton Township, Springfield Township, Wrightstown Borough, Jackson Township, Lakehurst Borough, Manchester Township, and Plumsted Township. JB MDL is classified as "unplanned" on a local level because municipal zoning regulations do not apply to Federal property. JB MDL and portions of the surrounding area are also located within the Pinelands National Reserve, also referred to as the Pinelands, which is protected by Section 502 of the National Parks and Recreation Act of 1978 and the NJ Pinelands Protection Act of 1979. The National Parks and Recreation act established the Pinelands National Reserve. This reserve consists of approximately 1.1 million acres in southern NJ, managed by the NJ Pinelands Commission. The Pinelands National Reserve includes portions of seven counties, including: Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, and Ocean.

JB MDL has three cantonment areas within the installation; one each on the McGuire, Dix, and Lakehurst areas. The cantonment areas support the urban cores of the installation. Major land uses include residential (troop housing and family quarters), administrative, recreation, community support, military training,

ammunition storage, and industrial.

JB MDL identifies 15 general land use designations in the 2012 IDP: Mission Support: Administrative; Airfield; Community Support; Accompanied Housing; Industrial; Medical; Non-DoD; Open Space; Operations: Airfield; Operations: Training; Research, Development, Test, and Evaluation (RDT&E); Recreation; and Ranges. JB MDL's land use zoning differs from the standard USAF land use zoning scheme to a degree, which reflects the varied missions of the three areas of the Joint Base. Table 3.1-1 describes these land use zoning designations, their areal extents on JB MDL, and the designations associated with the locations of the projects selected for detailed analysis. The dominant land use category at JB MDL is *Ranges* within the Dix area, which comprises approximately two-thirds of the total base land area of JB MDL. Zoning maps relevant to the Proposed Action sites are shown in Figures 3-1 and 3-2.

Table 3.1-1. JB MDL Land Use Zoning Designations and Associated Projects Selected for Detailed Analysis

Land Use Zoning Designation	Area (acres)	Description	Associated Projects Selected for Detailed Analysis
Accompanied Housing	855	Dedicated to attached and detached housing for enlisted and officer families.	I5
Airfield	3,256	Includes airfield CZs, ramps, taxiways and runways.	C6, I2, I3, I5
Community Support	491	Commercial and service community functions reflecting a mixed-use district strategy and campus-style development goals. Includes functions such as: schools, adult education facilities, libraries, worship and religious education spaces, child care, youth centers, dormitories and bachelor officer housing.	D2, I5
Industrial	430	Dedicated to logistics, transportation, maintenance, utilities functions, supply, fuel facilities, open storage, vehicle maintenance, weapons storage areas, general storage, and other similar functions.	I1, I5
Medical	29	Dedicated to medical and dental services. Limited to the medical clinic on Neely Road (Dix area); the clinic on Lakehurst is compatible with Community Support land use and falls within that designation.	I5
Mission Support: Administration	196	Mission support administrative includes functions such as: headquarters, personnel management, and legal offices.	I5, R1, R2
Non-DoD	410	Non-DoD land is within the installation boundary but is not owned and controlled by the DoD. Three parcels include: the Federal Correctional Institute compound, the Mid-State Correctional compound, and the U.S. Coast Guard compound all in the Dix area. NJ Army Reserve National Guard leased areas in the Dix area are categorized under Operations: Training for functional adjacency reasons.	none
Open Space	3,074	Open space is reserved or retained in a generally undeveloped or natural condition. This category includes natural bodies of water, wetlands, cemeteries, and landscaped areas.	I5
Operations: Airfield	1,128	Supports airfield functions, such as hangars and the passenger terminal, and restricts non-airfield facility encroachment.	C1, C2, I4, I6, I5
Operations: Training	1,496	Training areas are found throughout JB MDL and are mixed use non-airfield and non-RDT&E training areas. In the cantonment areas, includes campus-style development with dormitories, dining, classrooms, and outdoor training and recreation areas. Dormitories are incorporated to allow military personnel to walk to classes in a campus-like atmosphere.	I6
Ranges	27,551	Ranges consist of maneuver areas, outdoor firing ranges, bombing ranges, firing points, and the impact area.	C5, I5
RDT&E	2,578	Includes Navy research functions in the Lakehurst area. These areas predominantly support Aircraft Platform Interface systems development/support for the fleet. Functions include testing facilities and administrative support.	none
Recreation	686	Distinct from Open Space, Recreation areas, with or without structures, is used for organized and impromptu recreational activities. Outdoor recreation facilities include neighborhood parks, picnic areas, open space for parades, and specific recreation uses such as, swimming pools, golf courses, and court sports.	D1, D2, C3, C4

Prior to joint basing, the land uses for each area of JB MDL (i.e., McGuire, Dix, and Lakehurst) were managed individually with individual planning documents. The 2012 IDP is the first master plan since the standup of Joint Base in 2009. The IDP developed the aforementioned JB MDL land use zoning designations. The IDP also has a long range component known as the 25-year Base Development Plan, which includes planning districts based upon missions rather than military services. The IDP is a consensus-based plan that provides a

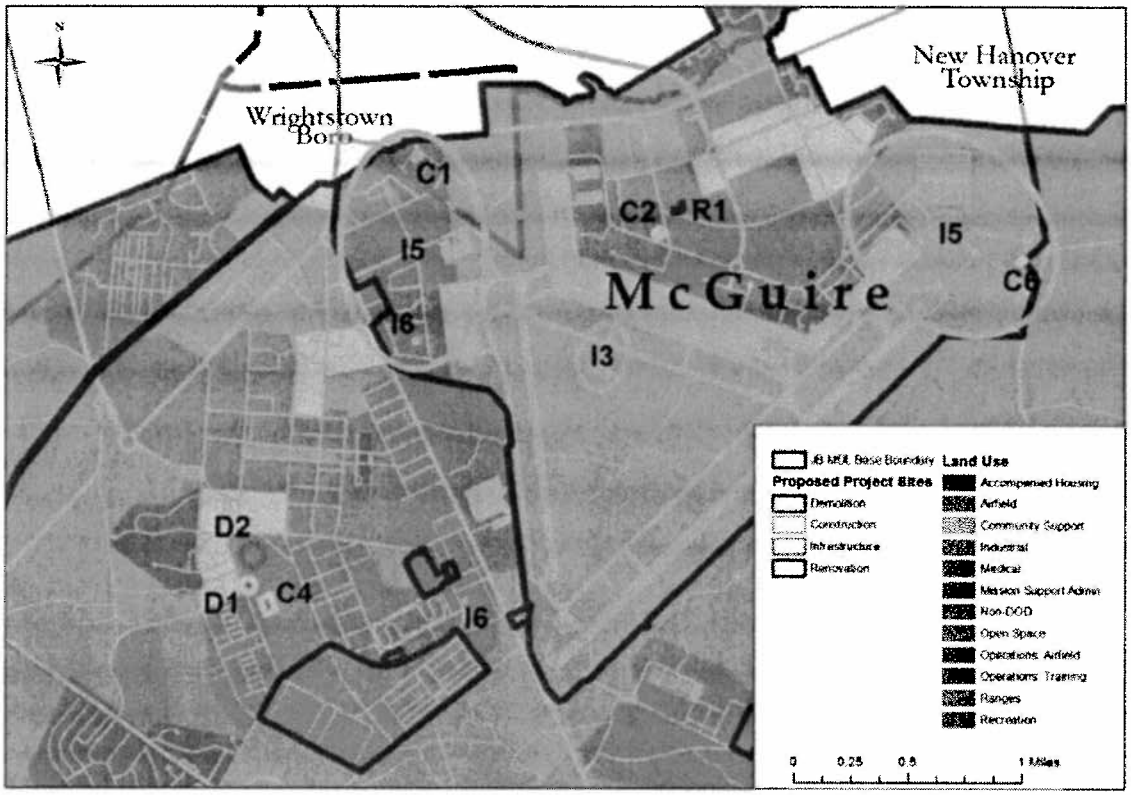


Figure 3-1. Land Zoning, JB MDL West

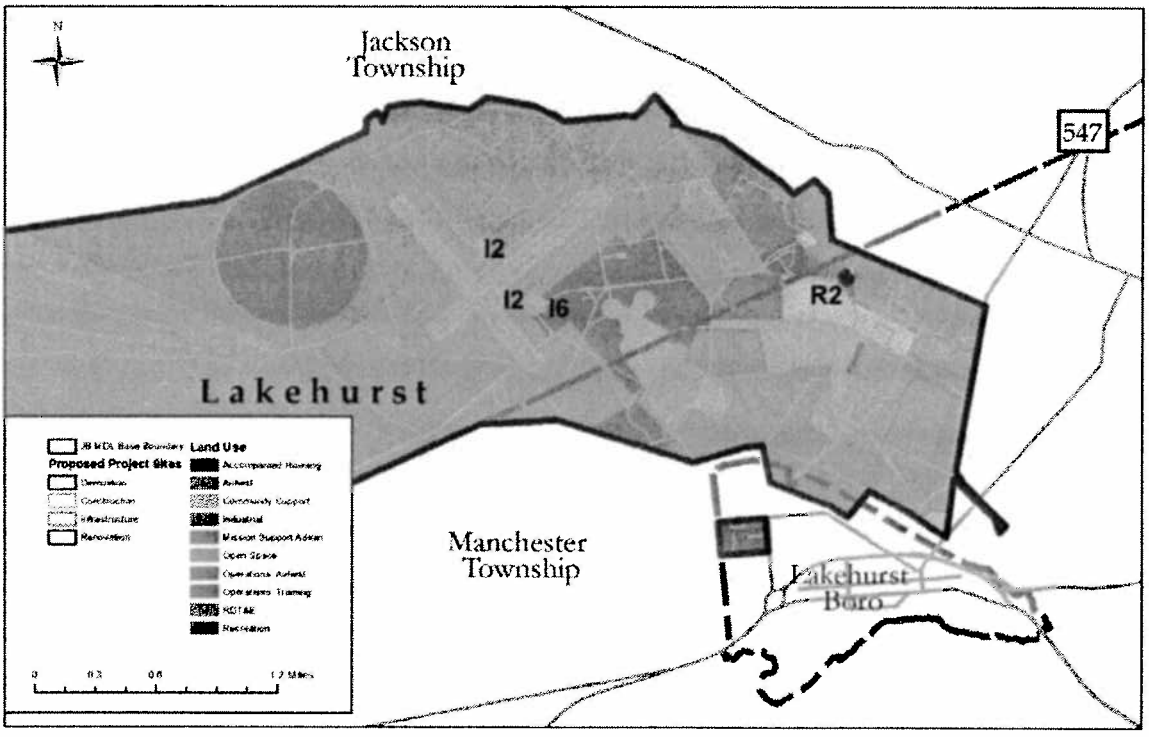


Figure 3-2. Land Zoning, JB MDL East

holistic view for the future of JB MDL. This collaborative effort consolidates functions and efficiencies, while providing the flexibility for unidentified future mission requirements; however, the IDP does not address proposed projects for the ranges. The ranges are addressed in a separate Range Control Master Plan managed by the Army Support Activity.

3.2 Airfields and Airspace

3.2.1 Definition of the Resource

The management of airspace is governed by Federal legislation and by military regulations and procedures. The ultimate authority in assigning and managing airspace is the FAA. The objective of airspace management is to meet military operational mission and training requirements through the safe and efficient use of available navigable airspace. AFI 13-201, *U.S. Air Force Airspace Management,* indicates that this objective is to be accomplished in a peacetime environment, while minimizing the impact on other aviation users and the public (USAF, 2012).

All military aircraft operate in accordance with Federal Aviation Regulations (FAR) Part 91, *General Operating and Flight Rules*, which governs such things as operating near other aircraft, right-of-way rules, aircraft speed, and minimum safe altitudes. This regulation has precise requirements for the use of airports, heliports, other landing areas, and local flying rules.

Designation of safety zones around an airfield and restriction of incompatible land uses can reduce the public's exposure to safety hazards. DoD analyses have determined that the areas immediately beyond the end of military runways and along the approach and departure flight paths have a substantial potential for aircraft accidents. These areas are called "Accident Potential Zones" (APZs).

Obstructions to air navigation are considered to be natural objects or man-made structures that protrude above imaginary surfaces. Airspace imaginary surfaces, in graphical form, are the result of the application of obstruction height criteria to areas surrounding the runways. Imaginary surfaces are surfaces in space around airfields in relation to runways. United Facilities Criteria (UFC) 3-260-01, *Airfield and Heliport Planning and Design,* contains a more complete description of runway airspace imaginary surfaces. USAF obstruction criteria in UFC 3-260-01 are based on those contained in FAR Part 77, *Objects Affecting Navigable Airspace*, Subpart C (DoD, 2008).

This IDEA only discusses the imaginary surfaces closest to the runway, as defined by UFC 3-260-01. There are "Clear Zones" (CZs) at the end of each runway that must remain clear of all obstructions over three inches. The Primary Surface extends along the length of the runway and 1,000 feet from the runway centerline on each side that must also remain clear of obstructions. The 7:1 Transitional Slope and the Approach/Departure surfaces will have varying height restrictions depending on the distance from the runway and mean sea level (MSL) elevation of the site (DoD, 2008).

3.2.2 Existing Conditions

3.2.2.1 McGuire Field at McGuire

McGuire Field contains two paved runways, 06/24 and 18/36. Runway 06/24 is 10,014 feet in length and 150 feet wide. Runway 18/36 is 7,126 feet long and 150 feet wide. There are two helicopter (helo) spots (i.e., helicopter landing areas) located on Taxiway Hotel. Runway 06/24 operates under USAF Class B criteria. Runway 18/36 operates under Air Force Class A criteria; however, the imaginary surfaces are protected under Class B criteria to allow the runway to operate as Class B when necessary.

Under USAF Class B criteria, the CZs are 3,000 feet by 3,000 feet at the end of each runway. The Primary Surface is 2,000 feet wide along the length of the runway. The Approach/Departure surface extends outward from the end of the runway. The 7:1 Transitional Surface is along the edges of the Primary Surface and Approach/Departure surface. Figure 3-3 shows McGuire Field and the associated imaginary surfaces.

McGuire Field has considerable apron space to accommodate aircraft parking for assigned and transient aircraft. There are several ramps or "rows" for parking aircraft. Most active is the Main Ramp used by the

305th and 514th for parking C-17 and KC-10 aircraft. The 108th Ramp is shared by the 108th and the Navy. Transient aircraft currently use the Bravo Ramp. X-ray and Victor Rows are used for instructional training and combat readiness practice. The newest ramp is used for the Marines' heavy and light attack rotorcraft.

3.2.2.2 Dix Airfields

There are no airfields associated with the Dix area. There is a helo pad near the boundary with the McGuire area.

3.2.2.3 Maxfield Field at Lakehurst

Maxfield Field at Lakehurst contains two paved runways, 06/24 and 15/33, and one Assault Landing Zone. Both runways are 5,000 feet in length and 150 feet wide. The Assault Landing Zone (parallel to Runway 06/24) is 3,500 feet in length and 90 feet wide and is used to conduct short field training exercises by C-17s. Two helo spots are located at Maxfield Field. Helo Spot 1 is located at the intersection of Taxiways Alpha, Bravo, and Charlie near the intersection of the runways and Helo Spot 2 is located on Mat 3, adjacent to Hangars 5 and 6. Maxfield Field currently operates under Navy (Grandfathered) Class B criteria. JB MDL plans to convert this airfield to USAF criteria; therefore, the IDP applies USAF Class A criteria to the airfield.

Under USAF Class A criteria, the CZs are 1,000 feet wide and 3,000 feet long. The Primary Surface is 1,000 feet wide centered on the runway. The Approach/Departure surface extends outward from the end of the runway. The 7:1 Transitional Surface is along the edges of the Primary Surface and Approach/Departure surface. Figure 3-4 shows Maxfield Field and the associated imaginary surfaces.

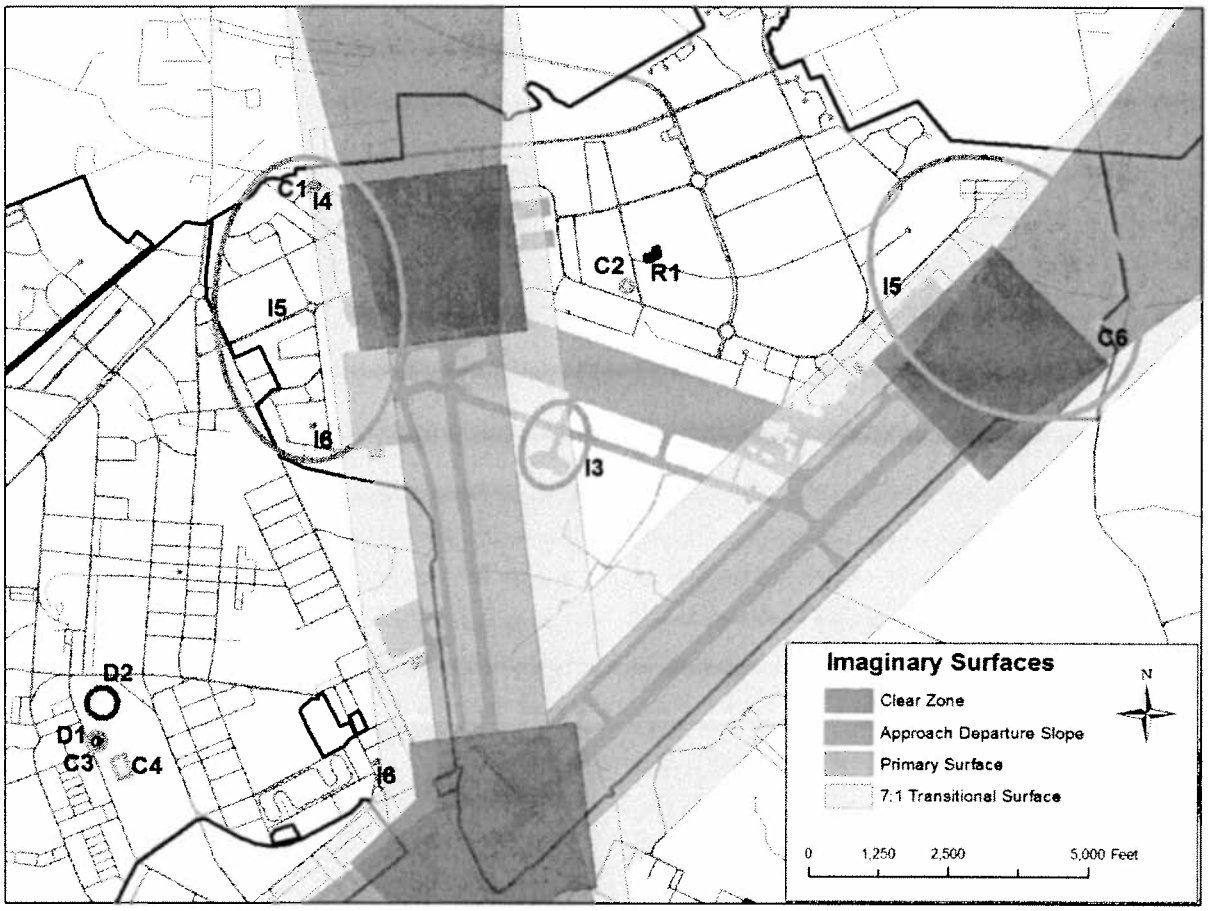


Figure 3-3. McGuire Field and Imaginary Surfaces

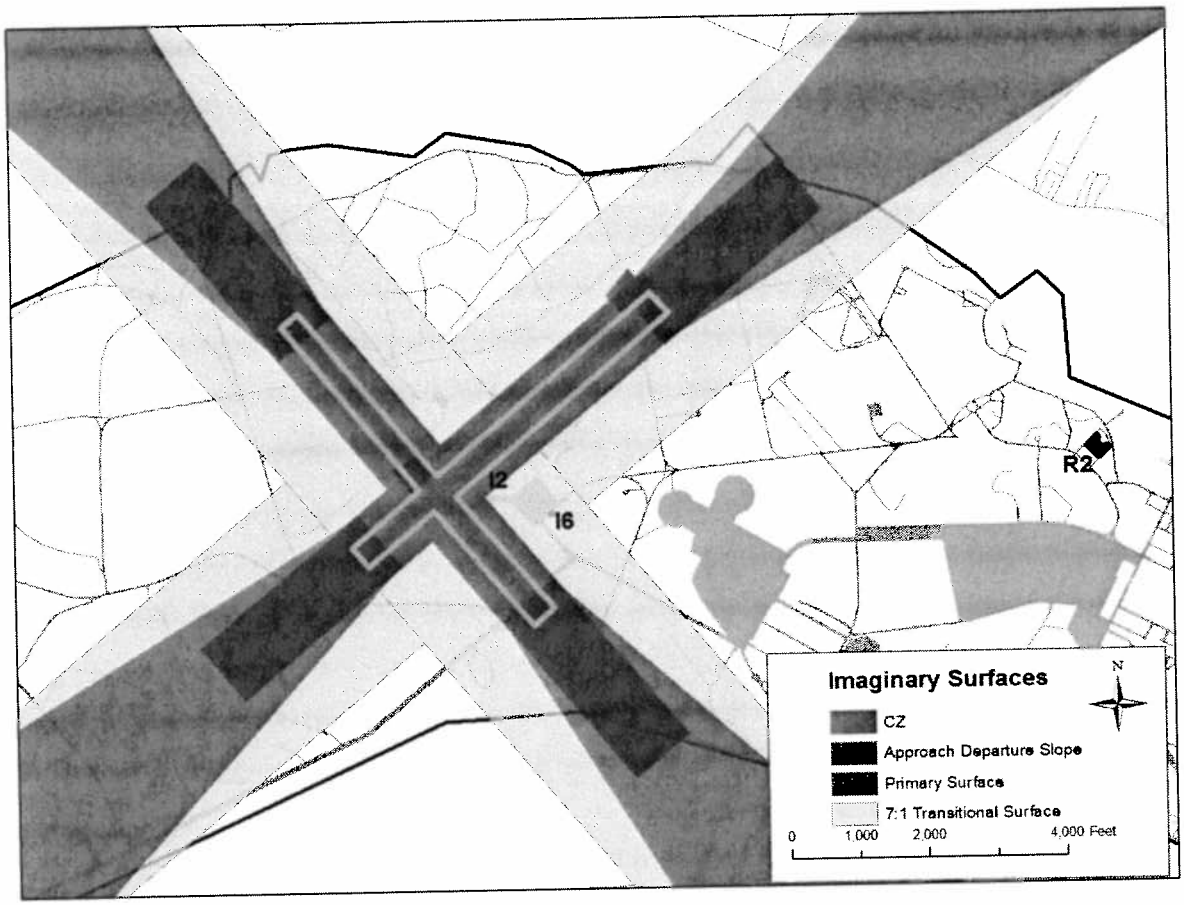


Figure 3-4. Maxfield Field and Imaginary Surfaces

3.2.2.4 Test Runway at Lakehurst

The Navy operates a 13,000-foot, 200-foot wide Test Runway (Runway 12/30) on Lakehurst to test aircraft carrier aircraft launch and arresting systems. The runway has a partial parallel taxiway and a catapult testing facility at its eastern end. This runway is dedicated to RDT&E activities exclusively.

3.3 Air Quality

3.3.1 Definition of the Resource

In accordance with Federal Clean Air Act (CAA) requirements, the air quality in a given region or area is measured by the concentration of various pollutants in the atmosphere. The measurements of these "criteria pollutants" in ambient air are expressed in units of parts per million (ppm), milligrams per cubic meter, or micrograms per cubic meter ($\mu g/m^3$). The air quality in a region is a result of not only the types and quantities of atmospheric pollutants and pollutant sources in an area, but also surface topography, the size of the topological "air basin", and the prevailing meteorological conditions. An assessment of air quality also considers the contribution of particulate matter emissions to regional haze and emissions of hazardous air pollutants and greenhouse gases.

3.3.2 Regulatory Framework

The CAA directed the United States Environmental Protection Agency (USEPA) to develop, implement, and enforce strong environmental regulations that would ensure clean and healthy ambient air quality. To protect public health and welfare, USEPA developed numerical concentration-based standards, or National Ambient

Air Quality Standards (NAAQS), for pollutants that have been determined to impact human health and the environment. USEPA established both primary and secondary NAAQS under the provisions of the CAA. NAAQS are currently established for six criteria air pollutants: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), respirable particulate matter (PM) (including PM equal to or less than 10 microns in diameter [PM_{10}] and PM equal to or less than 2.5 microns in diameter [$PM_{2.5}$]), and lead (Pb). The primary NAAQS represent maximum levels of background air pollution that are considered safe, with an adequate margin of safety to protect public health. Secondary NAAQS represent the maximum pollutant concentration necessary to protect vegetation, crops, and other public resources along with maintaining visibility standards. The State of NJ has also developed its own Ambient Air Quality Standards (AAQS), which assist the State in achieving or maintaining compliance with the NAAQS. Table 3.3-1 presents the primary and secondary USEPA and NJ AAQS.

Table 3.3-1. National and New Jersey Ambient Air Quality Standards

Pollutant	Averaging Time	Primary Standard		Secondary Standard		Form	
		Federal	NJ	Federal	NJ	Federal	NJ
CO	8-hour	9 ppm	9 ppm	9 ppm	9 ppm	Not to be exceeded more than once per year.	Not to be exceeded more than once per year.
	1-hour	35 ppm	35 ppm	35 ppm	35 ppm		
Pb[a]	Rolling 3-month average	0.15 µg/m^3	1.5 µg/m^3	0.15 µg/m^3	1.5 µg/m^3	Not to be exceeded.	Not to be exceeded.
NO_2	1-year	0.053 ppm	0.05 ppm	0.053 ppm	0.05 ppm	Annual mean.	Not to be exceeded.
	1-hour	0.1 ppm	NA	NA	NA	98th percentile averaged over 3 years.	NA
$PM_{2.5}$	Annual	12 µg/m3	NA	15 µg/m3	NA	Annual mean averaged over 3 years.	NA
	1-day	35 µg/m3	NA	35 µg/m3	NA	98th percentile averaged over 3 years.	NA
PM_{10}	1-day	150 µg/m3	NA	150 µg/m3	NA	Not to be exceeded more than once per year on average over 3 years.	NA
TSP[b]	1-year	NA	75 µg/m^3	NA	60 µg/m^3	NA	Not to be exceeded.
	1-day	NA	260 µg/m^3	NA	150 µg/m^3	NA	Not to be exceeded more than once per year.
O_3[c]	8-hour	0.075 ppm	NA	0.075 ppm	NA	Annual fourth-highest daily maximum 8-hour concentration averaged over 3 years.	NA
	1-hour	NA	0.12 ppm	NA	0.08 ppm	NA	Not to be exceeded more than once per year.
SO_2[d]	1-year	NA	0.03 ppm	NA	0.02 ppm	NA	Not to be exceeded.
	1-day	NA	0.14 ppm	NA	0.1 ppm	NA	Not to be exceeded more than once per year.

Table 3.3-1. National and New Jersey Ambient Air Quality Standards

Pollutant	Averaging Time	Primary Standard		Secondary Standard		Form	
		Federal	NJ	Federal	NJ	Federal	NJ
	3-hour	NA	NA	0.5 ppm	0.5 ppm	Not to be exceeded more than once per year.	Not to be exceeded more than once per year.
	1-hour	0.075 ppm	NA	NA	NA	99th percentile of 1-hour daily maximum concentrations averaged over 3 years.	NA

Sources: USEPA, 2013a and NJDEP, 2009

Notes:

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

[b] Although Federal standards regulate PM based on size categories (at 2.5 and 10 micron diameters), the NJ standards address all suspended particulates in a single category.

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

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

Key: CO=carbon monoxide, $\mu g/m^3$=micrograms per cubic meter of air, NA=Not Applicable, NO_2=nitrogen dioxide, O_3=ozone, $PM_{2.5}$=particulate matter (2.5 micron diameter), PM_{10}=particulate matter (10 micron diameter), Pb=lead, ppm=parts per million by volume, SO_2=sulfur dioxide, and TSP=total suspended particulates.

The CAA and USEPA delegated responsibility for ensuring compliance with NAAQS to the States and local agencies. As such, each State must develop air pollutant control programs and promulgate regulations and rules that focus on meeting NAAQS and maintaining healthy ambient air quality levels. These programs are detailed in State Implementation Plans (SIPs), which are required to be developed by each State or local regulatory agency and approved by USEPA. A SIP is a compilation of regulations, strategies, schedules, and enforcement actions designed to move the State into compliance with all NAAQS. Any changes to the compliance schedule or plan (e.g., new regulations, emissions budgets, controls) must be incorporated into the SIP and approved by USEPA. In NJ, USEPA has delegated the authority for ensuring compliance with the NAAQS to the NJDEP; therefore, the Proposed Action would be subject to rules and regulations developed by this regulatory body.

USEPA classifies the air quality in an air quality control region (AQCR), or in subareas of an AQCR, according to whether the concentrations of criteria pollutants in ambient air exceed the primary or secondary NAAQS. All areas within each AQCR are designated as either "attainment", "nonattainment", "maintenance", or "unclassified" for each of the six criteria pollutants. Attainment means that the air quality within an AQCR is below the NAAQS value, nonattainment indicates that criteria pollutant levels exceed NAAQS, maintenance indicates that an area was previously designated nonattainment but is now attainment, and unclassifiable means that there is not enough information to appropriately classify an AQCR, so the area is considered attainment.

The General Conformity Rule requires that any Federal action meet the requirements of a SIP or Federal Implementation Plan. More specifically, CAA conformity is ensured when a Federal action does not cause a new violation of the NAAQS; contribute to an increase in the frequency or severity of violations of NAAQS; or delay the timely attainment of any NAAQS, interim progress milestones, or other milestones toward achieving compliance with the NAAQS.

The General Conformity Rule applies only to actions in nonattainment or maintenance areas and considers both direct and indirect emissions. The rule applies only to Federal actions where the total emissions from the action meet or exceed the *de minimis* thresholds presented in 40 CFR Part 93.153. If a Federal action does not meet or exceed the *de minimis* thresholds, then a full Conformity Determination is not required. A conformity

evaluation is a multi-step process used to determine and document that a proposed USAF action meets the conformity rule. There are two main components to the overall process: an applicability analysis to determine whether a conformity determination is required and, if it is, a conformity determination to demonstrate that the action conforms to the SIP. Many USAF applicability analyses will find that conformity requirements area satisfied because the action is exempt, presumed to conform, or because the action's projected emissions are below the conformity applicability threshold values.

Title V of the CAA Amendments of 1990 requires states and local agencies to permit major stationary sources. A major stationary source is a facility (i.e., plant, base, or activity) that can emit more than 100 tons per year (tpy) of any one criteria air pollutant, 10 tpy of a hazardous air pollutant (HAP), or 25 tpy of any combination of HAPs. The purpose of the permitting rule is to establish regulatory control over large, industrial-type activities and monitor their impact on air quality.

Federal Prevention of Significant Deterioration (PSD) regulations also define air pollutant emissions from proposed major stationary sources or modifications to be significant if (1) a proposed project is within 10 kilometers (6 miles) of any Class I area, and (2) regulated pollutant emissions would cause an increase in the 24-hour average concentration of any regulated pollutant in the Class I area of 1 $\mu g/m^3$ or more (40 CFR Part 52.21(b)(23)(iii)). A Class I area includes national parks larger than 6,000 acres, national wilderness areas and national memorial parks larger than 5,000 acres, and international parks. PSD regulations also define ambient air increments, limiting the allowable increases to any area's baseline air contaminant concentrations, based on the area's class designation [40 CFR Part 52.21(c)].

EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, was signed in October 2009 and requires agencies to set goals for reducing greenhouse gas (GHG) emissions. One requirement within EO 13514 is the development and implementation of an agency Strategic Sustainability Performance Plan that prioritizes agency actions based on lifecycle return on investment. Each Strategic Sustainability Performance Plan is required to identify, among other things, "agency activities, policies, plans, procedures, and practices" and "specific agency goals, a schedule, milestones, and approaches for achieving results, and quantifiable metrics" relevant to the implementation of EO 13514. On August 26, 2010, DoD released its *Strategic Sustainability Performance Plan* to the public. This implementation plan describes specific actions DoD will take to achieve its individual GHG reduction targets, reduce long-term costs, and meet the full range of goals of the EO. All Strategic Sustainability Performance Plans segregate GHG emissions into three categories: Scope 1, Scope 2, and Scope 3 emissions. Scope 1 GHG emissions are those directly occurring from sources that are owned or controlled by the agency. Scope 2 emissions are indirect emissions generated in the production of electricity, heat, or steam purchased by the agency. Scope 3 emissions are other indirect GHG emissions that result from agency activities but from sources that are not owned or directly controlled by the agency. The GHG goals in the DoD Strategic Sustainability Performance Plan include reducing Scope 1 and Scope 2 GHG emissions by 34 percent by 2020, relative to FY 2008 emissions, and reducing Scope 3 GHG emissions by 13.5 percent by 2020, relative to FY 2008 emissions.

3.3.3 Existing Conditions

3.3.3.1 JB MDL Emission Sources and Title V Permits

The Dix, McGuire, and Lakehurst areas each maintain separate Title V permits and do not plan to consolidate these permits under joint basing. Table 3.3-2 provides an overview of existing permit limits for significant stationary sources and actual emissions.

Primary emission sources in the McGuire area include boilers, space heaters (heating units and roof-mounted space heaters), generators, and engine tests conducted in the engine test cell. Other operational sources include degreasers, woodworking, welding, chemical use and painting operations, aircraft deicing, and aircraft fuel cell maintenance.

Primary emission sources in the Dix area include boilers, a paint booth, space heaters (heating units and roof-mounted space heaters), and generators. Air pollutants are released to the air from various operational sources on Dix, such as solvents, cleaners, antifreeze, adhesives, and other products that contain criteria pollutants and HAPs. These operational sources include degreasers, woodworking, welding, chemical use and painting

operations, aircraft deicing, and aircraft fuel cell maintenance.

Primary emission sources at Lakehurst include: natural gas boilers providing heat to individual buildings, the Power Plant 2 steam plant (supporting Navy catapult testing); diesel generators for backup power; paint spray booths; and industrial shop equipment.

Table 3.3-2. 2011 JB MDL Potential and Actual Air Pollutant Emissions from Title V Sources

Pollutant	Category	McGuire Area Emissions (tpy)	Dix Area Emissions (tpy)	Lakehurst Area Emissions (tpy)	Total (tpy)
CO	Permitted Maximum	74.8	32.5	55.6	172.3
	2011 Actual	8.29	14.97	10.36	33.62
Nitrogen Oxide (NO_x)	Permitted Maximum	90.3	76.6	70.2	278.8
	2011 Actual	23.24	17.58	24.87	65.69
Pb[1]	Permitted Maximum	NA	NA	0.0062	0.0062
	2011 Actual	0.0004	0.023	0.00025	0.02025
PM_{10}	Permitted Maximum	12.0	3.3	11.4	26.7
	2011 Actual[2]	3.43	7.18	2.51	13.12
$PM_{2.5}$[1]	Permitted Maximum	NA	NA	NA	NA
	2011 Actual	1.94	1.34	2.49	5.79
SO_2	Permitted Maximum	58.2	20.3	2.99	81.49
	2011 Actual	4.58	2.57	1.11	8.26
TSP	Permitted Maximum	12.3	4.2	11.4	27.9
	2011 Actual[2]	3.45	14.09	2.52	20.06
Volatile Organic Compounds (VOC)	Permitted Maximum	19.5	22.7	20.3	62.5
	2011 Actual	8.78	12.04	7.36	28.17
Hazardous Air Pollutants (HAPs)	Permitted Maximum	NA	NA	9.54	9.54
	2011 Actual	5.79	4.18	0.23	10.20
Carbon Dioxide (CO_2)[3]	2011 Reported	45,870	18,220	11,750	75,840

Sources: JB MDL, 2012; JB MDL, 2012a; JB MDL, 2012b.
Notes: Actual emissions include significant, insignificant and fugitive emissions. Permit limits are limits only for significant sources. tpy= tons per year
[1] There is no permitted maximum allowances designated for Pb and $PM_{2.5}$. NA=Not Applicable.
[2] PM_{10} and TSP actual emission levels for Dix include fugitive dust from traffic from unpaved roads and munitions operations.
[3] There are no permitted maximums for CO_2. However, CO_2 is reported in the annual emission summaries.

3.3.3.2 Nonattainment Areas and State Implementation Plan

NJ's location along the northeast corridor between the major metropolitan centers of Boston and Washington, D.C., places NJ at the epicenter of pollutants transported from other states. In addition, westerly winds from the Ohio River Valley and night-time reservoirs of pollutants from southern states along the Appalachian Mountain Range have been shown to contribute to high ozone and fine particulate concentrations in NJ (NJDEP, 2010). Atmospheric ozone occurs when NO_x, CO, and VOCs react in the atmosphere in the presence of sunlight (a photochemical reaction). NO_x and VOCs are called ozone precursors and are regulated as a means of controlling ozone production. Motor vehicle exhaust, industrial emissions, and chemical solvents are the major anthropogenic sources of these chemicals.

JB MDL is located in Ocean and Burlington Counties, NJ. Ocean County is in moderate/marginal nonattainment with the 2008 ozone standards (8-hour). Burlington County was previously within a nonattainment area for $PM_{2.5}$. On September 4, 2013, the USEPA approved a designation of attainment for $PM_{2.5}$ for counties in NJ (including Burlington County), effective on that date (USEPA, 2013b). JB MDL is

located in an area of attainment for all other criteria pollutants.

The October 29, 2007 NJ SIP established general conformity budgets for McGuire and Lakehurst for VOCs and NO_x. These proposed budgets were established to provide the bases the operational flexibility to meet their missions and future missions of the DoD. These proposed budgets were approved by USEPA under 40 CFR Part 52.1582(m)(5). The 2011 general conformity budget for Lakehurst is 129 tpy of VOC and 793 tpy of NO_x. The 2011 budget for McGuire is 730 tpy of VOC and 1,534 tpy of NO_x (NJDEP, 2007). The base's aircraft operations are its largest source of mobile emissions and are the basis for the SIP budgets allocated to McGuire and Lakehurst. Since the 2007 SIP budget was established, McGuire implemented several energy conservation projects, including the decentralization of the heating plant by installing individual natural gas boilers in buildings. There is no specific SIP budget for the Dix area.

3.3.3.3 Proximity of Class I Areas

The Regional Haze Rule aims to improve visibility in national parks and wilderness areas (Class I Areas). Class I areas are subject to the most stringent PSD increments. PSD requirements discourage siting a major source of air pollutant emissions (as defined in Section 3.3.1) within 100 kilometers (62 miles) of a Class I visibility area. The closest Class I Federal Area to JB MDL is the Brigantine Wilderness Area, located approximately 50 kilometers (31 miles) to the southeast of the base.

3.3.3.4 Regional Emissions

Table 3.3-3 provides the regional emission levels for Burlington and Ocean Counties.

Table 3.3-3. Regional Emissions for Burlington and Ocean Counties, New Jersey

Source	NO_x	VOCs	CO	PM_{10}	$PM_{2.5}$	SO_2
Regional Emissions – Burlington County						
Stationary Sources	2,935	1,882	6,767	1,010	940	500
Area-Wide Sources	311	25,564	12,110	4,191	1,066	73
Mobile Sources	9,594	6,056	60,287	592	487	122
Total	12,840	32,502	79,164	5,793	2,493	695
Regional Emissions – Ocean County						
Stationary Sources	2,881	1,277	5,078	883	666	582
Area-Wide Sources	339	19,656	6,369	2,740	583	36
Mobile Sources	8,415	12,765	70,288	656	516	109
Total	11,635	33,698	81,735	4,279	1,765	727

Notes: Emissions of lead are not included because the region contains no significant sources of this criteria pollutant. Numbers may not be precise due to rounding.
Source: USEPA, 2013c

3.4 Noise

3.4.1 Definition of the Resource

Sound is defined as a particular auditory effect produced by a given source, for example the sound of rain on a rooftop. Sound is measured with instruments that record instantaneous sound levels in decibels (dB). The measurement dBA is used to characterize sound levels that can be sensed by the human ear.

Noise and sound share the same physical aspects, but noise is considered a disturbance while sound is defined as an auditory effect. Noise is defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or is otherwise annoying. Noise can be intermittent or continuous, steady or impulsive, and can involve any number of sources and frequencies. It can be readily identifiable or generally nondescript.

Human response to increased sound levels varies according to the source type, characteristics of the sound

source, distance between source and receptor, receptor sensitivity, and time of day. How an individual responds to the sound source will determine if the sound is viewed as music to one's ears or as annoying noise.

Sensitive noise receptor locations include housing areas, schools, places of worship, daycare facilities, and hospitals. As military operations have occurred on JB MDL for several decades, sensitive facilities are located an adequate distance from the airfields and range areas to minimize noise impacts.

3.4.1.1 Noise Metrics

Sound levels, reported in dB, are used to summarize how people hear sound and to determine the impact of noise on public health and welfare. Noise is quantitatively measured in dBs using a sound level meter. Sound can be measured at a particular moment or over a period of time. Below are some common sound descriptors used to evaluate the way the human ear interprets dB from various sources:

- **A-Weighted Sound Level.** A measure of noise level (expressed as dBA) designed to reflect the acuity of the human ear, which is less efficient at low and high frequencies than at medium or speech-range frequencies. This descriptor is typically used to evaluate noise from aircraft and ground transportation.
- **Un-Weighted Sound Level.** A measure of noise level (expressed as dBP) used to measure impulsive sounds, either a single pressure peak or a single burst of multiple pressure peaks. These types of sound events occur for a duration of less than one second as measured on a dBP meter. This descriptor is typically used to characterize sound levels emitted from small arms weapons firing on ranges.
- **Day-Night Sound Level (DNL).** A method to measure the impact of noise (expressed as Ldn) using the A-weighted sound level for a 24-hour period with an additional 10 dB imposed on the equivalent sound levels for nighttime hours of 10 p.m. to 7 a.m. The DNL will always be higher than the equivalent sound level (defined below) due to the nighttime decibel penalty. The DNL is the primary descriptor for military noise, except small arms.
- **Equivalent Sound Level.** A time-averaged method to express varying ADNL (the A-weighted DNL) over a given time period as a steady noise level.
- **C-Weighted Day-Night Level.** A measure of noise designed to measure the peak noise level from impulsive sounds (i.e., blasts). This descriptor is typically used to evaluate noise from large caliber weapons fire and explosives.

Two types of measurements are normally considered when determining noise impacts on the surrounding population: the DNL and peak sound levels. Single event noise levels are also used to assess the risk of noise complaints. A peak sound level is a single noise event; it is the estimated maximum noise level that is heard. Sound levels are expressed in dBA or dBP. Sound levels resulting from multiple single events, are used to characterize community noise effects from aircraft or sustaining road and building construction activity, and are measured in ADNL. ADNL is the preferred sound level metric used to characterize noise impacts of the FAA, HUD, USEPA, and DoD for modeling airport environments.

3.4.1.2 Regulations

DNL is the designated metric of the Federal government for measuring noise and its impacts on humans. According to the USAF, FAA, and the HUD criteria, residential units and other noise-sensitive land uses are "clearly unacceptable" in areas where the noise exposure exceeds 75 dBA DNL, "normally unacceptable" in regions exposed to noise between 65 and 75 dBA DNL, and "normally acceptable" in areas exposed to noise of 65 dBA DNL or less. The Federal Interagency Committee on Noise developed land use compatibility guidelines for noise in terms of DNL (FICON, 1992). For outdoor activities, the USEPA recommends 55 dBA DNL as the sound level below which there is no reason to suspect that the general population would be at risk from any of the effects of noise (USEPA, 1974).

The Federal government has established noise guidelines and regulations for the purpose of protecting citizens from potential hearing damage and from various other adverse physiological, psychological, and social effects

associated with noise. Under the Noise Control Act of 1972, the Occupational Safety and Health Administration (OSHA) established workplace standards for noise. The minimum requirement states that constant noise exposure must not exceed 90 dBA over an 8-hour period. The highest allowable sound level to which workers can be constantly exposed is 115 dBA and exposure to this level must not exceed 15 minutes within an 8-hour period. The standards limit instantaneous exposure, such as impact noise, to 140 dBA. If noise levels exceed these standards, employers are required to provide hearing protection equipment that will reduce sound levels to acceptable limits (29 CFR Part 1910.95).

NJ's Noise Control Act of 1971 authorized promulgation of codes, rules, and regulations relating to the control and abatement of noise. NJDEP has developed a Model Noise Ordinance that can be adopted by local municipalities. The Noise Control Act allows municipalities to adopt noise control ordinances that are more stringent than the State code. NJDEP promulgated noise regulations to control noise from stationary commercial and industrial sources in 1974, pursuant to the Noise Control Act of 1971, NJ Statutes Annotated (N.J.S.A.) 13:1G-1 et seq. Within the noise regulations, there are established sound level standards of 50 dB during nighttime (10:00 p.m. to 7:00 a.m.) and 65 dB during daytime (NJDEP, 2012).

3.4.1.3 Common Sounds

Most people are exposed to sound levels of 50 to 55 dBA or higher on a daily basis. Table 3.4-1 compares typical sound levels of various sources. Studies specifically conducted to determine noise impacts on various human activities show that about 90 percent of the population is not significantly bothered by outdoor sound levels below 65 dBA (USDOT, 1984). Sound levels of 65 dBA or more are generally considered to cause human irritation. Noise levels can become annoying at 80 dBA and very annoying at 90 dBA. Repeated exposure to levels of 90 dBA or higher can lead to hearing loss. To the human ear, each 10 dBA increase multiplies the sound intensity tenfold (USEPA, 1981).

Table 3.4-1. Typical Sound Levels of Various Sources

Noise Source	Typical Sound Level (dB)[1]
Normal breathing	10
Light Traffic	50
Rainfall	50
Normal conversation	60
Lawn mower at 50 feet	90
Motorcycle	100
Thunder	110
Gunshot blast	140
Near jet plane at takeoff	140
Artillery fire at 500 feet	150
Rifle discharge	163

Source: Bearden, 2003; USEPA, 1974
1. The threshold of pain is 120 dB.

3.4.2 Existing Conditions

The ambient sound environment around JB MDL is likely to resemble a noisy urban atmosphere. To address both noise and safety, DoD required military departments to establish an AICUZ program. The goal of AICUZ is to promote compatible land use on and off base to minimize noise complaints and safety hazards. Typical noise sources in and around JB MDL include vehicle traffic, aircraft operations from Lakehurst and McGuire airfields, and military operations which includes weapons training on Dix. Figure 3.4-1 depicts the noise levels predicted by the 2012 AICUZ for all of JB MDL.

3.4.2.1 McGuire Airfield Noise

The noise contours for the McGuire airfield (Figure 3-2) were updated in the 2012 JB MDL AICUZ Study. The noise contours are similar in both shape and extent of coverage when compared to the noise contours in the 2009 AICUZ Study, but are generally smaller. Major differences in the contours occur to the north, where

the 2012 contour extends farther, and to the northeast and southwest, where the 2012 contour covers less land. Additionally, a portion of land southeast of the installation exposed to noise levels of 65–69 dB DNL in the 2009 study is no longer exposed to these levels in the 2012 study. The primary reason for the smaller contours in 2012 was that C-17 training in 2009 concentrated to a greater extent on tactical operations, which are conducted at low-altitude, high engine power settings, and/or late at night. In isolated areas, such as the area north of Runway 18/36, increases in KC-10 night operations have led to minor increases in area exposed to noise greater than 65 dB DNL.

Many of the airfield support buildings at McGuire are located within the 65+ dBA noise zone, which cannot be avoided; however, barracks and housing areas are located outside the 65+dBA zone, limiting noise complaints. JB MDL actively participates in the DoD Readiness and Environmental Protection Initiative program to identify and purchase restrictive easements for off-base land parcels that are in high noise zones. To date, the program has resulted in easements on, or long-term preservation of, 990 acres in the vicinity of the McGuire airfield.

3.4.2.2 Lakehurst Maxfield Field Noise

The noise contours for the Lakehurst Maxfield Field (Figure 3-3) were updated in the 2012 JB MDL AICUZ Study. Training flights on the C-17 assault landing zone at Maxfield Field is the leading contributor to airfield noise on Lakehurst. The 2012 noise contours are similar in both shape and extent of coverage when compared to the noise contours in the EA for East Coast Basing of C-17 Aircraft (HQ AMC, 2005), but are generally smaller. The primary cause of the reduction in size of the noise contours is a decrease of C-17 operations and particularly of C-17 operations conducted late at night (after 10:00 p.m.) (JB MDL, 2013). Testing on the Lakehurst Test Runway occurs infrequently and primarily during day-light hours. The remoteness of the Test Runway helps alleviate noise complaints from both on-base and off-base receptors; however, when jet aircraft are tested on the Test Runway (such as the F-35), the noise (although intermittent) is perceptible for several miles. To date, the Readiness and Environmental Protection Initiative program has resulted in easements on or preservation of 2,500 acres in the vicinity of the Lakehurst Airfield Complex.

3.4.2.3 Compatible Land Use

Table 3.4-2 lists the categories of land use compatible with different noise zones. Thresholds have been established under Army Regulations for three noise zones (Noise Zone I, II and III) and a land use planning zone (LUPZ). The LUPZ is provided for planning purposes; all land uses are considered compatible with Noise Zone I, which is inclusive of the LUPZ. Noise zones across JB MDL are shown in Figure 3-5.

Table 3.4-2. Land Use Compatibility with Noise Zones

Category	LUPZ	Noise Zone I	Noise Zone II		Noise Zone III	
	60-65 dB	<65 dB	65-69 dB	70-74 dB	75-79 dB	80+ dB
Households/ Government/ Education/ Parks/ Hospitals	Y	Y	C	C	N	N
Manufacturing/ Agriculture	Y	Y	Y	C	C	C
Retail-General/ Restaurants/ Personal Services	Y	Y	Y	C	C	N
Public Assembly	Y	Y	Y	N	N	N

Y = Compatible Use
C= Conditionally Compatible Use
N= Non-conditionally compatible Use

The term "conditionally compatible" refers to land uses and related structures that are generally recommended within the AICUZ environs, with certain restrictions. Restrictions can include limits on densities of people and structures, requirements that noise level reduction measures are incorporated into the design and construction of structures, or the restriction that personnel should wear hearing protection devices.

Several projects under the Proposed Action would be located in high noise areas. Specifically, Projects C2,

C6, I5, and I6 on McGuire and projects C5 and I6 on Lakehurst would be located in Noise Zone II. Project I3 on McGuire would be located in Noise Zone I, and Project I2 on Lakehurst would be located in Noise Zones I and II. See Figures 3-6 and 3-7 for project locations relative to noise zones.

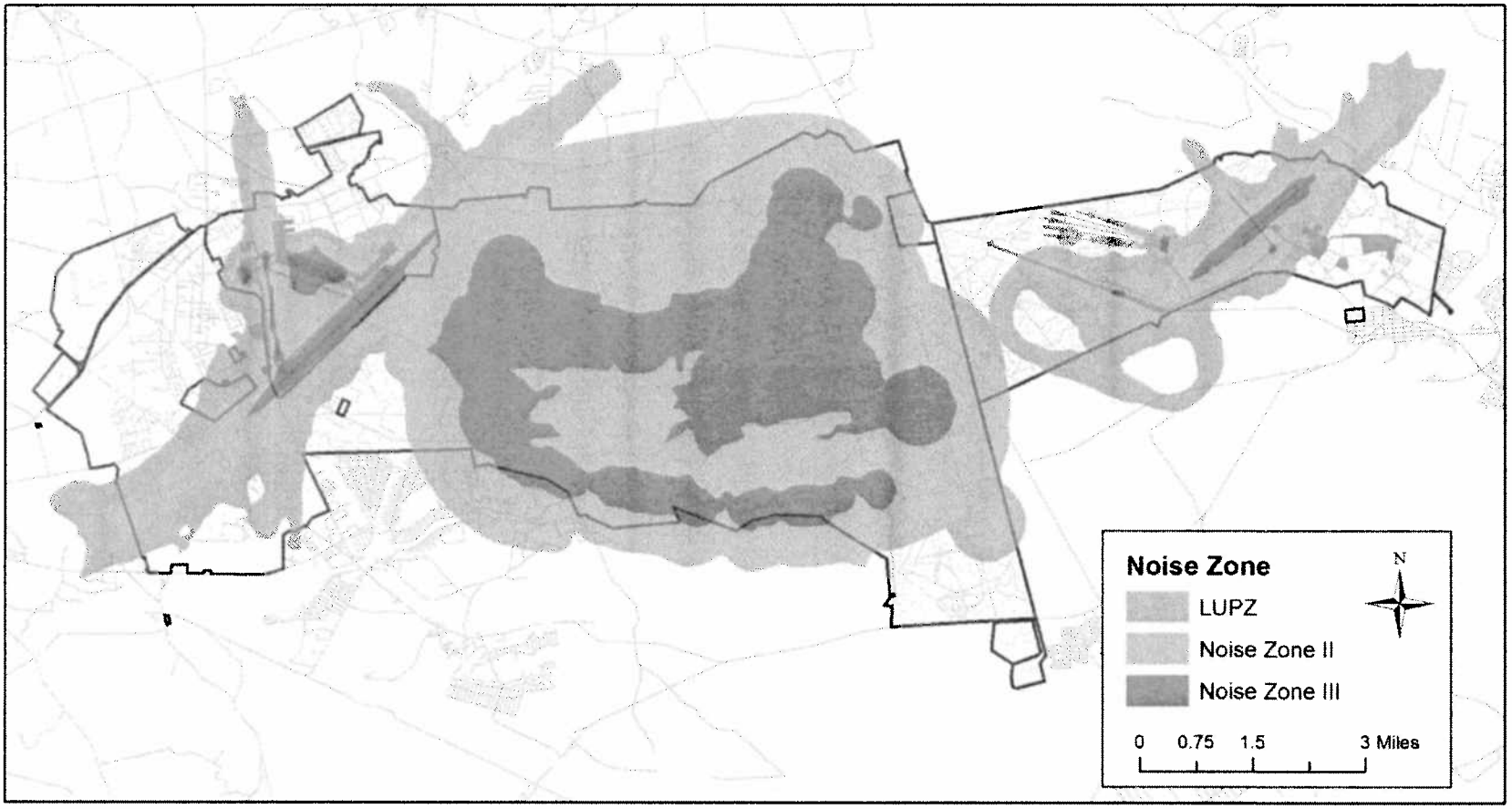


Figure 3-5. Noise Zones across JB MDL

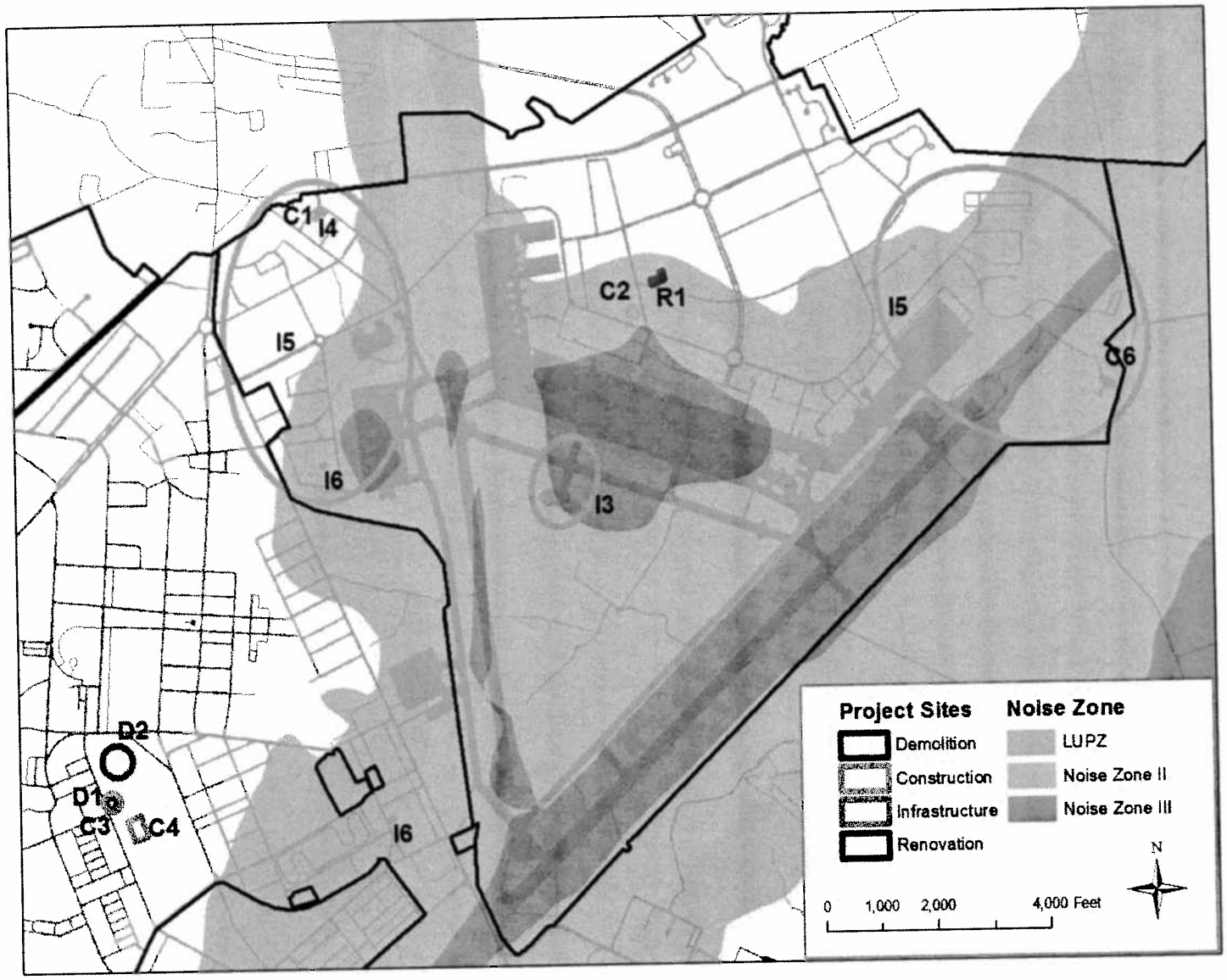


Figure 3-6. Projects Selected for Detailed Analysis on McGuire and Dix Relative to Noise Zones

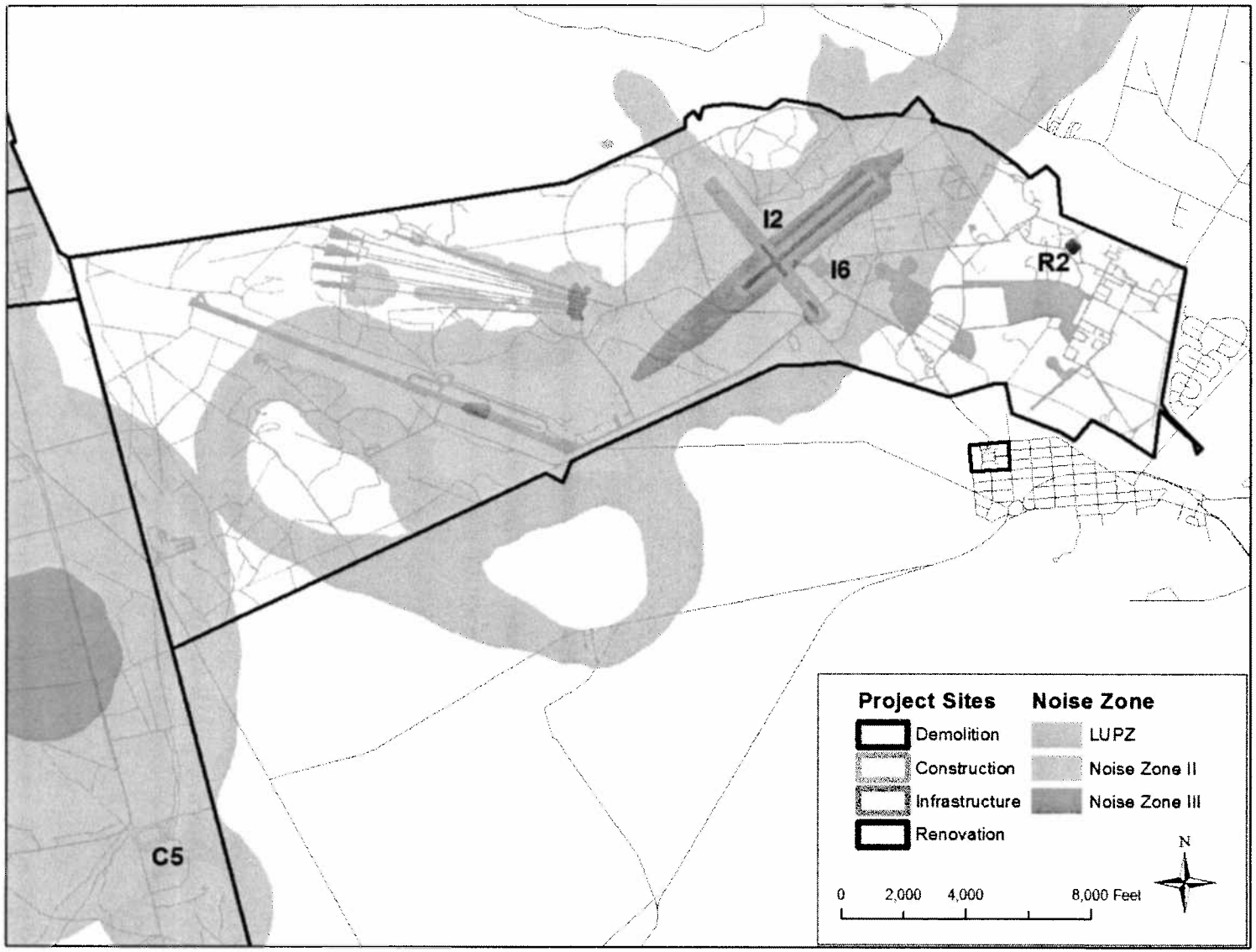


Figure 3-7. Projects Selected for Detailed Analysis on Lakehurst and the Dix Range Relative to Noise Zones

3.5 Geologic Resources

3.5.1 Definition of the Resource

Geological resources consist of the Earth's surface and subsurface materials. Within a given physiographic province, these resources typically are described in terms of topography, soils, geology, minerals, and paleontology.

Topography is defined as the relative positions and elevations of the natural or human-made features of an area that describe the configurations of its surface. An area's topography is influenced by many factors, including human activity, seismic activity of the underlying geological material, climatic conditions, and erosion. Information about an area's topography typically encompasses surface elevations, slope, and physiographic features (i.e., mountains, ravines, or depressions).

Geology is the study of the solid earth, the rocks of which it is composed, and the processes by which they evolve. Geology gives insight into the history of the Earth, as it provides the primary evidence for plate tectonics, the evolutionary history of life, and past climates. Geology is commercially important for mineral and hydrocarbon exploration and is publicly important for the prediction and understanding of natural hazards, the remediation of environmental problems, and for providing insights into past climate changes.

Soil is a natural body consisting of layers (soil horizons) that are primarily composed of minerals which differ from their parent materials in their texture, structure, consistency, color, chemical, biological, and other characteristics. It is the unconsolidated materials overlying bedrock or other parent materials. Soil is the end product of the influence of the climate (temperature, precipitation), relief (slope), organisms (flora and fauna), parent materials (original minerals), temperature, and time. Soils are typically described in terms of their complex type, slope, and physical characteristics. Differences among soil types in terms of their structure, elasticity, strength, shrink-swell potential, and erosion potential affect their abilities to support certain applications or uses. In appropriate cases, soil properties must be examined for their compatibility with particular construction activities or types of land uses. In NJ, all construction activities must comply with the Soil Erosion and Sedimentation Control Act (NJ Public Law 975, Chapter 251), which established and implemented a Statewide comprehensive and coordinated erosion and sediment control program. The National Pollutant Discharge Elimination System (NPDES) program, the CWA, and NJ's Erosion and Sedimentation Control Act mandate that erosion and sedimentation controls be implemented during projects that require one or more acres of ground disturbance. These projects must obtain a NJ Pollutant Discharge Elimination System (NJPDES) general permit for construction that includes a site-specific Erosion and Sediment Control Plan. Also, for JB MDL projects disturbing over one acre of soil, a site-specific Erosion and Sedimentation Control Plan must be submitted to either the Ocean County Soil Conservation District or Burlington County Soil Conservation District for review and certification prior to initiation of construction.

The Federal Farmland Protection Policy Act (FPPA) (Public Law 97 98; 7 U.S.C. 4201 et seq.) was enacted in an effort to document potential impacts to agricultural land and to preserve land with the potential to consistently produce food and raw materials. The supply of high quality farmlands is limited; therefore, the U.S. Department of Agriculture (USDA) encourages the preservation of soils classified as prime farmland, or soils used for agriculture unique to a state. Prime farmland soils are defined by the USDA as: "land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and that is available for these uses (USDA, 2010). Determination of whether an area is considered prime or unique farmland and potential impacts associated with a proposed action is based on preparation of a farmland conversion impact rating form AD-1006 for areas where prime farmland soils occur and by applying criteria established at Section 658.5 of the FPPA (7 CFR Part 658). The USDA Natural Resources Conservation Service is responsible for overseeing compliance with the FPPA and has developed the rules and regulations for implementation of the FPPA (see 7 CFR Part 658, 5 July 1984).

3.5.2 Existing Conditions

3.5.2.1 Topography

JB MDL is located within the Atlantic Coastal Plain Physiographic Province which formed as a result of continental and marine deposition of clays, silts, sands, and gravel 170 to 200 billion years ago. More specifically, JB MDL is located within both the Inner and Outer Coastal Plain Physiographic Regions. Although they are not greatly different geologically, they are quite distinct geographically (see Figure 3-8). The Inner Coastal Plain is characterized by relatively flat terrain, underlain by sands and gravels with meandering rivers which drain to the Raritan or Delaware Rivers. The Inner Coastal Plain's northwest border lies along the Piedmont fall line. The McGuire portion of JB MDL lies along the eastern boundary of the Inner Coastal Plain. Major features of the Inner Coastal Plain include nearly level plains, gently rolling uplands, extensive surficial dissection, mature streams, and swampy areas. The Outer Coastal is characterized by relatively flat terrain, underlain by the sands and gravels of relatively recent geologic origin and is separated from the Inner Coastal Plain by a low ridge, marked by hills. The sandy-soiled Pinelands, occupies a large portion of the Outer Coastal Plain.

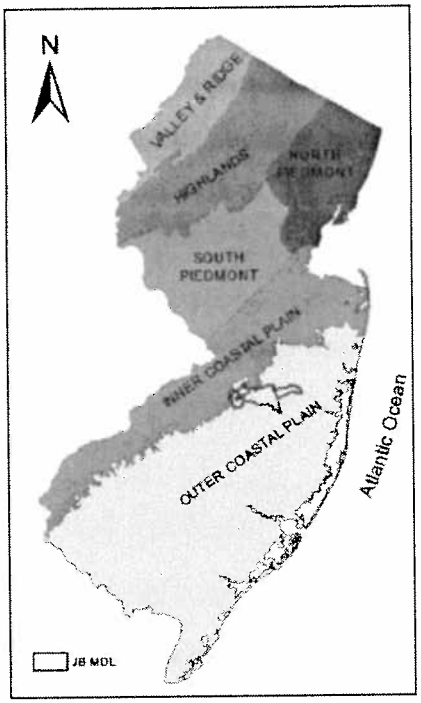


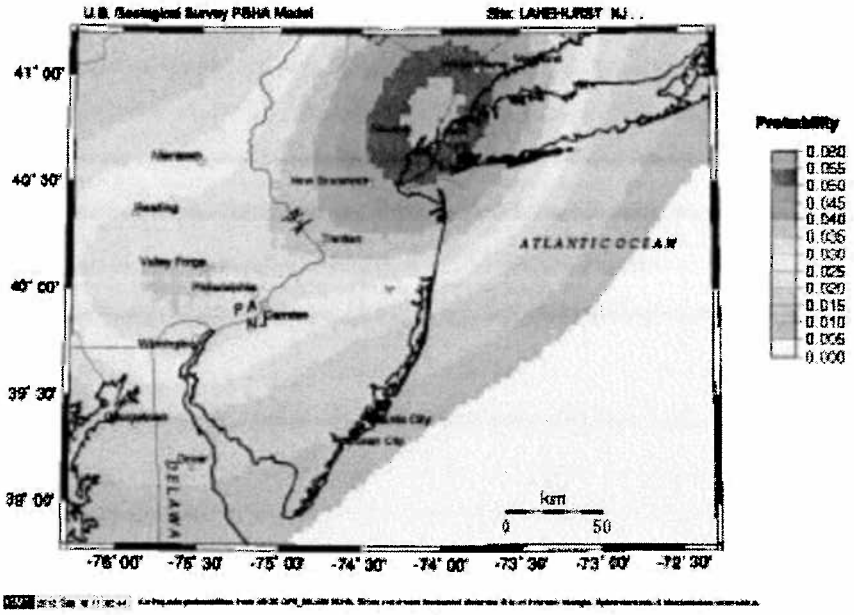
Figure 3-8. Physiographic Regions throughout NJ

The elevations throughout JB MDL range from 70 feet above MSL in the eastern portion of the Dix area and portions of the Lakehurst area to a maximum of 200 feet above MSL on Dix (USACE, 2006 and NAES Lakehurst, 2002). Surface elevations on McGuire range from 80 feet above MSL along the South Run stream channel to 144 feet above MSL in the cemetery along Texas Avenue (MAFB, 2004).

3.5.2.2 Geology

The local geology on JB MDL is dominated by interbedded continental and near-shore marine sands and clays of the Cohansey (Pliocene and Miocene), Kirkwood (Miocene), and Vincentown (Paleocene) formations. The Cohansey formation represents most of the surface deposits throughout the Coastal Plain and is well exposed in road cuts and sand pits throughout the Pinelands region (USGS, 2012). The Cohansey sand which forms a thin veneer over much of the installation, consists of light gray to yellow brown, well sorted, cross bedded, fine to coarse grained, partly arkosic quartz sand (MAFB, 2001). The Kirkwood formation consists of a clayey to silty mudrock, massive sand, and thin pebble lenses deposited in near-shore environments. The base of the Kirkwood sits on top of older Tertiary units and its thickness ranges from 100 to 300 feet in the Pinelands region. The Vincentown formation thickness ranges from 50 to 100 feet and consists of quartz sand, with phosphatic pellets, and glauconite (USGS, 2012).

Through the National Earthquake Hazard Reduction Program, the U.S. Geological Survey (USGS) generated a geologic seismic hazard probability database to estimate the potential for earthquakes in the U.S. Through this database the USGS has produced seismic hazard maps that are used to update seismic design maps and provisions contained in building codes, to provide a basis for design requirements for highway bridges, to set property insurance rates, to estimate landslide potentials of hillsides, and to set waste-disposal facility standards that ensure safety (USGS, 2001). According to this database, in the next 30 years there is a 25 to 30 percent chance that a magnitude 5.0 or greater earthquake would occur within 30 miles of JB MDL (Figure 3--9) (USGS, 2012a); however, the physical damage from a local earthquake is dependent on the magnitude of the seismic event, a location's distance to the epicenter, the stability of the ground, and the structural integrity of the building.



Source: USGS, 2012

Figure 3-9. Probability of an Earthquake within 30 years and 30 Miles of JB MDL

The USGS has produced seismic hazard maps for the rate at which earthquakes occur and on the amount of ground shaking anticipated. A calculation called the Peak Ground Acceleration predicts the amount of ground shaking a location could feel from an earthquake that has a 5 percent chance of being exceeded in a 50-year period. Ground shaking is expressed as a percentage of the force of gravity (percent g) and is proportional to the hazard faced by a structure. In general, little or no damage is expected at values less than 10 percent g, moderate damage could occur at 10 to 20 percent g, and major damage could occur at values greater than 20 percent g. The Peak Ground Acceleration value for JB MDL ranges from four to six percent g (USGS, 2008), where little to no damage is expected.

3.5.2.3 Soils

The following section describes the different predominant soils found throughout JB MDL. There are 32 soil series and 95 soil mapping units underlying JB MDL. Sixty percent of the acreage on JB MDL is comprised of four major soil series: Lakewood (23 percent), Lakehurst (18 percent), Atsion (11 percent), and Downer (8 percent). The Lakehurst, Lakewood and Downer soil units are not limited for construction, while the Atsion unit is very limited (JB MDL, 2012c). Table 3.5-1 provides a summary of the soil series on JB MDL by total acreage.

Table 3.5-1. Soil Series on JB MDL

Soil Series	Area (acres)	Soil Series	Area (acres)
Adelphia	1,160.5	Lakewood	9,662.7
Atsion	4,439.4	Manahawkin	2,063.8
Berryland	2,058.5	Mullica	475.4
Buddtown	169.4	Pemberton	340.4
Colemantown	16.4	Phalanx	27.7
Collington	200.8	Pits	441.9
Downer	3,257.2	Psamments	172.1
Evesboro	1,946.4	Psammaquents	120.9
Fluvaquents	376.9	Sassafras	2,131.2
Freehold	662.6	Shrewsbury	425.5

Table 3.5-1. Soil Series on JB MDL

Soil Series	Area (acres)	Soil Series	Area (acres)
Galloway	465.7	Udorthents	492.9
Holmdel	243.1	Urban Land	1,565.5
Humaquepts	10.5	Water	316.6
Jade Run	260.3	Westphalia	450.9
Keyport	36.4	Woodmansie	531.6
Lakehurst	7,454	Woodstown	157.7

Source: JB MDL, 2012c

Forty eight different soil mapping units and 26 soil series have been mapped at the McGuire area of JB MDL (MAFB, 2008). Surface soils at McGuire are typically sandy and permeable and have a shallow water table (i.e., six feet or less below the ground surface). The majority of the surface areas on McGuire are classified as Urban Land, sandy (Ug). Most of this land is developed. Areas of both cut and fill are moderately or rapidly permeable. The soil has slight limitations for industrial or commercial use, moderate limitations for woodland or wildlife use, and severe limitations for farming and ponds (USDA, 1971).

Fifteen soil mapping units and nine soil series have been mapped on the Lakehurst area. The predominant soil at Lakehurst is classified as non-hydric upland soils, followed by hydric soils, Psamments, and Urban Land. Upland soils include sands, sandy loams, and loamy sands. The majority of the surface area at Lakehurst consists of Lakewood, Evesboro, Downer, and Lakehurst series. The Lakewood and Evesboro series are both deep, excessively drained soils formed in acid sandy Coastal Plain sediments found on divides and side slopes. The Downer series is a well-drained soil formed in acid loamy Coastal Plain sediments on divides and slopes and the Lakehurst series is moderately well drained formed in acid sandy Coastal Plain sediments found in depressional areas and low divides (USDA, 1989). Hydric soils are those soils that are sufficiently wet in the upper part to develop anaerobic conditions during the growing season. Hydric soils are typically found in and adjacent to wetlands, drainage channels, and depressions. Hydric soils on Lakehurst include Manahawkin muck, Atsion sand, and Berryland sand. Psamments consist of unconsolidated sand deposits, have no distinct soil horizons, and must consist entirely of material of loamy sand or coarser in texture. Psamments are fill areas, which at Lakehurst, are primarily filled and leveled portions of the operational areas (NAES Lakehurst, 2002a).

Soils throughout the Dix area are characterized by a very sandy surface layer and sandy subsoil with occasional clay layers. The predominant soils at Dix consist of Lakewood, Lakehurst, Manahawkin, Berryland, and Atsion series. The Lakewood and Lakehurst soil series are the same as those described above for Lakehurst. The Manahawkin and Berryland series are both very poorly drained soils found on broad flats that are at the lowest position on the landscape. The Manahawkin series is formed in acid organic material derived from woody plants whereas the Berryland series is formed in acid sandy Coastal Plain sediments, similar to the Evesboro series. The Atsion series is a poorly drained soil formed in acid sandy Coastal Plain sediments found in depressional areas and on broad flats (USDA, 1989).

Overall, the majority of soils found throughout JB MDL are medium to coarse grained sands with some thin clay soil layers developed from the Cohansey geologic formation that are indicative of the Pinelands. The five prevalent soil series that have developed from the Cohansey formation in the Pinelands are Lakewood, Lakehurst, Atsion, Berryland, and Muck (most of which were discussed in detail above) and are all major factors in the Pinelands unique soil-water-plant-animal relationship (New Jersey, 2012).

Twenty three percent of the soils on JB MDL are classified as prime (7 percent) or unique (16 percent) farmland. The prime farmland soils are largely located within the built-up Dix cantonment area and portions of McGuire occupied by the commissary, exchange, clinic, and the Falcon Courts North housing area. Unique soils occur within the wetland areas that border the range and impact area on Dix. In addition, there are areas of unique soils located along the perimeter of the Lakehurst area that are developed. No land area on JB MDL is currently utilized for agricultural purposes, aside from some areas planted as tree plantations, though species are native and no soil management is required.

Soil map units at the locations of the projects selected for detailed analysis are listed in Table 3.5-2. The majority of Project I6 (*Install Power Generators*) is not included in Table 3.5-2 as specific locations of all disturbances are not currently known; however, this project would be expected to disturb areas of existing infrastructure in heavily modified areas, thus, natural soils would not be disturbed to an appreciable degree.

Table 3.5-2. Soils Mapped at Locations of Projects Selected for Detailed Analysis

Soil Map Unit	Associated Project(s)	Farmland Designation
Sassafras sandy loam, 2 to 5% slopes (SacB)	D1, D2, C3, C4	Prime Farmland
Urban land-Collington Complex, 0 to 5% slopes (USCOLB)	I1, I5	None
Collington loam, 0 to 2% slopes (ConA)	I1, I5	Prime Farmland
Adelphia fine sandy loam, 0 to 2% slopes (AdmA)	C1, I4, I5	Prime Farmland
Adelphia-Urban Land Complex, 0 to 5% slopes (AdpB)	C2, R1, I5	None
Sassafras sandy loam, 0 to 2% slopes (SacA)	C4, I5	Prime Farmland
Sassafras sandy loam, 2 to 5% slopes (SacB)	I5	Prime Farmland
Lakewood sand, 0 to 5 percent slopes (LasB)	C5	None
Woodmansie sand, 0 to 5 percent slopes (WobB)	C5	None
Downer loamy sand, 0 to 5% slopes (DocB)	I2, R2	Farmland of Statewide Importance
Udorthents, organic substratum, 0 to 8% slopes (UdoB)	C6, I5	None
Udorthents wet substratum, 0 to 8% slopes (UdwB)	I5, R1	None
Woodstown fine sandy loam, 0 to 2% slopes (WofA)	I3	Prime Farmland
Galloway sand, 0 to 5% slopes (GahB)	I3, I5	Farmland of Statewide Importance
Evesboro sand, 0 to 5% slopes (EveB)	I2	None
Psammaquents, sulfidic substratum, 0 to 3 percent slopes, frequently flooded (PstAt)	I2	None
Colemantown loam, 0 to 2% slopes, occasionally flooded (CoeAs)	I5	None
Shrewsbury fine sandy loam, 0 to 2% slopes (ShsA)	I5	Farmland of Statewide Importance
Pits, sand and gravel (PHG)	I5	None
Urban Land (UR)	I2	None

Source: USDA, 2012

3.6 Water Resources

Water resources include groundwater, surface water, floodplains, and wetlands. Evaluation of water resources examines the quantity and quality of the resource and its demand for various purposes.

3.6.1 Definition of the Resource

3.6.1.1 Surface Water and Groundwater

Surface water systems are typically defined in terms of watersheds. A watershed is a land area bounded by topography that drains water to a common destination. Watersheds drain, capture, filter, and store water and determine its subsequent release. A watershed divides the landscape into hydrologically defined areas whose biotic and abiotic components function interactively. The watershed can be large or small because every surface water (stream, tributary, wash, and river) has an associated watershed and smaller watersheds combine to form larger watersheds. The watershed boundary will more or less follow the drainage divide or the highest ridgeline around the stream channels, which will meet at the bottom or lowest point of the land where water flows out of the watershed, commonly referred to as the mouth of the waterway. Any activity that affects water quality, quantity, or rate of movement at one location within a watershed has the potential to affect the characteristics of locations downstream.

Groundwater is water that collects or flows beneath the Earth's surface, filling the porous spaces in soil, sediment, and rocks. Groundwater originates from rain and from melting snow and ice and is an essential

resource often used for potable water consumption, agricultural irrigation, and industrial applications. Groundwater typically can be described in terms of its depth from the surface, aquifer or well capacity, water quality, surrounding geologic composition, and recharge rate.

Nearly all surface water features (streams, lakes, reservoirs, wetlands, and estuaries) interact with ground water. These interactions take many forms. In many situations, surface water bodies gain water and solutes from groundwater systems and in others the surface water body is a source of groundwater recharge and causes changes in groundwater quality. As a result, withdrawal of water from streams can deplete groundwater or conversely, pumpage of groundwater can deplete water in streams, lakes, or wetlands. Pollution of surface water can cause degradation of groundwater quality and, conversely, pollution of groundwater can degrade surface water.

3.6.1.2 Floodplains

Floodplains are areas of low-level ground present along rivers, stream channels, or coastal waters. Such lands might be subject to periodic or infrequent inundation due to rain or melting snow. Risk of flooding typically hinges on local topography, the frequency of precipitation events, and the size of the watershed above the floodplain. Flood potential is evaluated by the Federal Emergency Management Agency (FEMA), which defines 100-year and 500-year floodplains. The 100-year floodplain is the area that has a 1 percent chance of inundation by a flood event in a given year while 500-year floodplains have a 0.2 percent chance of inundation in a given year. The 100-year floodplain is typically the regulatory standard for governing development activities. Certain facilities inherently pose too great a risk from flooding to be located in either the 100- or 500-year floodplain, such as hospitals, schools, or buildings storing irreplaceable records. Federal, State, and local regulations often limit floodplain development to passive uses, such as recreational and preservation activities, to reduce the risks to human health and safety. FEMA does not map floodplains or hold any regulatory authority over potential floodplain development on military installations; floodplains are delineated and mapped on military installations on a project-by-project basis as necessary.

3.6.1.3 Wetlands

The U.S. Army Corps of Engineers (USACE) defines wetlands as "Those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas". Classification of wetlands is based on a functional definition of wetlands that is commonly called the three-parameter approach and is outlined in the 1987 USACE *Federal Manual for Identifying and Delineating Jurisdictional Wetlands*. The three parameters defining wetlands are hydric soils (soils saturated, flooded, or ponded long enough to develop anaerobic conditions that favor establishment of vegetation adapted to such conditions), hydrophytic vegetation (plants adapted for life in saturated conditions), and wetland hydrology (all hydrologic characteristics of areas periodically inundated or saturated at the surface) (USACE, 1987). In NJ, all three parameters must be met to qualify as a wetland; therefore, areas with hydric soils are not wetlands if they do not meet hydrology and vegetation standards.

3.6.2 Regulatory Framework

3.6.2.1 Surface Water and Groundwater

Water resources at JB MDL are regulated under the Federal CWA under the jurisdiction of NJDEP. NJDEP has the primary responsibility for protecting NJ's surface and groundwater from pollution caused by improperly treated wastewater and its residuals, as well as destruction of watersheds from development.

Water quality standards at JB MDL are regulated by the NJDEP, Bureau of Water Quality Standards and Assessment under NJAC 7:9B, *Surface Water Quality Standards*, and NJAC 7:9C, *Groundwater Quality Standards*, as well as USEPA, under the Federal Safe Drinking Water Act (SDWA) and the CWA. Section 303(d) of the CWA requires states to identify and develop a list of impaired water bodies where technology based and other required controls have not provided attainment of water quality standards. Section 305(b) of the CWA requires states to assess and report the quality of their water bodies. NJ combined their 303(d) and 305(b) list into one report referred to as the Integrated Report. The Integrated Report identifies those water

bodies that are impaired and do not meet designated uses, and it establishes total maximum daily loads (TMDLs) for the pollutants of concern. Stormwater and wastewater discharges are regulated by USEPA through the NJDEP, under Sections 401 and 402 of the CWA (permitting requirements) through the NPDES. NJ stormwater quality and quantity standards are addressed in NJAC 7:8, *Stormwater Management.* See Section 3.9, *Infrastructure*, for additional information pertaining to stormwater and wastewater discharges on JB MDL.

Drinking water supplies are monitored and protected under the National Primary Drinking Water Regulations (40 CFR Part 141), National Secondary Drinking Water Regulations (40 CFR Part 143), and the Bureau of Safe Drinking Water within NJDEP. Through the SDWA, USEPA sets standards for public water systems to provide safe drinking water to its consumers by limiting high levels of contaminants in drinking water. In order to comply with provisions outlined in the SDWA and the Primary Drinking Water Regulations, JB MDL conducts sampling of all drinking water supply systems and each area of JB MDL (i.e. McGuire, Dix, and Lakehurst) employs a Wellhead Protection Plan. This plan provides management of land surface around a well where activities might result in contamination of the groundwater drawn by the well. AFI 32-1067, *Water Systems*, ensures the availability, conservation, and protection of water resources and ensures that drinking water provided by USAF meets standards specified in the SDWA and in applicable state and local regulations. It also establishes policies, procedures, and standards for the conservation, management, and restoration of land and natural resources.

3.6.2.2 Floodplains

EO 11988, *Floodplain Management*, states Federal agencies shall provide leadership and take action to reduce the risk of flood loss and minimize the impact of floods on human safety, and preserve the natural and beneficial values served by floodplains. It requires Federal agencies to determine whether a proposed action would occur within a floodplain by consulting the appropriate FEMA Flood Insurance Rate Maps. The EO directs Federal agencies to avoid floodplain development unless the agency determines there is no practicable alternative. When the only practicable alternative is to site within a floodplain, a specific step by step process must be followed, outlined in the FEMA document *Further Advice on EO11988 Floodplain Management.*

3.6.2.3 Wetlands

EO 11990, *Protection of Wetlands*, directs Federal agencies to minimize destruction, loss, or degradation of wetlands and preserve and enhance the natural and beneficial values of wetlands when a practicable alternative exists. Wetlands are regulated at the Federal level by USACE under Section 404 of the CWA (33 USC Part 1251). As wetlands are protected, permitting of several activities (i.e., the placement of structures and/or fill material) occurring within the boundaries of wetlands meeting certain criteria is required and confers regulatory authority to the USACE. The USACE has regulatory authority over wetlands adjacent to surface waters considered "traditional navigable waters," as well as wetlands adjacent to non-navigable tributaries to traditional navigable waters that are relatively permanent where the tributaries typically flow year-round or have seasonal continuous flow (e.g., typically for three months) (USEPA, 2007).

In 1987, NJ adopted the NJ Freshwater Wetlands Protection Act (N.J.S.A. 13:9B, rules at NJAC 7:7A). Additional provisions governing wetland transition areas were adopted in July of 1989. In 1994, NJDEP assumed responsibility in most of NJ for the Federal wetlands permitting program, also known as the "Federal 404 program" because it stems from Section 404 of the Federal CWA. The Federal 404 program had previously been administered in NJ by the USACE. USEPA oversees the NJDEP's wetlands program in accordance with the CWA and a Memorandum of Agreement between NJDEP and USEPA. While NJ's freshwater wetlands program operates in place of the Federal 404 program throughout most of the State, the USACE has retained responsibility for the Federal 404 program in all interstate and navigable waters (including adjacent wetlands). Projects in these waters remain subject to USACE jurisdiction as well as to the NJDEP wetlands program and; therefore, may require both a Federal 404 permit from the USACE and a NJDEP permit from the State (NJDEP, 2012a).

3.6.3 Existing Conditions

3.6.3.1 Surface Water and Groundwater

Surface water resources at JB MDL consist of seven major streams: Ridgeway Brook, Assiscunk Creek, Crosswicks Creek, Rancocas Creek, Manapaqua Brook, North Ruckles Branch, and the Toms River. Three of these creeks are tributaries to the Delaware River: Assiscunk Creek, Crosswicks Creek, and North Branch Rancocas Creek (JB MDL, 2012d). Smaller streams on JB MDL include Harris Branch, Elisha Branch, Paint Branch, and a number of unnamed tributaries. See Figure 3-10 for a depiction of the extent of existing surface waters on JB MDL and the watersheds JB MDL lies within. The streams of the Pinelands are slow moving, warm, largely forest-covered, and shallow. The waters are low in nutrients, turbidity, and dissolved solids; however, they are generally high in acidity and dissolved iron. Surface water conditions impact the fish, amphibians, invertebrate populations, and flora that occur within them (McCormick, 1970). Although impacted directly by above ground hydrological processes, such as precipitation and runoff, water levels in Pinelands streams are most dependent upon groundwater (TRCTF, 2004).

Surface water drainage on the McGuire portion of JB MDL is a combination of aboveground and belowground channels and pipes. McGuire crosses two watersheds, the Crosswicks Creek and Rancocas Creek watersheds, both of which are part of the Lower Delaware watershed. Surface water features on McGuire have been heavily modified by concrete-lined channels and stream-straightening to facilitate rapid discharge of stormwater from the base (MAFB, 2008a). Surface water flows on the northern portion of McGuire drain into North Run, and surface water flows on the central portion of McGuire drain into South Run. Surface water flows on the southern portion of McGuire drain towards Jacks Run, Larkins Run, and Bowkers Run. The headwaters of Jacks and Larkins runs are just north of the McGuire/Dix boundary. These three small tributaries flow towards the southeast through Dix and then into the North Branch of Rancocas Creek (MAFB, 2008a). The majority of the Dix portion of JB MDL drains into the Rancocas Creek watershed and the Crosswicks Neshaminy Watershed both of which ultimately drain into the Delaware River Basin (Fort Dix, 2000 and USACE, 2006). A small portion of Dix drains into streams, such as Hurricane Brook, which ultimately drain into the Atlantic Ocean. In the Lakehurst area of JB MDL, surface water drainage runs southeast and is primarily in the Toms River Basin, which drains southeast into Barnegat Bay.

Natural lakes are virtually absent from the Pinelands, and any occurring in the region are the result of damming to form mill ponds, lakes, or cranberry bogs. At JB MDL, North Ruckles Branch was dammed in the 1950s to create three small lakes; Pickerel Lake, Clubhouse Lake, and Bass Lake. Several other created lakes on the installation include Hanover Lake, Willow Pond, Laurel Pond, Brindle Lake and Dogwood Pond. Other impoundments have been created for fire suppression, fishing, and waterfowl use (JB MDL, 2012d).The stormwater drainage system at JB MDL consists of natural waterways, ditches, culverts, catch basins, manholes, and piping. All stormwater on JB MDL is ultimately routed to surface waters. See Section 3.9, *Infrastructure*, for more information on stormwater management.

The majority of JB MDL lies within the Outer Coastal Plain and the McGuire portion of JB MDL lies along the eastern boundary of the Inner Coastal Plain. Depth to the seasonal high water table on JB MDL ranges from 6 inches to over 72 inches (JB MDL, 2012c). The Cohansey Aquifer underlies much of the Outer Coastal Plain and supplies most of the installation with potable fresh water. The water in this shallow aquifer frequently lies at or near the surface and feeds the area's abundant bogs, marshes, and swamps. Because of the high water table and permeable soils, the underlying groundwater resources are particularly sensitive to contamination making groundwater pollution prevention an important issue on the installation. JB MDL implements Wellhead Protection Areas per NJ Safe Drinking Water Rules (N.J.A.C. 7:10-11.7(b)). Wellhead Protection Areas are the horizontal areas of groundwater that are captured by a well pumping at a specific rate over a 5- and 12- year period of time. The purpose of establishing Wellhead Protection Areas is to protect the potable water supply wells from contamination. Immediately below the Cohansey Formation is the Kirkwood Formation. Together, these two aquifers are estimated to contain as much as 17 trillion gallons of water (Pinelands Preservation Alliance, 2012). Underlying the Cohansey and Kirkwood Formations is the Potomac Raritan Magothy (PRM) Formation. The installation's largest capacity well taps into the PRM aquifer at about 1,580 feet.

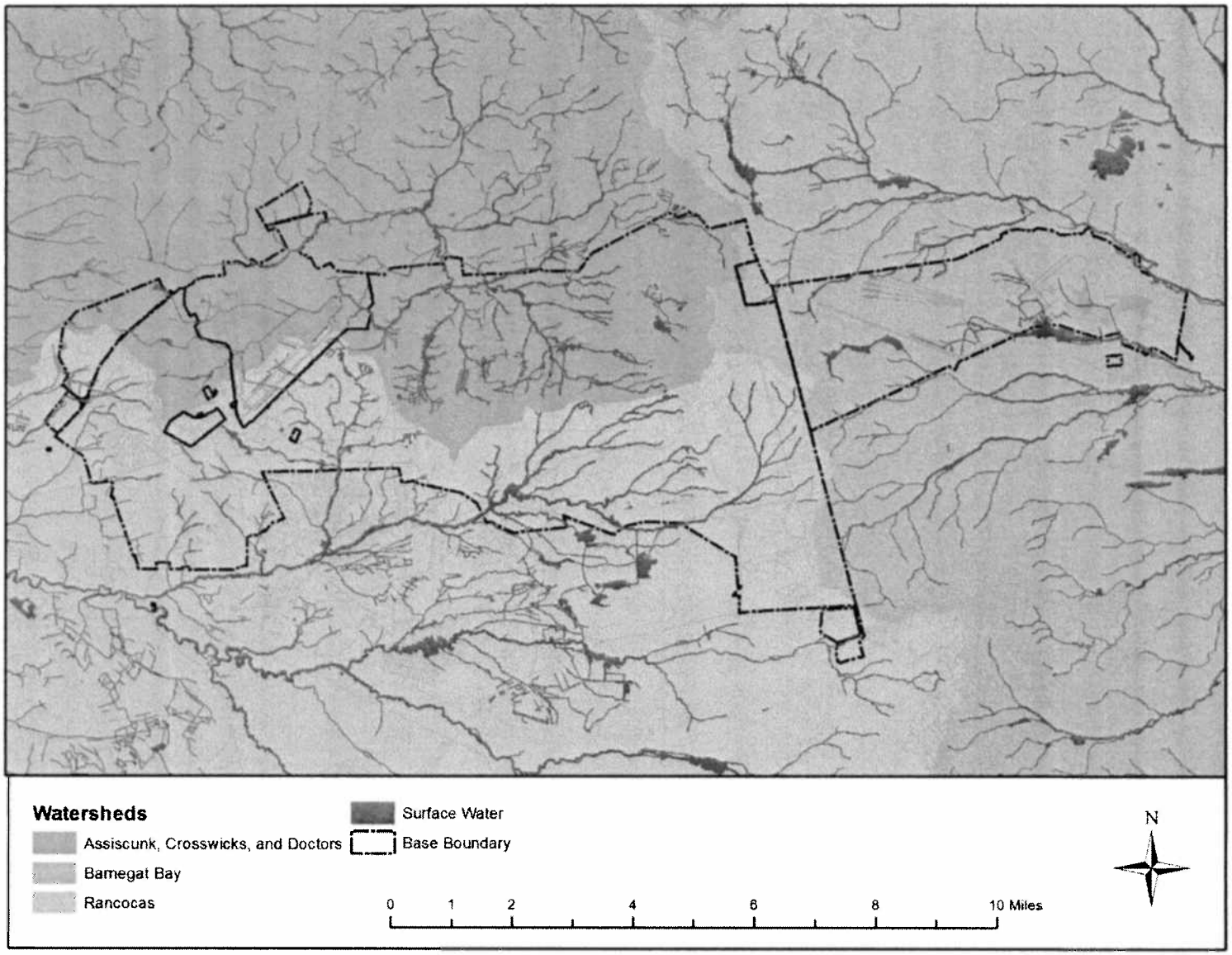


Figure 3-10. Watersheds and Existing Surface Waters on JB MDL

Recharge to the underlying aquifer systems occurs primarily through the infiltration of precipitation. Rainfall on JB MDL averages 46 inches per year. Precipitation falls fairly uniformly throughout the year, though fall and winter are slightly drier than spring and summer. Precipitation ranges from 2.9 to 4.7 inches per month (JB MDL, 2012d). With an annual rainfall of 46 inches per year, this recharge amounts to slightly less than 20 inches. Groundwater recharge patterns can be disrupted if impervious surfaces associated with development increase runoff to streams, thereby decreasing the quantity of rainwater that infiltrates the soil and bedrock to recharge the aquifer systems (TRCTF, 2004).

JB MDL obtains potable water from both surface and groundwater sources. The primary sources of potable water at the installation are a surface water diversion on Greenwood Branch on the North Branch of Rancocas Creek and several wells drawing from the PRM and Kirkwood/Cohansey aquifers. All water sources are tested and treated to ensure that State water quality standards are met (see Section 3.9, *Infrastructure*, for a more detailed discussion of JB MDLs potable water supply).

3.6.3.2 Floodplains

Floodplains within military bases are typically not mapped or reviewed by FEMA for National Flood Insurance Program compliance as the Pentagon has this responsibility. As a Federal agency, the Pentagon is also responsible for carrying out all the requirements of EO 11988, *Floodplain Management*, previously discussed in Section 3.6.1.2. Information regarding the presence of 100- or 500- year floodplains on JB MDL is therefore not provided on FEMA's Flood Insurance Rate Maps.

A formal floodplain study has never been completed for the McGuire or Dix portions of JB MDL. Surface waters on McGuire have historically been straightened and deepened to facilitate rapid movement of stormwater within the airfield area and; therefore, have little to no natural flood plain (JB MDL, 2011). McGuire has identified approximately 60 acres in the military family housing area along North Run as subject to flooding (MAFB, 2001). Based on topography, underlying soil characteristics, and the presence of water bodies and wetlands, other areas might also be subject to flooding along North Run north of Wrightstown-Cookstown Road and along South Run and its tributaries in the Runway 24 and munitions storage areas (JB MDL, 2008).

The surface waters within the Dix cantonment area have been engineered and generally do not contain natural floodplains although a formal study has never been conducted. The range area of Dix has also never had a formal study; however, floodplains are suspected to be located in the southeastern section of the range, along Gaunts Brook and the North Branch of the Rancocas Creek.

A floodplain study was prepared by USACE on the Lakehurst portion of JB MDL in 1989 and later revised in 1990. The USACE found that Lakehurst contains more than 1,300 acres of flood-prone areas occurring primarily in its' south-central portion. Peak discharge levels of 10-, 50-, 100-, and 500-year storms were determined for Ridgeway Branch, North Ruckles Branch, Manapaqua Brook, Paint Branch, and Harris Branch (NAES Lakehurst, 2008).

3.6.3.3 Wetlands

Wetlands make up approximately 21 percent of total land area at JB MDL (8,792 acres). See Table 3.6-1 below for a summary of the areal extents of wetlands in each JB MDL area.

Table 3.6-1. Wetlands Identified on JB MDL

Location of Wetlands	Area (Acres)
McGuire	238
Dix	7,654
Lakehurst	900
Total	**8,792**

Source: JB MDL 2012d

Wetlands at JB MDL were mapped following the Cowardin Wetland Classification Codes (Cowardin et al.,

1979). The Cowardin classification is divided into five major systems; Marine, Estuarine, Riverine, Lacustrine, and Palustrine. The wetland communities found on JB MDL are representative of those found throughout the Pinelands and include palustrine emergent, palustrine scrub/shrub, palustrine forested, as well as riverine and open water. Palustrine wetlands include all non-tidal wetlands dominated by trees, shrubs, persistent emergent, mosses or lichens, and vegetated wetlands traditionally called marshes, swamps, bogs, fens, and ponds (NAES Lakehurst, 2002a). Riverine wetlands are generally considered open water habitats and consist of relatively shallow surface waters contained within natural or artificial channels. Open water wetlands consist of relatively shallow open surface waters (e.g., ponds).

On the McGuire portion of JB MDL, a wetland survey was conducted in 2004 in the military housing area and another was conducted in 2006 to the south and west of Wrightstown-Cookstown road. The majority of these habitats were classified as palustrine forested, palustrine emergent, and palustrine scrub/shrub. The emergent and scrub/shrub wetlands were generally located along the margins of the forested wetland habitats (MAFB, 2004a and MAFB, 2006).

Approximately 30 percent of the Dix area is classified as wetland with the palustrine forested wetlands comprising the largest wetland type. Dix contains wetlands such as red maple-hardwood, Atlantic white cedar swamps, and pitch pine lowlands. In some locations the pitch pine lowlands grade to a shrub/scrub forest (Fort Dix, 2009).

On the Lakehurst area, a 1993 wetland delineation was conducted as part of a State-wide wetland mapping project, which has been field verified and updated over the past several years. More accurate delineations were conducted in 1996 for the eastern third and in 2000 for the western two thirds of Lakehurst. Wetlands on Lakehurst are classified as palustrine and riverine. The palustrine wetlands on Lakehurst include emergent, scrub/shrub, and forested (NAES Lakehurst, 2008).

3.7 Biological Resources

3.7.1 Definition of the Resource

Biological resources include native or naturalized plants and animals and the habitats (e.g., forests and grasslands) in which they exist. From a regulatory standpoint, biological resources afforded legal protections typically consist of rare or migratory species deemed in need of protection by Federal or State agencies in accordance with enacted legislation.

3.7.2 Regulatory Framework

Federally-listed threatened and endangered species are protected under the ESA, which is administered by the USFWS. The ESA regulations prohibit the "take" (i.e., to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct) of any listed species, as well as the destruction or modification of "critical habitat" (i.e., habitat that is designated essential to the survival of a protected species). "Endangered species" are defined as any species in danger of extinction throughout all or a major portion of its range. A "threatened species" is one that is likely to become endangered in the foreseeable future. "Proposed species" include species proposed for listing as threatened or endangered in the *Federal Register*. "Candidate species" include species that have been studied and USFWS has concluded that they should be proposed for addition to the Federal endangered and threatened species list, though time and available funding require prioritizing processing of listing proposals. "Species of concern" is an informal term that refers to those species which USFWS believes might be in need of concentrated conservation actions. Legal protections are only afforded to threatened and endangered species; proposed and candidate species and species of concern do not receive any protection unless they are ultimately designated threatened or endangered.

At the Federal level, the Migratory Bird Treaty Act (MBTA) provides protection to migratory birds, their nests, and eggs. Bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) are protected by the Bald and Golden Eagle Protection Act.

The NJ Endangered and Nongame Species Conservation Act of 1973 established a list of wildlife species designated by NJ as threatened or endangered. The law prohibits taking, possessing, transporting, exporting,

processing, selling, or shipping State-threatened or endangered species. "Take" is defined as harassing, hunting, capturing, or killing, or attempting to do so. A separate NJ law, the Endangered Plant Species List Act, established an official State list of endangered plants. Although the rule does not provide any protection for endangered plant species, several regulatory agencies in the NJDEP responsible for protecting plant habitat have incorporated the Endangered Plant Species List into their criteria for review of permits.

Although certain Federal and State-noted rare species do not necessarily require protection consideration by Federal agencies, it is USAF policy to provide protection of ESA proposed and candidate species and State-protected species where practical and not in conflict with mission objectives. Thus, the analysis of effects to biological resources includes discussion of such species.

Protection and management of biological resources at JB MDL is guided by a number of other laws, regulations, and guidance documents. The other primary statutes, regulations, EOs, and guidance that apply to the management of biological resources at the installation include:

- Federal Noxious Weed Act of 1975 (7 USC 2801)
- Fresh Water Pollution Control Act, as amended by the CWA (33 USC 1251 et seq.)
- Fish and Wildlife Conservation Act of 1980 (16 USC 2901 et seq.)
- Fish and Wildlife Coordination Act of 1934 (16 USC 661 et seq.)
- Migratory Bird Conservation Act of 1966 (16 USC 715)
- Sikes Act of 1960 (16 USC 670 et seq.), and Sikes Act Improvement Act of 1997
- 10 USC 2665; *Sale of Certain Interests in Land; Logs*
- AFI 32-7064, *Integrated Natural Resources Management*
- EO 11988, *Floodplain Management*, 24 May 1977
- EO 11990, *Protection of Wetlands*, 24 May 1977
- EO 11991, *Protection and Enhancement of Environmental Quality*, 24 May 1977

3.7.3 Integrated Natural Resources Management Plan

A JB MDL INRMP is under development. Until the new INRMP is promulgated, natural resources for the Lakehurst study area are addressed by the 2002 Lakehurst INRMP (NAES Lakehurst, 2002a). A Draft Fort Dix INRMP (JB MDL, 2010 and Fort Dix, 2009) addresses natural resources on the Dix area. Natural resources on the McGuire area are addressed by a 2002 INRMP as well as a 2010 Draft INRMP (JB MDL, 2010). The INRMPs provide detailed descriptions of the natural resources present, identify management issues, and establish specific natural resources management activities. The most recent version of the in-development JB MDL INRMP has been consulted to include the most recent information available; however, it is not yet a finalized document.

3.7.4 Existing Conditions

Bailey's (1995) document *Description of the Ecoregions of the United States* provides a general description of the ecosystem geography of the Nation. Ecoregions denote areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources. Bailey's ecoregion system consists of three different levels from geographically larger to smaller areas – Domain, Division, and Province. JB MDL is located within: the Humid Temperate Domain, the Hot Continental Division, and the Eastern Broadleaf (Oceanic) Province (Bailey, 1995).

The Eastern Broadleaf (Oceanic) Province includes diverse topography; east of the Appalachian Mountains is the Piedmont Plateau and coastal plain, where altitudes range from sea level to about 1,000 feet above MSL. The climate includes a strong annual temperature cycle, with cold winters and warm summers. Precipitation occurs year-round, though it is markedly greater in summer months. Vegetation of this Province is characterized by temperate deciduous forest dominated by tall broadleaf trees. Lower layers of small trees and shrubs develop weakly. Forest vegetation is divided into three major associations: mixed mesophytic,

Appalachian oak (*Quercus sp.*), and pine-oak (*Pinus sp. – Quercus sp.*). The dominant vegetation association at JB MDL is pine-oak forest, which occupies dry sandy soils that are frequently exposed to naturally occurring fires along the northern Coastal Plain. There is a thick shrub layer beneath the canopy and Atlantic white-cedar (*Chamaecyparis thyoides*) swamps occur on moderately moist sites (Bailey, 1995).

JB MDL is located entirely within the NJ Pinelands, which occupies approximately 1.1 million acres in central and southern NJ. In 1978, the U.S. Congress designated the area as the Nation's first National Reserve due to its unique ecological significance as the largest pine barrens complex in the world and the largest area of contiguous, undeveloped forest and wetland on the Atlantic Coastal Plain of the Mid-Atlantic region. In addition, the United Nations Educational, Scientific, and Cultural Organization have designated the area as an international Biosphere Reserve. The Pinelands provides habitat for a noteworthy number of species, including 850 plants, 299 birds, 91 fish, 59 reptiles and amphibians, and 39 mammals (USFWS, 2006)

The following sections describe the vegetation, wildlife, and protected species associated with JB MDL.

3.7.4.1 Vegetation

The majority of JB MDL is located within the Pinelands, which is generally characterized by a mix of pitch pine (*Pinus rigida*), Virginia pine (*Pinus virginiana*), and short leaf pine (*Pinus echinata*). Much of JB MDL is forested with pine/oak or oak/pine forest communities (depending on which genus is dominant) with understories typically consisting of mountain laurel (*Kalmia latifolia*), blueberry (*Vaccinium sp.*), and huckleberry (*Gaylussacia sp.*) as well as a variety of vines, wildflowers, and grasses. Forested wetlands typically consist of relatively dense deciduous stands, including red maple (*Acer rubrum*), sweet gum (*Liquidambar styraciflua*), and black gum (*Nyssa sylvatica*) (JB MDL, 2012d).

The majority of the JB MDL land cover is forested. Table 3.7-1 provides a summary of the vegetation cover across JB MDL.

Table 3.7-1. Vegetation Cover Types on JB MDL

Vegetation Cover Type	McGuire (acres)	Dix (acres)	Lakehurst (acres)	Total (acres)
Coniferous Forest	20	11,859.6	1,969.5	13,849.1
Coniferous Scrub/Shrub	0	1,604.8	175.0	1,779.8
Deciduous Forest	260.5	4,590.1	255.6	5,106.2
Deciduous Scrub/Shrub	40.2	608	85.0	733.2
Mixed Forest	21.8	4,124.5	1,425.6	5,571.9
Mixed Scrub/Shrub	3.0	649.6	278.2	930.8
Grassland/Old Field[1]	418.4	1,509.1	135.5	2,063
Agricultural Land/Plantation	0.7	551.6	171.6	723.9

Source: NJDEP, 2010a
Note: [1] Maintained lawn land cover not included.

Non-native, invasive plants may spread into wild habitats and displace native plant species, altering vegetation communities and habitat characteristics for all biota previously utilizing affected areas. An "invasive species" is defined as: non-native (or alien) to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health. There are a number of invasive plant species that occur on JB MDL, such as Chinese Lespedeza (*Lespedeza cuneata*), Japanese barberry (*Berberis thunbergii*), spotted knapweed (*Centaurea biebersteinii*), and common reed (*Phragmites australis*) (JB MDL, 2012d).

The majority of programmed projects selected for detailed analysis in this IDEA that would affect vegetation are located in areas of maintained lawn/landscaping. Table 3.7-2 describes the vegetation types associated with each of these projects.

Table 3.7-2. Vegetation Types Associated with Projects Selected for Detailed Analysis

Vegetation Type	Project
Coniferous Forest (pine-oak)	C5
Mixed Hardwood	C6
Maintained Lawn/Landscaping	C1, C2, C4, I1, I4, I5, I6
Airfield Grassland	I2, I3
Built Up/No Vegetation	D1, D2, C3, I1, R1, R2

3.7.4.2 Fish and Wildlife

JB MDL provides habitat for a wide array of wildlife species. Common larger mammals on JB MDL include species such as white-tailed deer (*Odocoileus virginianus*), gray fox (*Urocyon cinereoargentus*), and raccoon (*Procyon lotor*), while less common larger mammals include eastern coyote (*Canis latrans*) and bobcat (*Lynx rufus*). Certain mammal species relatively well adapted to human-altered habitats, such as groundhog (*Marmota monax*), house mouse (*Mus musculus*), and eastern gray squirrel (*Sciuris carolinensis*), are commonly found, particularly groundhogs with respect to large areas of maintained grassland on the base. Common smaller terrestrial mammals present include species such as eastern cottontail rabbit (*Sylvilagus floridanus*) and meadow vole (*Microtus pennsylvanicus*), while bat species are known to be present, such as little brown bat (*Myotis lucifugus*) and red bat (*Lasiurus borealis*) (NAES Lakehurst, 2002a and Fort Dix, 2009).

Approximately 150 bird species are known to occur in the NJ Pinelands and bird surveys in the Lakehurst area alone have recorded more than 80 species present. Grassland areas provide habitat for numerous birds, such as state-listed threatened grasshopper sparrow (*Ammodramus savannarum*) and savannah sparrow (*Passerculus sandwhichensis*), including providing open hunting areas for predatory raptors, such as red-tailed hawk (*Buteo jamaicensis*). Areas of pine and pine-oak forest support a number of forest interior dwelling species, such as eastern towhee (*Pipilo erythrophthalmus*) and pine warbler (*Dendroica pinus*). Several bird species are known to utilize forest edge/grassland habitats, such as eastern bluebirds (*Sialia sialis*) and barn swallows (*Hirundo rustica*), which often perch on woodland edges overlooking grasslands. Shallow ponds and lakes and open wetlands attract an assortment of wading birds and waterfowl, such as great blue heron (*Ardea herodias*), great egret (*Ardea alba*), and wood duck (*Aix sponsa*). Several native and introduced game species are known to be present including wild turkey (*Meleagris gallopavao*) and American woodcock (*Scolopax minor*); ring-necked pheasant (*Phasianus colchicus*) is stocked for hunting in the Lakehurst area. A variety of species can present bird/airstrike hazard (BASH) concerns and JB MDL implements a robust BASH reduction program for both airfields; gulls (Family Laridae) and Canada geese (*Branta canadensis*) are of particular concern where water bodies and wetlands are adjacent to the airfield (NAES Lakehurst, 2002a and Fort Dix, 2009).

There are a variety of reptiles and amphibians that occur on JB MDL. Several snakes are present, such as northern black racer (*Coluber constrictor*), eastern garter snake (*Thamnophis s. sirtalis*), and northern water snake (*Nerodia s. sipedon*). Turtles present include species such as eastern painted turtle (*Chrysemys picta picta*) and redbelly turtle (*Pseudemys rubriventris*). Frogs and toads include species such as green frog (*Rana clamitans*), Fowler's toad (*Bufo woodhousii fowleri*), and southern leopard frog (*Rana utricularia*). There are only two lizard species known to occur on JB MDL, northern fence lizard (*Sceloporus undulatus hyacinthinus*) and ground skink (*Scincella lateralis*), and two salamanders, redback salamander (*Plethodon cinereus*) and northern red salamander (*Pseudotriton ruber*) (NAES Lakehurst, 2002a and Fort Dix, 2009).

Aquatic communities in Pinelands surface waters are generally less diverse than other areas of NJ due to relatively acidic water conditions. Only about 15 species of fish are common in typical Pinelands surface waters compared to 70 species that occur State-wide. Within the Dix and Lakehurst areas, JB MDL has had long-standing recreational fish stocking programs, thus resident fish species include both natives and non-

natives. Native fish present include species such as bluespotted sunfish (*Enneacanthus gloriosus*), chain pickerel (*Esox niger*), redfin pickerel (*E. americanus*), black crappie (*Pomoxis nigromaculatus*), American eel (*Anguilla rostrata*), yellow bullhead (*Ictalurus natalis*), and mudminnow (*Umbra pygmaea*). None of these species have special protection statuses. Non-native species present include largemouth bass (*Microterus salmoides*), brook trout (*Salvelinus fontinalis*), rainbow trout (*Samo gairdnerii*), and bluegill (*Lepomis macrochirus*) (NAES Lakehurst, 2002a and Fort Dix, 2009).

3.7.4.3 Protected Species

Table 3.7-3 provides a summary of the Federal and State-listed rare and protected species known to or likely to occur at JB MDL. No designated critical habitat is located on or in close proximity to JB MDL. It is the policy of USAF to treat any State-protected species with the same protection afforded Federally-protected species whenever practicable (AFI 32-7064, *Integrated Natural Resources Management*). Although not required by the ESA, USAF will provide acceptable conservation measures for species protected by NJ State law, when such protection is not in conflict with the military mission.

One Federal ESA-protected animal species, bog turtle (*Glyptemus muhlenbergii* – threatened), has been documented on JB MDL. Habitat for this species typically consists of bogs and wet meadows with clean standing or slow-moving shallow water and a mucky substrate (NAES Lakehurst, 2002a). Potentially suitable bog turtle habitat exists in all three areas of JB MDL; however, the only confirmed sightings are from the late 1980's and early 1990's in the Lakehurst area. Species surveys in the Dix area in 2004 and 2005, the McGuire area in 2004, and a limited survey of the Lakehurst area in 2011, did not find any individuals or signs of their presence.

One ESA-protected plant species, Knieskern's beaked-rush (*Rhynchospora knieskernii* – threatened), has been documented on JB MDL (NAES Lakehurst, 2002a). Habitat for this species typically consists of early successional habitats in pitch pine lowlands within pine barrens with fluctuating water regimes. The species is usually found on bare or sparsely vegetated sites that are maintained open by natural disturbances (e.g., flood scouring and fire) or human-caused influences (e.g., roadsides and maintained utility corridor right-of-ways) (NatureServe, 2012). There are two ESA-protected plant species, American chaffseed (*Schwalbea americana* – endangered) and swamp pink (*Helonias bullata* – threatened), that have not been documented on JB MDL; however, they have been found in the vicinity and all three areas of the base contain potentially suitable habitat. Typical habitat for American chaffseed includes acidic, sandy, or peaty soils in open pine flatwoods, pitch pine lowland forests, seepage bogs, palustrine pine savannahs, and other grass- and sedge-dominated plant communities. They frequently grow in ecotonal areas between peaty wetlands and drier, sandy soils. Typical habitat for swamp pink includes forested wetlands that are groundwater influenced and are perennially water-saturated with a low frequency of inundation (NatureServe, 2012).

Although no longer protected under the Federal ESA, the bald eagle (*Haliaeetus leucocephalus*) remains protected under the Federal Bald and Golden Eagle Protection Act. Bald eagle breeding habitat most commonly includes areas close to coastal areas, bays, rivers, lakes, reservoirs, or other bodies of water where primary food sources, e.g. fish, waterfowl, and seabirds, are available. Nests are usually in tall trees or on pinnacles or cliffs near water (NatureServe, 2012). A nesting pair of bald eagles was discovered in the Dix area in the spring of 2000 in a large pitch pine/scrub oak forest in the Impact Area. This pair has remained and successfully raised nine eaglets. In order to minimize the potential for disturbances to the nesting eagles, JB MDL has established a half-mile buffer around the nest with safety restrictions in place in which range firing activities do not impact. A pair of individuals (one mature and one immature) have been sighted at Bass Lake on the Lakehurst area, but no nests have been found in the vicinity (JB MDL, 2012d).

The vast majority of bird species found at JB MDL are afforded regulatory protection under the Federal MBTA. In order to avoid impacts to migratory birds and their nests and eggs, JB MDL restricts tree clearing activities to outside the migratory bird nesting season (March 15 to July 31) unless a nest survey is performed immediately prior to the clearing activity confirming no nests present.

There are numerous species protected or considered rare under NJ regulation known to, or with the potential to, occur on JB MDL. These species are identified in Table 3.7-3.

Table 3-7.3. Protected or Rare Species Known to or with the Potential to Occur at JB MDL

Common Name	Scientific Name	Federal Status	State Status[1]	Documented Occurrence (JB MDL Area)	Potential to Occur (JB MDL Area)
		Birds			
American bittern	*Botaurus lentiginosus*	MNB	Ebr, SCnb	Dix, Lakehurst	NA
American kestrel	*Falco sparverius*	NL	T	Dix, McGuire, Lakehurst	NA
Bald eagle	*Haliaeetus leucocephalus*	BGEPA	Ebr, Tnb	Dix, Lakehurst	NA
Barn owl	*Tyto alba*	NL	SC	NA	Dix, McGuire, Lakehurst
Barred owl	*Strix varia*	NL	T	Dix, Lakehurst	NA
Black-throated blue warbler	*Dendroica caerulescens*	NL	SCbr	Dix	NA
Black-throated green warbler	*Dendroica virens*	NL	SCbr	Dix, Lakehurst	NA
Bobolink	*Dolichonyx oryzivorus*	NL	Tbr, SCnb	Dix, Lakehurst	Dix
Broad-winged hawk	*Buteo platypterus*	NL	SCbr	Dix, Lakehurst	NA
Brown thrasher	*Toxostoma rufum*	NL	SCbr	Dix	NA
Common nighthawk	*Chordeiles minor*	NL	SC	Dix, Lakehurst	NA
Cooper's hawk	*Accipiter cooperi*	NL	SCbr	Dix, Lakehurst	Dix
Eastern meadowlark	*Sturnella magna*	MNB	SC	Dix, McGuire, Lakehurst	NA
Grasshopper sparrow	*Ammodramus savannarum*	MNB	Tbr	Dix, McGuire, Lakehurst	NA
Great blue heron	*Ardea herodias*	NL	SCbr	Dix, Lakehurst	McGuire
Henslow's sparrow	*Ammodramus henslowii*	MNB	E	Lakehurst	Dix, McGuire
Hooded warbler	*Wilsonia citrina*	NL	SCbr	Dix, Lakehurst	NA
Horned lark	*Eremophila alpestris*	NL	Tbr, SCnb	Lakehurst	NA
Long-eared owl	*Asio otus*	NL	T	NA	Dix
Nashville warbler	*Vermivora reficapilla*	NL	SCbr	Dix	NA
Northern goshawk	*Accipiter gentilis*	MNB	Ebr, SCnb	NA	Dix
Northern harrier	*Circus cyaneus*	MNB	Ebr, SCnb	Dix, McGuire, Lakehurst	NA
Northern parula	*Parula americana*	NL	SCbr	Dix	NA
Osprey	*Pandion haliaetus*	NL	Tbr	Dix, Lakehurst	NA
Pied-billed grebe	*Podilymbus podiceps*	NL	Ebr, SCnb	McGuire	Dix, Lakehurst
Red-headed woodpecker	*Melanerpes erythrocephalus*	NL	T	NA	Dix
Red-shouldered hawk	*Buteo lineatus*	MNB	Ebr, SCnb	Dix	NA
Savannah sparrow	*Passerculus sandwichensis*	NL	Tbr	Dix, McGuire, Lakehurst	NA
Sedge wren	*Cistothorus platensis*	MNB	E	NA	Dix
Sharp-shinned hawk	*Accipiter striatus*	NL	SC	NA	Dix, McGuire, Lakehurst
Upland sandpiper	*Bartramia longicauda*	MNB	E	McGuire, Lakehurst	Dix
Veery	*Catharus fuscescens*	MNB	SCbr	Dix, Lakehurst	NA
Vesper sparrow	*Pooecetes gramineus*	NL	Ebr, SCnb	Lakehurst	Dix, McGuire
Whip-poor-will	*Caprimulgus vociferus*	NL	SCbr, Unb	Dix, Lakehurst	NA
Winter wren	*Troglodytes troglodytes*	NL	SCbr	Dix	NA
Wood thrush	*Hylocichla mustelina*	NL	SCbr	Dix	NA

Table 3-7.3. Protected or Rare Species Known to or with the Potential to Occur at JB MDL

Common Name	Scientific Name	Federal Status	State Status[1]	Documented Occurrence (JB MDL Area)	Potential to Occur (JB MDL Area)
		Mammals			
Bobcat	*Lynx rufus*	NL	E	Lakehurst	Dix
		Reptiles and Amphibians			
Bog turtle	*Glyptemys muhlenbergii*	T	E	Lakehurst	Dix
Carpenter frog	*Lithobates virgatipes*	NL	SC	Dix, Lakehurst	McGuire
Corn snake	*Elaphe guttata guttata*	NL	E	Dix, Lakehurst	NA
Eastern box turtle	*Terrapene carolina carolina*	NL	SC	Dix, McGuire, Lakehurst	NA
Eastern king snake	*Lampropeltis getula getula*	NL	SC	Lakehurst	NA
Eastern mud salamander	*Pseudotriton montanus montanus*	NL	T	NA	Dix
Fowlers toad	*Anaxyrus fowleri*		SC	Dix, McGuire, Lakehurst	NA
Marbled salamander	*Ambystoma opacum*	NL	SC	Lakehurst	Dix
Northern pine snake	*Pituophis melanoleucus melanoleucus*	NL	T	Dix, Lakehurst	McGuire
Pine barrens tree frog	*Hyla andersonii*	NL	T	Dix, Lakehurst	NA
Southern (Cope's) gray tree frog	*Hyla chrysoscelis*	NL	E	NA	Dix
Spotted turtle	*Clemmys guttata*	NL	SC	NA	Dix, McGuire
Timber rattlesnake	*Crotalus horridus*	NL	E	Dix	Lakehurst
Wood turtle	*Glyptemys insculpta*	NL	T	Dix	NA
		Insects			
Arogos skipper	*Atrytone arogos arogos*	NL	E	Dix	Lakehurst
Dotted skipper	*Hesperia attalus slossonae*	NL	SC	Lakehurst	NA
Frosted elfin	*Callophrys irus*	NL	T	NA	Dix
Silver-bordered fritillary	*Boloria selene myrina*	NL	T	Dix	NA
		Plants			
American chaffseed	*Schwalbea americana*	E	E	NA	Dix, McGuire, Lakehurst
Apple[2]	*Malus sp.*	NA	SC	Dix	McGuire, Lakehurst
Bitter panic grass[3]	*Panicum amarum*	NA	SC	Lakehurst	NA
Blackberry[2]	*Rubus sp.*	NA	E	Dix	McGuire, Lakehurst
Bristling panic grass	*Panicum aciculare*	NA	E	Lakehurst	NA
Broom crowberry	*Corema conradii*	NA	E	Dix	McGuire, Lakehurst
Bushy broomsedge[3]	*Andropogon glomeratus*	NA	SC	Lakehurst	NA
Canada mayflower[3]	*Maianthemum canadense*	NA	E	Dix	McGuire, Lakehurst
Canby's lobelia	*Lobelia canbyi*	NA	SC	Lakehurst	NA
Cinnamon fern[3]	*Osmunda cinnamomea*	NA	E	Dix	McGuire, Lakehurst
Cinquefoil[2]	*Potentilla sp.*	NA	E	Dix	McGuire, Lakehurst
Clustered beakrush	*Rhynchospora glomerata*	NA	E	Lakehurst	NA
Dock[2]	*Rumex sp.*	NA	SC	Lakehurst	NA
Downy willow herb	*Epilobium strictum*	NA	SC	Dix	McGuire, Lakehurst

Table 3-7.3. Protected or Rare Species Known to or with the Potential to Occur at JB MDL

Common Name	Scientific Name	Federal Status	State Status[1]	Documented Occurrence (JB MDL Area)	Potential to Occur (JB MDL Area)
Dragon's mouth	*Arethusa bulbosa*	NA	SC	Lakehurst	NA
Goldenrod[2]	*Solidago sp.*	NA	E	Dix	McGuire, Lakehurst
Jack in the pulpit[3]	*Arisaema triphyllum*	NA	SC	Dix	McGuire, Lakehurst
Knieskern's beaked-rush	*Rhynchospora knieskernii*	T	E	Lakehurst	Dix, McGuire
Little ladies' tresses	*Spiranthes tuberosa*	NA	SC	Lakehurst	NA
Meadow beauty[2]	*Rhexia sp.*	NA	SC	Lakehurst	NA
Plantain[2]	*Plantago sp.*	NA	E	Dix	McGuire, Lakehurst
Purple bladderwort	*Utricularia purpurea*	NA	SC	Lakehurst	NA
Purpletop tridens[3]	*Tridens flavus*	NA	E	Dix, Lakehurst	McGuire
Redtop panic grass[3]	*Panicum rigidulum*	NA	SC	Dix	McGuire, Lakehurst
Rose	*Rosa sp.*	NA	SC	Dix	McGuire, Lakehurst
Rough goldenrod[3]	*Solidago rugosa*	NA	SC	Dix	McGuire, Lakehurst
Sedge[2]	*Carex sp.*	NA	E	Dix	McGuire, Lakehurst
Sickle-leaved golden aster	*Pityopsis falcata*	NA	SC	Lakehurst	NA
Southern arrowwood[3]	*Viburnum dentatum*	NA	SC	Dix	McGuire, Lakehurst
Southern twayblade	*Listera australis*	NA	SC	Lakehurst	NA
Sphagnum moss[2]	*Sphagnum sp.*	NA	E, SC	Lakehurst	Dix, McGuire
Swamp chestnut oak	*Quercus michauxii*	NA	SC	Dix	McGuire, Lakehurst
Swamp pink	*Helonias bullata*	T	E	NA	Dix, McGuire, Lakehurst
Three-awn grass[3]	*Aristida dichotoma*	NA	SC	Lakehurst	NA
Torrey's dropseed	*Muhlenbergia torreyana*	NA	SC	Lakehurst	NA
Humped bladderwort	*Utricularia gibba*	NA	SC	Lakehurst	NA
Walter Benner's panic grass[3]	*Panicum aciculare*	NA	SC	Lakehurst	NA
White boneset[3]	*Eupatorium album*	NA	SC	Lakehurst	NA

Sources: NJDEP, 2010b; USACE, 2006; Geo-Marine Inc., 2006; JB MDL, 2012d

Notes: NA=Not Applicable, E=Endangered, T=Threatened, SC=Special Concern, C=Candidate, br=breeding population, nb=non-breeding population, BGEPA=Bald and Golden Eagle Protection Act, U=Undetermined, NL= Not Listed, *sp.*=identified to genus level – species unknown, MNB=migratory nongame bird of management concern.

[1] NJ animals and plants designated Special Concern and plants designated Endangered are not afforded legal protections, but are noted as rare species.

[2] One or more species in this genus is designated Endangered or Special Concern; due to the fact that these plants could not be identified to the species level during vegetation surveys it is currently unknown if an Endangered or Special Concern designated species has actually been documented on JB MDL.

[3] A variety or subspecies of this species is designated Endangered or Special Concern; it is unknown if this particular variety or subspecies has been documented on JB MDL.

3.8 Cultural Resources

3.8.1 Definition of the Resource

Cultural resources is an umbrella term for many heritage-related resources, including prehistoric and historic sites, buildings, structures, districts, or any other physical evidence of human activity considered important to a culture, a subculture, or a community for scientific, traditional, religious, or any other reason. Depending on the condition and historic use, such resources might provide insight into the cultural practices of previous civilizations or they might retain cultural and religious significance to modern groups.

Typically, cultural resources are subdivided into archaeological resources (prehistoric or historic sites, where human activity has left physical evidence of that activity but no structures remain standing); architectural resources (buildings or other structures or groups of structures, or designed landscapes that are of historic or aesthetic significance); or resources of traditional, religious, or cultural significance to Native American tribes. These three categories are outlined in more detail below:

- *Archaeological resources* comprise areas where human activity has measurably altered the earth, or deposits of physical remains are found (e.g., projectile points and bottles).
- *Architectural resources* include standing buildings, bridges, dams, and other structures of historic or aesthetic significance. Generally, architectural resources must be more than 50 years old to be considered eligible for the NRHP. More recent structures, such as Cold War-era resources, might warrant protection if they are of exceptional importance or if they have the potential to gain significance in the future.
- *Resources of traditional, religious, or cultural significance to Native American tribes* can include archaeological resources, structures, neighborhoods, prominent topographic features, habitat, plants, animals, and minerals that Native Americans or other groups consider essential for the preservation of traditional culture.

3.8.2 Regulatory Framework

Several Federal laws and regulations govern protection of cultural resources, including the National Historic Preservation Act of 1966, which created the NRHP, the list of National Historic Landmarks, and the SHPOs; the Archaeological and Historic Preservation Act (1974); the American Indian Religious Freedom Act (1978); the Archaeological Resources Protection Act (1979); and the Native American Graves Protection and Repatriation Act (1990).

The EA process and the consultation process prescribed in Section 106 of the NHPA require an assessment of the potential impact of an undertaking on historic properties that are within the proposed project's Area of Potential Effect (APE) (see Section 3.8.4.1 for APE definition and details). NHPA Section 106 mandates that Federal agencies consider the effects of Federally funded and permitted undertakings on historic resources listed in or eligible for listing in the NRHP (16 USC 470). There are four criteria under which a historic resource (building, object, structure, site, or district) may be listed in the NRHP. These criteria are contained in Chapter VI, "*How to Identify the Type of Significance of a Property*," contained in National Register Bulletin 15, *How to Apply the National Register Criteria for Evaluation*. For a feature to qualify for NRHP-eligibility, the quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects (USDoI, 1990):

- That are associated with events that have made a significant contribution to the broad patterns of our history; or
- That are associated with the lives of significant persons in our past; or
- 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
- That has yielded or may be likely to yield, information important in history or prehistory.

Ordinarily, cemeteries, birthplaces, 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 NRHP; 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 religious property deriving primary significance from architectural or artistic distinction or historical importance; or
- A building or structure removed from its original location, but which is primarily significant for architectural value, or which is the surviving structure most importantly associated with a historic person or event; or
- A birthplace or grave of a historical figure of outstanding importance if there is no appropriate site or building associated with his or her productive life; or
- A cemetery that derives its primary importance from graves of persons of transcendent importance, from age, from distinctive design features, or from association with historic events; or
- 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
- A property primarily commemorative in intent if design, age, tradition, or symbolic value has invested it with its own exceptional significance; or
- A property achieving significance within the past 50 years if it is of exceptional importance.

In addition to possessing or satisfying one or more of the NRHP criteria, a historic resource must also retain its integrity, defined as "the ability of the historic resource to convey its significance." The NRHP recognizes seven aspects of integrity which, in combination, are essential to conveying its significance. These aspects include integrity of location, design, setting, materials, workmanship, association, and feeling and are further defined in Part VIII of Bulletin 15, "*How to Evaluate the Integrity of a Property*" (USDoI, 1990).

Section 106 of the NHPA applies when a JB MDL project qualifies as an undertaking, defined as any project, activity, or program funded by, subject to approval of, or conducted under the aegis of, a Federal agency. Under Section 110 of the NHPA, Federal agencies are required to inventory resources under their purview and nominate those eligible to the NRHP.

36 CFR Part 800 outlines procedures to comply with NHPA Section 106. Under 36 CFR Part 800(a), Federal agencies are encouraged to coordinate NHPA Section 106 compliance with any steps taken to meet the requirements of NEPA, and to coordinate their public participation, review, and analysis in such a way that they can meet the purposes and requirements of both NEPA and NHPA in a timely and efficient manner. The Section 106 process for the Proposed Action has been completed and is being coordinated with DoD's obligations under NEPA regarding cultural resources (see Appendix F). The regulations require that all Federal entities conduct consultation with all the stakeholders concerning cultural resources issues. At JB MDL, the consulting parties are:

- NJDEP, SHPO
- Advisory Council on Historic Preservation (ACHP)
- National Park Service
- In accordance with EO 13175, *Consultation and Coordination with Indian Tribal Governments*, Federally- recognized Native American Tribes with an interest in JB MDL: Delaware Nation and the Delaware Tribe of Indians.
- NJ Pinelands Commission

Per 40 CFR Part 1501.7, Native American groups not Federally-recognized and interested members of the public may also be invited to participate in the consultation and review process.

3.8.3 Integrated Cultural Resources Management Plan

Cultural Resources are managed on JB MDL through the implementation of the ICRMP. An ICRMP covering the entire Joint Base is under development and should be promulgated in late 2013. It outlines specific procedures for consultation with the NJ Historic Preservation Office, the ACHP, the National Park Service, Federally-recognized Native American tribes, and other potential partners in cultural resource management. The ICRMP is developed according to DoD Instruction (DoDI 4710.02, 4715.3) and AFI 32-7065 requirements in order to protect resources significant to American history and prehistory (JB MDL, 2013a). Until the draft is approved, the plans in effect for actions within their respective portions of JB MDL are the 2008 McGuire Air Force Base (AFB) ICRMP (MAFB, 2008b), the 2006 Fort Dix ICRMP (updated annually through 2009) (U.S. Army Reserve, 2009), and the 2006 Naval Air Engineering Station ICRMP (NAES Lakehurst, 2006).

The ICRMP also provides an internal compliance and management tool that integrates the entirety of the cultural resources program with ongoing mission activities. The ICRMP establishes priorities for the identification and standards for the evaluation of cultural resources, and provides a schedule to accomplish program objectives during a five-year program.

3.8.4 Existing Conditions

3.8.4.1 Area of Potential Effect

The APE is defined as the geographic area(s) "within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist." As these projects are to take place within the next five years many project details are unavailable at this time, including the extent of and specific locations for some infrastructure projects. The projects selected for detailed analysis are divided into four categories (i.e. demolition, construction, infrastructure, and renovation). The APE's of the projects identified for detailed evaluation under the Proposed Action are displayed in Figures 2-2 through 2-10.

The figures also display the closest identified, eligible, and listed NRHP buildings as well as the closest NRHP-listed and eligible historic district to the APE's; all of which are discussed in detail in Sections 4.8.3.1 through 4.8.3.4.

3.8.4.2 Potential for Archaeological Resources

The prehistoric period is represented by Paleo-Indian through Late Woodland sites on JB MDL. These sites are more likely to be found in the Inner Coastal Plain than the Outer Coastal Plain. This tendency is attributed mainly to environmental factors, such as availability of water and other resources. The majority of JB MDL lies within the Outer Coastal Plain and the McGuire portion of JB MDL lies along the eastern boundary of the Inner Coastal Plain.

3.8.4.2.1 McGuire

No prehistoric archaeological sites are extant on McGuire, perhaps due to the level of disturbance during construction of the air base. Relatively undisturbed portions of McGuire, such as the margins of the former air base boundaries along North Run, have the potential to contain prehistoric archaeological sites; however, due to the overall degree of disturbance this potential may be moderate to low.

A comprehensive study of cultural resources at McGuire was commissioned by HQ AMC in 1994 and six historic archaeological site sensitivity areas were identified (Moeller et al., 1995). Three sites were determined eligible for listing in the NRHP (MAFB, 2003), one of which is described below. NRHP-eligible historic archaeological resources and site sensitivity areas located within or near the APE's of projects selected for detailed analysis on McGuire are described below:

- An area of potential historic archaeological sensitivity is located within the APE of Project I3 (*Replace Hot Cargo Loading Area Hydrant System and Expand Shoulders*). A former sawmill

was located on the south bank of South Run in the area now bounded by runways (Moeller et al., 1995).

- NRHP-eligible site 28-BU-473 is located within the CZ at the end of McGuire's main runway and east of one location for Project I6 (*Install Power Generators*) on Dix. Archaeological remains of a 19th century settlement of Pointville, including glass indicative of occupation by a household prior to the condemnation of the land for military purposes, was found, thus this site is eligible for the NRHP (Holmes, 1995). This site is also located east of the NRHP-eligible Cherry Valley Tavern (28-BU-413) and the Pointville Site (28-BU-542) also located on Dix. Although not within the Project I6 APE, the APE's proximity to these NRHP-eligible sites places it within an area of potential historic archaeological sensitivity.
- An area of potential historic archaeological sensitivity was surveyed in 1995 within the APE's of Projects I4 (*Construct Parking Lot at Air Force Reserve Center*), I5 (*Underground Electrical Distribution System*), I6 (*Install Power Generators*), and C1 (*Construct Addition to Combat Communications Administration Facility*) (Moeller et al., 1995). Much of the sensitivity areas were found to be highly disturbed and visual reconnaissance eliminated all documented historic site locations from further site consideration except for one. This one location is located within the Project I5 APE south of Broidy Road and east of the Building 3440 parking lot on McGuire. A significant quantity of mid-19th century artifacts was recovered at this location (Moeller et al., 1995). In general, the existence of South Run, its tributaries, and associated wetlands within Project I5's APE results in the potential for prehistoric archaeology, mitigated by potential disturbance. A subsequent Phase 1 archaeological study conducted in 1997 found no sites that may be eligible for NRHP-listing within the APEs of Projects I4, I5, I6, and C1 (Holmes et al., 1997).
- A historic map search indicates that two homes owned by J. Quigley in 1860 and T. English in 1858 were located near Project I5 (*Underground Electrical Distribution System*) and Project C6 (*Construct Road Bridge at South Run*) on McGuire. These areas were sampled and surveyed; however, no archaeological resources were found (Moeller et al., 1995). In general, the Project I5 and C6 APEs' proximity to wetlands results in the potential for prehistoric archaeology, mitigated by potential disturbance.
- Two late Woodland Period prehistoric sites have been recorded on McGuire (Site 28-BU-428/F-149a and 28-BU-429/F-149b) and the NJ State Museum and the Pinelands Commission place these sites near the intersection of East Arnold Avenue and Service Road, near South Run, just outside and west of the Project I5 APE. Neither of these sites could be found or identified during a 1991 study and it is believed that neither site survived the construction of the base (Moeller et al., 1995).

3.8.4.2.2 Dix

Numerous cultural resource investigations have been conducted within the boundaries of the Dix portion of JB MDL since 1985 including both archaeological sites and architectural resources (JB MDL, 2013a). A total of 60 prehistoric archaeological sites have been documented on Dix. The vast majority of these sites are situated along streams and adjacent to wetlands in the northwestern portion of the property. Few of these sites have been subjected to systematic field excavation by a professional archaeologist to determine whether they are eligible for the NRHP. As per the 2013 Draft ICRMP, the locations of the projects selected for detailed analysis within the Dix cantonment area have never been surveyed; however, they are considered to be within an area of moderate prehistoric archaeological sensitivity (JB MDL, 2013a). NRHP-eligible historic archaeological resources and site sensitivity areas located within or near the APEs for projects selected for detailed analysis on Dix are described below:

- The closest NRHP-eligible archaeological resources include the Cherry Valley Tavern (28-BU-413), the Pointville site (28-BU-542) and one additional nineteenth century household (28-BU-473) located southeast of the Project I6 (*Install Power Generators*) APE along Texas Avenue. Additional historic archaeological resources (including two wells, a cistern, and a house

foundation) have recently been identified at the same location and approximately 1,000 feet north of Pointville on the east side of Texas Avenue, but have not yet been evaluated for their NRHP-eligibility. Although not within the Project I6 APE; the proximity to these NRHP-eligible sites places Project I6 within an area of potential historic archaeological sensitivity.

- A potentially NRHP-eligible archaeological site (28-BU-739), consisting of a well likely dating to the mid-nineteenth century, was identified on Dix along Texas Avenue. It is located south of the APEs for Projects I5 (*Underground Electrical Distribution System*) and I6 (*Install Power Generators*), off Texas Avenue on McGuire. It was uncovered during construction of a retention basin, photographed, and preserved in place (URS, 2011). Although not within the Projects I5 and I6 APE's, their proximity to the NRHP-eligible site places them within an area of potential historic archaeological sensitivity.

3.8.4.2.3 Lakehurst

No prehistoric archaeological sites have been found on Lakehurst. Areas of sensitivity for archaeological sites have been identified (Baystate Environmental Consultants, 1994) but not tested through subsurface survey. As Lakehurst is located in the Outer Coastal Plain, it is expected to contain relatively few prehistoric archaeological sites; however, the potential exists for sensitive sites, mainly within wetland areas and stream margins.

No historic archaeological sites have been identified within the Lakehurst area; however, areas of potential historic archaeological resources have been identified. Those potential historic archaeological resources located near projects selected for detailed analysis on Lakehurst are described below:

- The former proving grounds associated with the Eddystone Ammunition Corporation are a potentially significant archaeological site. There are three areas of historic ruins associated with the use of proving grounds by the Russian Imperial Army. Two of these areas are near sites of projects selected for detailed analysis. The Main Proving Ground Ruins are located north of the Westfield runways between Rockwell and Johnson Roads, which is located just outside of the Project I2 (*Construct New Shoulders on Runway 06/24 and 15/33 [Maxfield]*), APE.

3.8.4.3 Potential for Historic Architectural Resources

To date, all buildings built prior to 1960 on Dix and prior to 1947 on McGuire and Lakehurst has been surveyed for NRHP eligibility. In addition, Cold War era resources on McGuire less than 50 years of age have been evaluated for eligibility under criteria for exceptional significance. An additional 24 Cold War era buildings on Lakehurst were evaluated and found not eligible for the NRHP.

A total of four NRHP-eligible historic districts (Scott Plaza, LTA, Boeing Michigan Aeronautical Research Center, Railroad Historic) have been identified on JB MDL along with one NRHP-listed and National Historic Landmark (Hangar 1) and seven individually eligible buildings (3135, 5353, 9726, Quarters 1, Quarters 2, Semi-Automatic Ground Environment [SAGE] Complex, and Building 120). NRHP-eligible historic architectural resources and the criteria for eligibility located within or near the APE's of projects selected for detailed analysis on JB MDL are described below.

3.8.4.3.1 McGuire

McGuire has inventoried and evaluated all buildings and structures with the potential to be eligible for inclusion in the NRHP built prior to 1947 and Cold War era facilities less than 50 years old. In accordance with Section 110, a 1994 comprehensive study (Moeller et al., 1995) found that all of the buildings and structures constructed prior to 1947 were not eligible for listing in the NRHP, with the exception of 18 World War II temporary structures. Section 110 surveys are used as a planning tool and SHPO concurrence is only sought for properties identified as potentially eligible. Thus, the buildings identified as not eligible for NRHP listing in the 1994 comprehensive study would only seek SHPO concurrence when Section 106 actions are proposed for those buildings. The World War II temporary structures were considered eligible; however, per the 1986 Programmatic Memorandum of Agreement between the DoD, the ACHP, and the National Conference of State Historic Preservation Officers, these structures can be demolished without further review

under Section 106 of the NHPA (NJDEP, 1994).

Two Cold War era resources were found eligible for the NRHP. One of these eligible resources, Building 1907, which is a part of the SAGE Complex is located within the APE of Project I5 (*Underground Electrical Distribution System*). The SAGE Complex which includes Buildings 1907, 1908, and 1909, has historical significance during the Cold War as part of the first air defense command and control system (JB MDL, 2013a).

3.8.4.3.2 Dix

Since 1917, over 1,000 structures have been erected at Dix (JB MDL, 2013a). Historic American Buildings Survey's and Historic American Engineering Record documentation has been completed for structures built prior to 1935 (Louis Berger & Associates, Inc., 1985). Since this initial baseline survey, several other small-scale inventories were completed in advance of proposed demolition that brought the total of surveyed structures to 71 (those built between 1917 and 1945). An inventory of 662 buildings dating from WWII to 1959 was completed in 2003. None of the three identified NRHP-eligible buildings or the NRHP eligible Scott Plaza Historic District on Dix lie within or immediately adjacent any of the Proposed Action APE's.

3.8.4.3.3 Lakehurst

The built environment of Lakehurst constructed prior to the Cold War has been inventoried and evaluated for NRHP-eligibility. A total of 71 buildings and 3 structures have been determined eligible for the NRHP as contributing properties of the Lakehurst LTA Historic District. Prior to the delineation of the district, Hangar 1 was listed on the NRHP as a National Historic Landmark. The LTA Historic District also has two non-contiguous outlying areas and one isolated property. The first consists of Hangars 5 and 6, Mat 3, and various support facilities on the western portion of Lakehurst. The second consists of the Cathedral of the Air (Building 264) and associated grounds well south of the Lakehurst main cantonment on County Road 547. Below is a list of the APE's for projects selected for detailed analysis that lie within the LTA Historic District:

- Project R2 (*Exterior Repairs to Building 120*) includes exterior repairs to Building 120 which is also located within the LTA Historic District. In addition, because of its association with the LTA era, Building 120 was found both individually eligible and eligible as a contributing element to the LTA Historic District. Over the years, there have been several interior and exterior renovations and improvements conducted to Building 120. Most notably, in 1994 after undergoing Section 106 consultation with SHPO and receiving a concurrence finding of No Adverse Effect, the original deteriorated painted wood divided pane windows were replaced with double-paned painted wood windows with surface-applied muntins in the same configuration and size. Additionally, the original slate portions of the roof were replaced with simulated slate-look roofing material in 2013 after receiving a concurrence finding of No Adverse Effect from SHPO during the Section 106 process.

3.8.4.4 Native American Sacred Sites and Properties of Traditional and Religious Cultural Importance

No traditional cultural properties (TCPs), sacred sites, or other resources of cultural significance to Native American tribes have been identified on JB MDL (JB MDL, 2013a). Consultation with the Delaware Tribe of Indians and Delaware Nation has been completed and neither of the tribes identified any potential areas of concern or expressed concerns regarding development of the projects (see Appendix F).

3.8.4.5 Native American Consultation

As stipulated in Section 101 of the NHPA, DoDI 4710.02, and EO's 13007, 13084, and 13175, JB MDL is required to consult with Federally-recognized Native American tribes affiliated with the installation, through what is known as a government-to-government (G2G) relationship. According to these guidelines, through the process of establishing the G2G relationship, tribes identify if they consider themselves to be affiliated with JB MDL, and if so, what their interests are and how they would like to consult with JB MDL. JB MDL invited three tribes to participate in a G2G relationship. Of the three, two tribes expressed interest: the Delaware Nation and the Delaware Tribe of Indians.

JB MDL is in the process of establishing G2G relationships with both tribes. Until a formal relationship is established, all projects involving substantial subsurface disturbance, require consultation under the Section 106 process with both tribes. G2G consultation with the tribes has been conducted as part of this IDEA. Copies of the letters sent and responses can be found in Appendix F.

3.9 Infrastructure

3.9.1 Definition of the Resource

Infrastructure is basic physical and organizational structures that enable a society to function. The term typically refers to the technical structures that support a society, such as roads, water supply, sewers, electrical grids, communications, and so forth, and can be defined as "the physical components of interrelated systems providing commodities and services essential to enable, sustain, or enhance societal living conditions". JB MDL's infrastructure and facilities are continually evolving, constantly being improved and expanded to accommodate the military's mission.

3.9.2 Existing Conditions

3.9.2.1 Infrastructure Condition Assessment

For consistency and ease of evaluating the status of infrastructure, the Air Mobility Command Infrastructure Assessment's Engineering Condition Assessment uses the following ratings:

- Adequate: full system capability, fully supports mission, very minor deficiencies (must meet all three conditions).
- Degraded: less than full system capability, potential mission impact with workarounds available, moderate deficiencies, and major upgrade required within five years (any one of these dictates degraded).
- Unsatisfactory: frequent system interruptions, potential mission impact with no workarounds available, health/safety/security shortfalls, major deficiencies, and major upgrade required within two years (any one of these dictates unsatisfactory).

The age of equipment, infrastructure, and use contribute to the condition of all utility systems. The overall JB MDL ratings are summarized in Table 3.9-1 (JB MDL, 2012c).

Table 3.9-1. JB MDL Infrastructure Condition Assessment

System	Status
Airfield Pavements	Degraded
Airfield Lighting	Degraded
Electrical Distribution	Unsatisfactory
Back-Up Power	Unsatisfactory
Natural Gas	Adequate
Energy Management	Degraded
Water	Adequate
Wastewater	Adequate
Stormwater	Degraded

Source: JB MDL, 2012c

Airfield pavements on the McGuire Airfield are adequate as they have recently been repaired; however, there is little to no room available for future growth. The Lakehurst Maxfield Airfield pavements are considered unsatisfactory due to deteriorating pavements and soil erosion issues. The airfield lighting systems at both airfields are considered degraded primarily due to the advanced ages of the systems and location compliance issues (JB MDL, 2012c).

The electrical systems on all three areas of JB MDL are considered unsatisfactory due to advanced ages of the systems with overhead distribution. Back-up electricity systems are also considered unsatisfactory due to a

lack of back-up generator capacity. The natural gas systems of all three areas are considered adequate; the McGuire area system is in good condition and the Dix and Lakehurst area's systems are owned and maintained privately. The overall energy management infrastructure is considered degraded because there is no central monitoring system to validate energy use (JB MDL, 2012c).

The potable water systems in the McGuire and Lakehurst areas are considered adequate and in good condition, though the Dix area system is considered degraded due to a considerable length of deteriorating piping that adversely affects water quality. The sanitary sewer systems in the McGuire and Lakehurst areas are considered adequate while the Dix area system is considered degraded primarily due to a considerable length of force sewer main that requires replacement as numerous stoppages have occurred caused by settling and pipe misalignment. Stormwater management infrastructure in the Dix area is considered adequate, though in the McGuire and Lakehurst areas, the infrastructure is considered degraded primarily due to insufficient maintenance (JB MDL, 2012c).

3.9.2.2 Airfield

As stated in Section 3.2.2, JB MDL has two geographically separated, primary operational airfields: McGuire Field and Maxfield Field.

Airfield runways and pavements on JB MDL were subject to an infrastructure review performed by HQ AMC in March 2011. This review did not include an evaluation of the Navy's Test Runway and taxiways. The overall airfield rating for JB MDL is degraded, due to deteriorating conditions, pavement deterioration, and soil erosion issues.

McGuire Field Runways 06/24 and 18/36 have both been re-surfaced in the last few years and are in adequate condition. Taxiway Hotel has 10-foot shoulders that do not meet width standards. Taxiways Golf and Lima are showing signs of deterioration and require repair. Taxiway Quebec has longitudinal grades that do not meet standards and it is unusable. All of the apron pavements at McGuire Airfield are in adequate condition.

On Lakehurst, the condition of Runway 15/33 is deemed unsatisfactory due to highly deteriorated pavement and soil erosion issues. Although recently constructed, the Assault Landing Zone's shoulders are also experiencing erosion problems. Taxiway Delta provides access to the Test Runway and is now designated a tow way unsuitable for taxi operations. Taxiway Echo provides access from Base Operations to Mat 3. Taxiways Delta and Echo are showing substantial pavement cracking and lack required paved shoulders, thus, they are experiencing soil erosion problems. Mat 3, to the west of Hangars 5 and 6, is used by the Army and the Department of Justice and is inadequate to support its current users. The majority of the pavement has numerous cracks and ponding areas and is in very poor to serious condition.

3.9.2.3 Transportation

The JB MDL transportation system includes a network of paved and dirt roads. All primary and secondary roads are asphalt and all tertiary roads are dirt. Paved roads stretch throughout JB MDL but are primarily located on the developed portions of the installation. There are several types of traffic controls throughout JB MDL; the most relevant are traffic signals and circles.

There are two entrances to the McGuire area of JB MDL. Two of the entrances (Gates 1 and 2) are off of Wrightstown-Cookstown Road. Gate 1 is the Main Gate and handles a majority of the off-installation traffic. Gate 2 is a secondary entrance and is designated for DoD registered vehicles only.

The primary access road to the Dix portion of JB MDL is State Route 68, which connects the installation to the NJ Turnpike to the west. There are four gates that serve as gateways and checkpoints for access control and security located on State Route 68, Wrightstown Road, Browns Mill Road, and Pemberton Boulevard. Checkpoint 9 on the Dix area of JB MDL serves as the commercial gate for both McGuire and Dix.

Range road is the primary route connecting the Dix cantonment to the range and training areas. Texas Avenue is the most important thoroughfare of the cantonment, used by both Dix and McGuire. It supports the highest traffic volume on Dix (Fort Dix, 2000). The existing cantonment road and street networks are generally adequate to serve transportation needs on Dix; however, capacity may be exceeded during periods of infrequent mobilization (the population during peak mobilization is approximately 18,000 persons). The

primary vehicular routes on the McGuire portion of JB MDL include McGuire Boulevard and East Arnold Avenue, which provide north-south movement, and Tuskegee Airmen Avenue, which provides east-west access. Finally, Broidy Road provides freight access from checkpoint 9 on McGuire.

Access to the Lakehurst portion of JB MDL is via two primary gates (Main and Commercial) located on County Road 547. Paved roads stretch throughout the Lakehurst area but are concentrated on the developed eastern portion. The primary road servicing Lakehurst is Lansdowne Road. Broome Road and Taxiway 4 are the major routes between the eastern and western portions of Lakehurst.

3.9.2.4 Water Supply

The potable water system at JB MDL is comprised of several systems and consists of ground and surface water supply, treatment, storage, and the water line distribution system. JB MDL has the capacity to provide 24 million gallons per day (mgd) of potable water. Table 3.9-2 displays an overview of the potable water supply systems on JB MDL.

Table 3.9-2. JB MDL Potable Water Supply System

Feature	McGuire	Dix	Lakehurst
Surface Water Utilized	None	Primary water supply is from the Greenwood Branch of the Rancocas Creek	None
Groundwater Wells Utilized	4 wells each capable of pumping 1 mgd.	• 4 wells each capable of pumping 1 mgd[2]. • 2 wells currently in use to supplement surface water supply.	• Hill System, 5 wells with a total capacity of 0.81 mgd and 1 well in PRM aquifer capable of pumping 0.43 mgd. • Test System, 2 wells each capable of pumping 0.72 mgd. • Helo System, 1 well capable of pumping 0.14 mgd.
Aquifer Utilized	PRM[1]	PRM	• Hill System, Cohansey, and PRM. • Test System, PRM. • Helo System, Cohansey.
Treatment	Groundwater treated at each well and temporarily stored in 25,000 gallon (gal) above ground storage tank (AST). Treatment includes filtering, chlorination, and fluorination.	Surface water from Greenwood Branch sent to the new Lisbon Pumping Station (4 mgd capacity). Treatment includes pH adjustment, coagulation, chlorination, and fluorination. There are 13 Public Water Systems total supplied via groundwater, 12 of which service the range area.	• Hill System, water treated through pH adjustment, filtering, and chlorination. • Test System, water treated using caustic soda, chlorine, and sand filter. • Helo System, water treated using calcite filters, hypochlorite solution, and a cartridge filter.
Capacity of System	4 mgd	5.17 mgd	• Hill System 1.24 mgd • Test System 1.44 mgd • Helo System 0.14 mgd **Total capacity 2.82 mgd**
Aboveground Storage Capacity	1 elevated 750,000 gal storage tank.	3 elevated storage tanks with a combined capacity of 2 million gallons.	• Hill System, 2 water towers with a combined capacity of 400,000 gal. • Test System, 1, 5,000 gallon hydro-pneumatic storage tank. • Helo System, 1 500 gal hydro-pneumatic tank.
Demand of System	1 to 1.4 mgd	3.2 mgd in summer 1.5 mgd in winter	0.20 mgd
Emergency Use	Water allocation permit entitles McGuire to use 450 million gallons per year[1].	• Interconnected to the McGuire and Wrightstown water systems for emergencies. • 3 of the 4 groundwater wells used for fire protection.	Water allocation permit entitles Lakehurst to use 198 million gallons per year[1].

Sources: Fort Dix, 2000; USACE, 2006; MAFB, 2005; NAES Lakehurst, 2003; and NAES Lakehurst, 2008.
Notes: mgd=million gallons per day
[1] PRM aquifer has a critical rating assigned by the NJDEP. This rating prompted NJDEP to issue water allocation permits.
[2] Dix is restricted to pumping a maximum of 1.5 mgd from the groundwater wells.

Federal and State regulations require scheduled monitoring of potable water for potential contaminants. JB MDL complies with the monitoring and reporting requirements of all these regulations. All lab results are routinely sent to the NJDEP (NAES Lakehurst, 2003). JB MDL provides an annual consumer confidence report for each community water system to the base population.

3.9.2.5 Sanitary Sewer and Wastewater Systems

The sewer system serving Dix and McGuire consists of a collection system, a number of lift stations, and a tertiary wastewater treatment plant located on Dix. Domestic wastewater is discharged into the sanitary sewer system, which flows to the treatment plant through a system of gravity and forced mains. The wastewater treatment plant has the capacity to divert incoming flow to a diversion facility if the waste stream is known to be untreatable and to divert disinfected flow to another diversion facility in case of failure of the effluent pumping or recharging system. The design capacity of the wastewater treatment plant is 4.6 mgd. The total combined flow to the treatment plant averages 2.75 mgd (JB MDL, 2012c). There are also a number of small septic systems that service remote portions of the Dix range area.

The sanitary sewer system at Lakehurst is connected to the Ocean County Utilities Authority regional treatment plant through a 24-inch diameter main. Domestic wastewater is discharged to the sanitary sewer system through a system of gravity and forced mains. The sewage collection system has adequate capacity to handle the present and future loading demands on Lakehurst (NAES Lakehurst, 2003), though growth in treatment demand must be coordinated with the Ocean County Utilities Authority. In addition, there are also a number of small septic systems that serve remote or low use areas on the Lakehurst portion of JB MDL.

3.9.2.6 Storm Water Systems

All McGuire stormwater drains ultimately into the Delaware River Basin. The McGuire stormwater system consists of surface water runoff from identifiable drainage areas that are routed to six outfalls. Four of the outfalls are classified as ephemeral streams or drainage ditches and the remaining two outfalls flow into the primary drainage basins of North Run and South Run of Crosswicks Creek (MAFB, 2005). Approximately 85 percent of the surface water runoff enters South Run of Crosswicks Creek, including the McGuire Airfield. JB MDL has installed a diversion pond and security gate on South Run near its exit from the base to intercept any major materials spills that may enter the system.

Stormwater on Dix is directed by natural drainage patterns or modified drainage facilities. Stormwater in developed areas of the Dix area are collected by extensive stormwater drainage networks that discharge to detention ponds, Hanover Lake, or streams (Assiscunk, Crosswicks, and Rancocas creeks) all located within the Dix area of JB MDL. A small portion of Dix drains into streams, such as Hurricane Brook which ultimately drain into the Atlantic Ocean. The majority of Dix drains into the Rancocas Creek Watershed and the Crosswicks Neshaminy Watershed, both of which drain into the Delaware River Basin (Fort Dix, 2000 and USACE, 2006).

The stormwater drainage system at Lakehurst consists of natural waterways, ditches, culverts, catch basins, manholes, and piping. Stormwater drains into Harris Branch, North Ruckels Branch, Manapaqua Brook, and Ridgeway Branch, all of which is eventually delivered to the Toms River in the Barnegat Bay Watershed (NAES Lakehurst, 2004 and Barnegat Bay Partnership, 2010). Fire ponds built in the 1950's, in the western section of the Lakehurst area of JB MDL provide reservoirs that help reduce peak flows of stormwater. Thirty stormwater outfalls exist at Lakehurst. Seven are used to re-route surface water and stormwater around runways, while the remainder drain residential, administrative, and operational areas. See Table 3.9-3 for a list of JB MDL's NJPDES permits.

Table 3.9-3. JB MDL New Jersey Pollutant Discharge Elimination System Permits

JB MDL Area	NJPDES Permit	Purpose
McGuire	0106747 – Individual NJPDES Discharge to Surface Water Permit	Authorizes the discharge of stormwater associated with industrial activity to surface water.
Dix	0153206 – Public Complex Municipal Stormwater General Permit	To address stormwater quality by implementing BMPs aimed at controlling stormwater pollutants from existing development.
Lakehurst	0088315 – Public Complex Municipal Stormwater General Permit	To address stormwater quality by implementing BMPs aimed at controlling stormwater pollutants from existing development.
Lakehurst	0141879 – NJPDES Basic Industrial Stormwater General Permit	To eliminate exposure of industrial materials or activities to surface waters.

Source: MAFB, 2005 and NAES Lakehurst, 2008

Each area of JB MDL (i.e. McGuire, Dix, and Lakehurst) has an active Stormwater Pollution Prevention Plan (SWPPP) that was developed in accordance with the NPDES, 40 CFR Part 122; NJ Stormwater Management Regulations, NJAC 7:11; NJPDES; and several other Federal, State, and county water pollution control regulations. The purpose of the SWPPP is to compensate for the added stormwater runoff and the possible runoff of pollution caused by development and industrial activities.

Construction activities on JB MDL that disturb one or more acres of land are subject to Federal and State soil conservation and stormwater pollution regulations. The 1972 amendments to the CWA, prohibit the discharge of any pollutants to waters of the U.S. from appoint source unless the discharge is authorized by a NPDES permit. Efforts to improve water quality under the NPDES program have focused traditionally on reducing pollutants in discharges from industrial and municipal wastewater treatment plants. Recently, the USEPA issued a Final Rule for the CWA concerning technology based Effluent Limitations Guidelines and New Source Performance Standards for the Construction and Development point source category. All NPDES stormwater permits issued by the USEPA or states must incorporate requirements established in the Final Rule. This Rule was effective February 1, 2010 and will be phased in over four years. All new construction sites are required to meet the non-numeric effluent limitations and to design, install, and maintain effective erosion and sedimentation controls, including the following:

- Control storm water volume and velocity to minimize erosion.
- Minimize the amount of soil exposed during construction activities.
- Minimize the disturbance of steep slopes.
- Minimize sediment discharges from the site.
- Provide and maintain natural buffers around surface waters.
- Minimize soil compaction and preserve topsoil where feasible.

Construction activities such as clearing, grading, trenching, and excavating displace soils and sediment. If not managed properly, disturbed soils and sediments can easily be washed into nearby water bodies during stormwater events and reduce water quality. Section 438 of the Energy Independence and Security Act (EISA) (42 USC Section 17094) establishes into law new stormwater design requirements for Federal construction projects that disturb a footprint greater than 5,000 s.f. of land. Additional guidance is provided in the USEPA's Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the EISA.

3.9.2.7 Natural Gas

Natural gas is supplied to the McGuire and Dix areas by Public Service Electric and Gas Company under an uninterruptible supply agreement, thus, supply capacity is not considered an issue for future growth. The McGuire area is serviced by two separately metered lines. One line services the main portion of McGuire and another line feeds the Falcon Courts North housing area and the west end of McGuire. Natural gas on Dix is piped to over 1,000 housing units for cooking and heating. Additionally, older buildings have been or will be converted to stand alone heating and hot water fueled by natural gas (Fort Dix, 2000).

Natural gas is supplied to the Lakehurst area by NJ Natural Gas. This is a non-interruptible system, thus, supply capacity is not considered an issue for future growth. Lakehurst buildings are heated by individual natural gas furnaces. Power Plant 2 at the Test Runway is serviced by a high pressure natural gas line for boiler operations to produce steam for test operations. The current steam distribution system is in good condition and its capacity is adequate for present and future use.

3.9.2.8 Liquid Fuel

There are five primary types of fuels that are stored and distributed at JB MDL, including JP-8 (jet fuel), No. 2 light fuel oil (FS-2), unleaded gasoline, E85 (85 percent ethanol/15 percent gasoline mixture), and diesel. Most of these fuels are trucked; however, JP-8 is delivered to the McGuire area through a commercial pipeline. On McGuire there are three primary bulk fuel storage areas as follows: the bulk fuel storage area, the BRAC hydrant system, and the NJ Army National Guard facility (MAFB, 2005a). The fuel storage capacity at

McGuire includes approximately 1,150,000 gallons of No. 2 light fuel oil, 7,520,000 gallons of JP-8 jet fuel, 32,000 gallons of diesel fuel, 25,000 gallons of unleaded gasoline, and 10,000 gallons of E85 (JB MDL, 2012c).

Users in the Dix area utilize the McGuire area's jet fuel facilities to meet their needs. As required, there are numerous fuel storage tanks around the Dix area with sufficient capacity to support vehicle, heating, and range training operation requirements. The fuel storage capacity at Dix includes 175,000 gallons of No. 2 light fuel oil, 25,000 gallons of unleaded gasoline, and 75,000 gallons of diesel fuel (JB MDL, 2012c).

The fuel storage capacity at Lakehurst includes 88,500 gallons of JP-8 (jet fuel), 47,500 gallons of diesel fuel, 12,000 gallons of unleaded gasoline, and 16,000 gallons of E85. Most of the fuel storage and dispensing (72 percent) occurs at Fuel Farm 424 to the south of Hangar 6 along McCord Road. The remaining fuel storage occurs at the Recovery Systems Test Sites, Trenton Test Site (currently not operational), and in small above ground tanks associated with backup generators and fire pumps (JB MDL, 2011a).

3.9.2.9 Electricity

The electrical system on JB MDL consists of power purchased from Jersey Central Power & Light. Electricity is supplied to the McGuire area via a single 34.5 kilovolt (kV) switching station and the primary distribution system is a 12.47/7.2 kV line that leaves the main substation. This substation supplies power via seven feeder circuits which each serve a different area of McGuire. Emergency electrical power on McGuire is supplied to critical facilities via stationary emergency backup generators installed within or adjoining buildings portable emergency generators for contingency situations (MAFB, 2005a).

The electricity in the Dix area is supplied via a 34.5 kV transmission loop that originates at a substation in Cookstown, approximately five miles east of the installation. Two circuits (26 kV each) and six substations (4.16 kV each) provide primary and back up capacity to Dix (Fort Dix, 2000).

Electricity is supplied to the Lakehurst area through two primary supply lines that are rated at 34.5 kV and reduced by two substations. Both substations are tied together by a transformer so that power can be transferred from one side of Lakehurst to the other in the event of a power failure. Lakehurst also has emergency generators at several buildings. These emergency generators only provide power to the buildings in which they are located (NAES Lakehurst, 2003).

The existing electricity demand across JB MDL is currently being met and Jersey Central Power & Light has stated that they can supply the necessary capacity to support future missions. Overall, the power supply is not considered an issue for future development; however, old distribution and transformer infrastructure on base likely requires upgrading to guarantee adequate supplies to support future growth.

3.9.2.10 Communications

The McGuire area of JB MDL owns and maintains all the outside copper and fiber optic cables, which are designed for official use. The copper cables support voice, fire and crash systems, security alarm systems, radio systems, the Energy Monitoring and Control System, and low speed point to point data systems. The fiber optic cables support McGuire's data network. New military construction projects are required to provide the necessary copper and fiber optic cabling for new facilities as well as any necessary manhole/ducts to accommodate both the copper and fiber optic cabling (MAFB, 2005a).

The Dix area of JB MDL owns a combination of buried and aerial cable. Although copper cable has been installed in select areas, the majority of outside cable consists of lead and is in relatively good condition. This outside cable is maintained by a contractor and will not support data communications greater than 2,400 baud. The Dix Dial Center Office owns an Integrated Digital Network which is maintained and operated by a contractor. The Network has a capacity of 5,000 lines and approximately 75 percent are currently utilized. Local trunking is provided by Verizon though the Wrightstown, NJ Branch Office (Fort Dix, 2000).

Voice, video, and data services on the Lakehurst area of JB MDL are provided through the Navy Marine Corps Intranet (NMCI). The NMCI is the Navy program that delivers comprehensive, end to end information services enterprise wide to the Navy and Marine Corps. It includes associated capital infrastructure improvements necessary to meet quality of service requirements as well as maintenance, training, and

operation of that infrastructure (NAES Lakehurst, 2003).

3.10 Materials and Waste

3.10.1 Definition of the Resource

Materials include any raw substances or goods needed for construction or maintenance of facilities or infrastructure. The availability of materials might affect, or be affected by, a proposed action. Hazardous materials are defined by 49 CFR Part 171.8 as "hazardous substances, hazardous wastes, marine pollutants, elevated temperature materials, materials designated as hazardous in the Hazardous Materials Table (49 CFR Part 172.101), and materials that meet the defining criteria for hazard classes and divisions in 49 CFR Part 173". Transportation of hazardous materials is regulated by the U.S. Department of Transportation regulations within 49 CFR Parts 105–180.

Special hazards are those substances that might pose a risk to human health and are addressed separately from other hazardous substances. Special hazards include asbestos-containing material (ACM), polychlorinated biphenyls (PCBs), and lead-based paint (LBP). The USEPA is given authority to regulate these special hazard substances by the Toxic Substances Control Act (TSCA) Title 15 USC Chapter 53. The USEPA has established regulations regarding asbestos abatement and worker safety under 40 CFR Part 763 with additional regulation concerning emissions (40 CFR Part 61). The presence of special hazards or controls over them might affect, or be affected by, a proposed action. Information on special hazards describing their locations, quantities, and condition assists in determining the significance of a proposed action.

Hazardous wastes are defined by the Resource Conservation and Recovery Act (RCRA) at 42 USC 6903(5), as amended by the Hazardous and Solid Waste Amendments, as "a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may (A) cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or (B) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed." Certain types of hazardous wastes are subject to special management provisions intended to ease the management burden and facilitate the recycling of such materials. These are called universal wastes and their associated regulatory requirements are specified in 40 CFR Part 273. Four types of waste are currently covered under the universal waste regulations: hazardous waste batteries, hazardous waste pesticides that are either recalled or collected in waste pesticide collection programs, hazardous waste thermostats, and hazardous waste lamps.

Solid waste management primarily relates to the availability of systems and landfills to support a population's residential, commercial, and industrial needs.

3.10.2 Existing Conditions

3.10.2.1 Construction Materials

Primary materials for construction projects would include structural steel, concrete, asphalt, and corrugated steel siding and roofing. Regionally and nationally, standard building materials are available from multiple sources and there are no supply chain issues. There are several concrete, aggregate, and asphalt plants within 25 miles of the base that could readily supply these materials. There are also at least 5 structural steel and other metals suppliers within 10 to 50 miles of the base.

3.10.2.2 Hazardous Materials and Petroleum Products

AFI 32-7086, *Hazardous Materials Management*, establishes procedures and standards that govern management of hazardous materials throughout USAF installations and outlines the requirements for a hazardous materials management program. The purpose of the management plan is to control the procurement and use of hazardous materials, ensure the safety and health of personnel and surrounding communities, and minimize dependence on hazardous materials. The management plan is to include the activities and infrastructure required for ongoing identification, management, tracking, and minimization of hazardous materials and petroleum products.

JB MDL developed a base-wide Hazardous Waste Management Plan in 2012 that provides guidance on the proper management of hazardous materials (AMEC, 2012). There are numerous hazardous materials storage lockers located throughout JB MDL. These lockers contain hydraulic fluid, engine oil, adhesive grease, paint, solvent, and cleaners to name a few. All of these materials are handled in accordance with USAF guidelines under the plans described above (JB MDL, 2008). Each activity at JB MDL has an Authorized Use List that identifies the hazardous materials that it is authorized to use. Activities are prohibited from using hazardous materials that are not on the Authorized Use List. A copy of the material safety data sheets for each hazardous material are maintained on-site and are available to all work center personnel.

3.10.2.3 Storage Tanks

AFI 32-7044, *Storage Tank Compliance*, implements Air Force Policy Directive (AFPD) 32-70 and identifies compliance requirements for USTs, ASTs, and associated piping that store petroleum products and hazardous substances. USTs are subject to regulation under RCRA, 42 USC 6901, and 40 CFR Part 280. An inventory of ASTs and USTs is maintained at each portion of JB MDL (i.e., McGuire, Dix, and Lakehurst) and includes the location, contents, capacity, containment measures, status, and installation dates. On JB MDL there are 32 active USTs, 400 active ASTs, and 39 used oil ASTs (JB MDL, 2012c). Table 3.10-1 below outlines the storage capacity of USTs and ASTs including mobile generators and portable containers throughout JB MDL.

Table 3.10-1. Storage Tank Capacity on JB MDL

Area of JB MDL	Storage Capacity (Gallons)		Totals (Gallons)
	Aboveground	Underground	
McGuire	8,344,911	101,000	8,445,911
Dix	261,961	138,500	400,461
Lakehurst	136,222	0	136,222

Source: NAES Lakehurst, 2008a; Fort Dix, 2012; MAFB, 2012

JB MDL has a total aboveground storage capacity of 8,743,094 gallons and an underground storage capacity of 239,500 gallons. The Discharge, Prevention, Containment and Countermeasure (DPCC) Plans, Spill Prevention Control and Countermeasures (SPCC) Plans and the Installation Spill Contingency Plan are the key documents addressing management, spill containment, and cleanup of bulk fuels across the installation. The DPCC Plan is a NJDEP requirement for facilities that have over 200,000 gallons of hazardous substances including fuel. Lakehurst does not meet that requirement and therefore does not have a DPCC; however, it does maintain an SPCC per USEPA requirements.

3.10.2.4 Oil/Water Separators

In order to adequately protect surface water and groundwater quality, JB MDL adheres to Section 2.10 of AFI 32-7041, *Water Quality Compliance*, and the applicable memorandums. Section 2.10 requires the application of certain criteria to normal O/WS operation and maintenance activities involving, for example, aircraft/vehicle maintenance, aircraft washing, fuel storage/transfer, fire training, storm water runoff and collection, and machine and paint shops (USAF, 2010). UFC 3-240-03N, *Wastewater Treatment Systems Augmenting Handbook*, serves to provide general information on O/WSs and specific information on determining the need, principles, and design criteria for an O/WS. This information also helps to prohibit the improper use of O/WSs located at USAF facilities (DoD, 2004). Table 3.10-2 below outlines the O/WSs currently active throughout JB MDL.

Table 3.10-2. Oil/Water Separators and Capacity at JB MDL

Area of JB MDL	Number of Active O/WS Tanks	Total Active Capacity (Gallons)
McGuire	36	148,600+
Dix	25	21,500
Lakehurst	2	3,000

Source: NAES Lakehurst, 2008a; Fort Dix, 2012; AFCEE, 2012.

JB MDL has a total of 63 active O/WS tanks with a total active capacity of over 173,100 gallons.

3.10.2.5 Asbestos Containing Material

Asbestos is regulated by the USEPA under the CAA; TSCA; and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The USEPA has established that any material containing more than one percent asbestos by weight is considered an ACM. Friable ACM is any material containing more than one percent asbestos, and that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure. Non-friable ACM is any ACM that does not meet the criteria for friable ACM.

JB MDL follows AFI 32-1052, *Facilities Asbestos Management*, which provides the guidelines and procedures for asbestos management at USAF installations. It requires installations to develop an asbestos management plan for the purpose of maintaining guidelines and procedures for recordkeeping, removal, encapsulation, enclosure, and repair activities associated with ACM-abatement projects. JB MDL maintains an Asbestos Management Plan in accordance with the guideline described above.

Building materials in older buildings (pre-1978) are assumed to contain asbestos; however, asbestos is still used in some construction materials today. Asbestos exists in a variety of forms and can include siding, ceiling tiles, floor tiles, floor tile mastic, roofing materials, joint compound, wallboard, thermal system insulation, boiler gaskets, paint, and other materials. If asbestos is disturbed, fibers can become friable. Common sense measures, such as avoiding damage to walls and pipe insulation, help keep the fibers from becoming airborne. In general ACM is removed on an as-needed basis to minimize health risks from release of asbestos fibers during normal activities, maintenance, renovation, or demolition. It is assumed that ACM would be encountered during the demolition, construction of additions to existing buildings, infrastructure repair, and renovation of existing buildings under the Proposed Action as the majority of buildings and utilities throughout JB MDL pre-date 1978. Table 3.10-3 presents the findings of previous ACM surveys with respect to existing facilities associated with the Proposed Action.

Table 3.10-3. Proposed Action Locations with Known ACM

Project	Building	Asbestos Material	Location	Square feet	Linear Feet	Hazard Ranking	Comments
D1, Demolish Outdoor Recreation Equipment Rental and Storage Facility	6045	No Asbestos Found	NA	NA	NA	NA	Surveyed February 22, 2012
D2, Demolitions for Construction of Physical Fitness Facility	6053	Transite Sheeting	Main Gym Area	5950	NA	7	Surveyed February 22, 2012
	6053	Transite Sheeting	Nautilus Room	960	NA	7	Surveyed February 22, 2012
I1: Replace Well A	3606	No Asbestos Found	NA	NA	NA	NA	Surveyed 1999.
R1, Repair Auto Hobby Shop	2415	Floor Tile	North and east hallways	810	NA	5	Surveyed October 19, 2011
	2415	Various joints and fittings	Majority in auto hobby, some in FSS Public Affairs	NA	20	5	Surveyed November 1, 2011
	2415	9"x9" Floor tile	Supervisor's Office under carpet	180	NA	7	Surveyed November 1, 2011
	2415	9"x9" Floor Tile	Supervisor's Office Storage Room	Not recorded	NA	7	Surveyed November 1, 2011
	2415	9"x9" Floor Tile	Tool Room Office	80	NA	7	Surveyed November 1, 2011. Found under 12x12 tan floor tile

Project	Building	Asbestos Material	Location	Square feet	Linear Feet	Hazard Ranking	Comments
	2415	9"x9" Floor Tile	SFS/MWD Area	160	NA	7	Surveyed October 19, 2011. Located under carpet.
C1, Construct Addition to Combat Communications Administration Facility	3514	Not Surveyed	NA	NA	NA	NA	NA

NA = Not applicable
Hazard Ranking: 1 – The highest ranking, ACM is significantly damaged; 2 –potential for significant damage; 3 – potential for moderate damage; 4: potential for damage: 5-7: materials are currently in good condition, but with a range of moderate to low in the likelihood of future disturbance.
Source: JB MDL, 2012e.

Generators of ACM shall submit a written notification of intention to demolish in accordance with 40 CFR Parts 61.145 to 61.155 and N.J.A.C. 7:26-2.12(d) and (e) to the USEPA, NJ Department of Community Affairs, NJ Department of Labor, and NJ Department of Health and Senior Services at least 10 days prior to beginning the demolition activity.

3.10.2.6 Lead Based Paint

Lead was commonly used in house paint for several years. LBP has lead levels greater than or equal to 1.0 milligram per square centimeter or more than 0.5 percent by weight. The Federal government banned the use of most LBP in 1978; therefore, it is assumed that all structures constructed prior to 1978 could contain LBP. Paint chips that fall from the exterior of buildings can contaminate the soil if the paint contains lead. The Residential Lead-Based Paint Hazard Reduction Act of 1992, Subtitle B, Section 408 (commonly called Title X) regulates the use and disposal of LBP on Federal facilities. Federal agencies are required to comply with applicable Federal, State, and local laws relating to LBP activities and hazards.

Each area of JB MDL (e.g. McGuire, Dix, Lakehurst) implements a LBP Management Plan in accordance with DoD guidance. The purpose of these plans is to establish the roles, responsibilities, and guidelines for activities involving the surveying and removal of LBP. Lead paint surveys have been conducted in housing facilities across JB MDL, although some office and industrial buildings have been surveyed on a case-by-case basis to support specific renovation and demolition projects. None of the buildings to be renovated or demolished under the Proposed Action have been surveyed for LBP.

Under the Proposed Action, the buildings listed in Table 3.10-4 would be demolished, renovated, or added to. Projects D1, D2, R1, and R2 would affect buildings built before 1978 and it is assumed that all could contain some LBP.

Table 3.10-4. Buildings to be Demolished or Altered under the Proposed Action

Project Name	Building Number	Year Built	Action	Notes
D1: Demolish Outdoor Recreation Equipment Rental and Storage Facility (Building 6045) (HEKP111000)	B6045	1963	Demolition	Potential for LBP is high.
D2: Demolition for Construction of Physical Fitness Facility (HEKP103000)	B6053, Griffith Field House	1942	Demolition	Potential for LBP is high.
C1: Construct Addition to Combat Communications Administration Facility (Building 3514) (PTFL119005)	B3514	2005	Construct Addition	No LBP is assumed.
C2: Construct Addition to Aeromedical Staging Squadron (Building 2309) (PTFL129000)	B2309	1987	Construct Addition	No LBP is assumed.

Table 3.10-4. Buildings to be Demolished or Altered under the Proposed Action

Project Name	Building Number	Year Built	Action	Notes
I1: Replace Well A (PTFL071008)	B3606	1954	Demolition of Former Well House	Potential for LBP is high.
R1: Repair Auto Hobby Shop (Building 2415) (PTFL095000)	B2415	1963	Interior Renovations and Exterior Siding Alteration	Potential for LBP is high.
R2: Exterior Repairs to Building 120 (MSBL478995)	B120	1932	Window Replacement	As windows were previously replaced in 1994, with LBP abatement, potential for LBP on casings is low.

3.10.2.7 Polychlorinated Biphenyls

PCBs are a group of organic compounds used as dielectric and coolant fluids in equipment, such as transformers, capacitors, fluorescent light ballasts, electric motors, and hydraulic systems. PCBs are managed and regulated in accordance with the USEPA's TSCA of 1976 (40 CFR Part 761). Federal regulations govern items containing 50 to 499 ppm PCBs. Chemicals classified as PCBs were widely manufactured and used in the U.S. throughout the 1950s and 1960s. The production of PCBs was banned in the U.S. in 1979.

Most major equipment, components, and transformers with PCB concentrations of 500 ppm or greater have been removed from service at JB MDL or are refilled with non-PCB oils. Based on their age, it is assumed that several of the buildings to be demolished under the Proposed Action could have PCB-containing equipment, particularly fluorescent light ballasts.

3.10.2.8 Pesticides

JB MDL follows AFI 32-1053, *Pest Management Program*, which describes the pesticide management requirements for each installation. Each area of JB MDL (i.e., McGuire, Dix, and Lakehurst) maintains their own Pest Management Plan in accordance with AFI 32-1053. JB MDL utilizes an Integrated Pest Management approach to pest control to minimize the types and quantities of pesticides used at the installation. The application of pesticides, herbicides, and fertilizers varies across the installation; however, it focuses on two major areas: runway/taxiways and the golf courses. With the exception of the golf courses, general and grounds maintenance pest management services on JB MDL are conducted by a contractor. The contractor has a written integrated pest management plan and follows a general policy of evaluating the need for chemical application prior to spraying. Lakehurst has a support agreement with Dix and under this contract no pesticides are mixed or stored on Lakehurst. All pesticides for Dix and Lakehurst are currently stored at Pesticide Storage Building 5385 on Dix. Pesticide management on McGuire is handled from Building 3564.

JB MDL has three active golf courses and the golf course staff applies pesticides and herbicides only as needed. The golf course activities are also covered in the Pest Management Plan. Pesticides and herbicides for the golf courses are mixed and stored at the golf course maintenance buildings. See Table 3.10-5 for ERP sites with known pesticide contamination near the locations of projects selected for detailed analysis.

3.10.2.9 Radon

Radon is a naturally occurring radioactive gas found in soils and rocks. It comes from the natural breakdown or decay of uranium. Radon has the tendency to accumulate in enclosed spaces that are usually below ground and poorly ventilated (e.g., basements). Radon is an odorless, colorless gas that has been determined to increase the risk of developing lung cancer. In general, the risk of lung cancer increases as the level of radon and length of exposure increase. The USEPA has established a guidance radon level of 4 picocuries per liter (pCi/L) in indoor air for residences; however, there have been no standards established for commercial structures. Radon gas accumulation greater than 4 pCi/L is considered to represent a health risk to occupants.

Burlington County has been designated a zone 2 radon area, which means that the predicted average indoor

radon screening level is between 2 and 4 pCi/L and that there is a moderate potential for elevated indoor radon levels. Ocean County has been designated a zone 3 radon area, which means that the predicted average indoor radon screening level is below 2 pCi/L (USEPA, 2012). All radon testing at JB MDL is performed by the Bioenvironmental group under the USAF Radon Assessment and Mitigation Program. The bulk of radon surveys have been conducted within the housing areas throughout the installation.

3.10.2.10 Environmental Restoration Program

The Defense ERP was formally established by Congress in 1986 to provide for the cleanup of DoD property at active installations, BRAC installations, and formerly used defense sites throughout the U.S. and its territories. The two restoration programs under the ERP are the Installation Restoration Program and Military Munitions Response Program (MMRP). The ERP requires each installation to identify, investigate, and clean up contaminated sites. The Installation Restoration Program includes sites managed under CERCLA, which are categorized as either National Priorities List or non- National Priorities List sites, and Compliance Restoration Program sites, which are managed under RCRA or applicable State laws (JB MDL, 2012c). The MMRP addresses nonoperational military ranges and other sites that are suspected or known to contain unexploded ordnance (UXO), discarded military munitions, or munitions constituents. Table 3.10-5 lists known ERP sites and types of contamination that could be encountered.

Table 3.10-5. ERP Sites Potentially Affecting the Proposed Action

Potential Affected Project	Defense ERP Site Number	Site Name	Defense ERP Site Description
D1: Demolish Outdoor Recreation Equipment Rental and Storage Facility, and C3: Construct Outdoor Recreation Equipment Rental and Storage Facility	TU970	Dix Outdoor Recreation Center, Building 6045	Building 6045 was the former location of a gasoline service station. The building currently serves as the Dix Outdoor Recreation Center. Restoration work began at this site in July 2005. Remedial activities included a removal of 120 cubic yards of impacted soil, injection of Oxygen Release Compound and groundwater monitoring for benzene, toluene, ethylbenzene, and xylenes. There are eight monitoring wells on-site which are sampled semi-annually. If contaminant levels do not decrease to acceptable levels, additional remediation may be required. If contaminant levels do decrease to acceptable levels, this site will be added to the current Dix base-wide CEA agreement with NJDEP.
I1: Replace Well A	SS025	Entomology Shops	This site lies less than 0.1 mile from the proposed Well A location. Pesticides, VOCs, semi-volatile organic compounds (SVOCs) and metals are present in surface soils exceeding NJDEP non-residential soil criteria in three areas. Source is believed to be from mixing pesticides outdoors between 1960 and 1982. Remedial Investigation (RI) field work was completed in May 2011. Draft RI was completed July 2012.
	SS036	Building 2300 Series and 3200 Series	This site lies less than 0.1 mile from the proposed Well A location. Site consisted of spills at industrial facilities where storage of hazardous materials and hazardous wastes occurred. Soils, surface water and sediment are contaminated with VOCs, SVOCs, pesticides and metals. Groundwater is contaminated with VOCs, SVOCs and metals. Final RI completed December 2012.
I2: Construct New Shoulders on Runways 06/24 and 15/33	ZZ003	Former Lakehurst Proving Grounds	The Proving Grounds were operated by the Eddystone Ammunition Company circa 1915-1917 to conduct munitions testing for the Russian Imperial Government. The Chemical Warfare Service operated the Proving Grounds from 1917 to 1921 and included three artillery ranges, two sets of trenches, and several impact areas. Munitions have been found throughout Lakehurst, particularly in areas corresponding to the former impact areas. Chemical shells were reported discovered during the construction of the runways at Maxfield Field in 1952. The project site would be located outside the highest UXO risk or "sweep required" area but would fall within the "use caution" zone that has a lower probability of UXO.
I3: Replace Hot Cargo Loading Area Hydrant System and Expand Shoulders *(Note: Project would occur between sites*	AT028	Suspected Fire Training Area 4	AT-028 is one of two fire training areas within the McGuire runways infield, located approximately 200 feet of the Hazardous Cargo Parking Area. Investigations in 2008 revealed VOC exceedances in groundwater, SVOCs exceedances in soil/ sediment, and one metals exceedance in all media. Draft RI completed November 2013.
	FT008	Fire Protection Area 1	FT-008 is a 3-acre fire training area used from the late 1940s to 1958 in the northern portion of the infield triangle. Waste oils, aviation gasoline (AVGAS), jet fuel, hydraulic fluid, spent solvent, and alcohol were stored and burned during exercises. Investigations identified VOCs and SVOCs in soil, and trichloroethene and benzene, toluene, ethylbenzene, and xylenes groundwater plumes. Draft RI

Table 3.10-5. ERP Sites Potentially Affecting the Proposed Action

Potential Affected Project	Defense ERP Site Number	Site Name	Defense ERP Site Description
AT-028 & FT-008)			completed November 2013.
I5: Underground Electrical Distribution System (3300, 3400, 3500 Areas)	LF002	Landfill No. 4	LF002 is a former 25-acre landfill that received mixed wastes between 1958 and the early 1970's. The landfill was operated in a trench and fill manner, with trenches approximately 15 feet deep, some extending below the water table. Waste materials included general municipal waste, construction debris, coal ash, and hazardous waste (possibly oil, fuel, solvents). Following closure, the site was covered with sandy soil. Since 1980, 6.5 acres of the site are used for active explosive ordnance disposal training range. EOD personnel certified that live ordnance is not present on the site. Groundwater is contaminated with VOCs, SVOCs and metals. Final RI completed January 2013; Draft Feasibility Study completed October 2013.
	WP021	Waste Water Treatment Plant Sludge Disposal Area	Between 1970 and 1980, an unlined area about 1 acre in size was used to stockpile excess dewatered sludge generated at the former treatment plant. Stockpiles eventually grew to be about 8 feet tall before it was removed by 1994, around the time the treatment plant closed. Early reports suggest sludge contained PCBs and metals above regulatory criteria. Surface soils are contaminated with SVOCs. Subsurface soils contain PCBs. Groundwater overlaps with ERP site LF-002. Final RI completed January 2013; Draft Feasibility Study completed October 2013.
	SS025	Entomology Shops	Pesticide mixing occurred within and outside former buildings 3205, 3207 and 3208. No major releases were documented, but small spills presumably occurred during mixing. Rinse water from buckets and tanks were reportedly discharged directly onto grass surfaces in this area. Surface soils are contaminated with SVOCs, PAHs, pesticides and metals. Groundwater is contaminated with VOCs, SVOCs, pesticides and metals. A Draft RI was completed in July 2012.
	TU026	Building 330 USTS E123 & E225	Two single walled No. 2 fuel oil USTs (1000 gallon and 550 gallon) were removed in January 1998. During removal, holes on the bottom of both tank and visibly stained soils were observed. Subsurface soils are contaminated with VOCs, SVOCs and TPH. The RI for the site was initiated in 2010.
	TU029	Building 3446	Four 25,000-gallon USTs (USTs 220A through 220D) were located in a parking lot next to Building 3446 to store AVGAS. During removal of the USTs in 1994, a sheen was observed on the water table. In 1996, soil sampling revealed elevated levels of fuel constituents. The concentrations of fuel constituents and total petroleum hydrocarbons in groundwater samples exceeded cleanup standards. A RI is underway to identify the extent of soil and groundwater contamination.
	SS036	Building 2300 Series and 3200 Series	Consisted of spills at industrial facilities where storage of hazardous materials and hazardous wastes occurred. Soils, surface water and sediment are contaminated with VOCs, SVOCs, pesticides and metals. Groundwater is contaminated with VOCs, SVOCs and metals. Pilot studies are underway and an emergency removal action was conducted at Building 2305 in April 2011.
	SS039	Building 3362 and 3300 Series Buildings	This site is a grouping of buildings associated with aircraft maintenance and support activities including repairing ground power units for aircraft startup. Large quantities of hazardous substances including toluene, diesel fuel, oil, antifreeze, and hydraulic fluids are used during maintenance and repair. There are OWSs associated with some of the buildings. A 1996 site investigation indicated groundwater samples with trichloroethane, bis-2-ethylhexylphthalate and cadmium above screening criteria.
	LF500	Demolition Debris Building 3408	Buildings T-34-9 and T-34-10 (supply buildings) were demolished in the late 1950's and early 1970's. When trenching a new gas line to Building 3447, demolition debris was found less than 3 feet below ground surface.
I6: Install Power Generators (Bldg 3350 only)	TU028	UST E237	A 290-gallon waste oil tank (labeled E237) was located at this building. During removal of the tank and oil water separator in 1971, holes were discovered in the bottom and sides of the tank, and impacted soils were observed. A 2010 site investigation discovered localized soil and groundwater contamination. A RI is underway to identify the extent of soil and groundwater contamination.
	SS039	Building 3362 and 3300 Series Buildings	This site is a grouping of buildings associated with aircraft maintenance and support activities including repairing ground power units for aircraft startup. Large quantities of hazardous substances including toluene, diesel fuel, oil, antifreeze, and hydraulic fluids, are used during maintenance and repair. There are O/WSs associated with some of the buildings. A 1996 site investigation indicated groundwater samples

Table 3.10-5. ERP Sites Potentially Affecting the Proposed Action

Potential Affected Project	Defense ERP Site Number	Site Name	Defense ERP Site Description
			with trichloroethane, bis-2-ethylhexylphthalate and cadmium above screening criteria. Final RI completed December 2012.
R1: Repair Auto Hobby Shop (Building 2415)	SS037	Building 2415	General vehicle maintenance activities are conducted in the building. Various petroleum-based materials are used and waste oils, waste antifreeze, spent absorbents and rags are generated. An O/WS is connected to the building floor drains. A 1996 sampling and analysis of soil and groundwater detected benzene above screening criteria in groundwater. RI field work indicated no soil contamination above action levels. Monitoring is recommended for groundwater. Final RI completed December 2012.

There is also minor potential for encountering UXO at the proposed fire house site (Project C5) based on proximity to the Dix range impact area.

3.10.2.11 Hazardous and Petroleum Wastes

JB MDL's Hazardous Waste Management Plan is required under AFI 32-7042 and complies with 40 CFR Parts 260 to 272) (AMEC, 2012). Each area of JB MDL (i.e., McGuire, Dix, and Lakehurst) manages their own Hazardous Waste Management Plan. The plans prescribe the roles and responsibilities of all members with respect to the waste stream inventory, waste analysis plan, hazardous waste management procedures, training, emergency response, and pollution prevention. The plan establishes procedures to comply with applicable Federal, State, and local standards for solid waste and hazardous waste management.

McGuire, Dix, and Lakehurst are all permitted as large quantity hazardous waste generators: handler Identifications NJ2571824018, NJ4213720275, and NJ7170023744 respectively (MAFB, 2008 and NAES Lakehurst, 2008). Large Quantity Generators are those that generate 1.1 tons per month or more of hazardous waste, or more than 2.2 pounds per month of acutely hazardous waste. Section 3002(a)(6) of the RCRA requires USEPA to develop a program for hazardous waste generators to report the nature, quantities, and disposition of hazardous waste generated at least once every two years (USEPA, 2012a). The biennial hazardous waste report was implemented in 1985 to comply with these requirements. Large Quantity Generators must submit a biennial hazardous waste report to the authorized State agency or the USEPA regional office every even numbered year.

McGuire has a RCRA Part B Hazardous Waste Storage Permit for Building 2310 and Dix has the same permit for Building 8131 (AMEC, 2012). This permit allows for the storage of hazardous waste in containers at these sites for up to 360 days. All hazardous waste is transported off-site for disposal or recycling by a licensed hazardous waste contractor. Lakehurst is permitted to accumulate hazardous waste on-site for 90 days or less without obtaining a Treatment, Storage, and Disposal facility permit provided that the installation follows the procedures outlined in 40 CFR Part 262.34. Lakehurst stores their hazardous waste at a 90-day hazardous waste transfer facility, Building 343. A waste management contractor removes the hazardous and non-hazardous wastes from the transfer facility approximately every 84 days (NAES Lakehurst, 2006a).

3.10.2.12 Solid Waste Management

The Solid Waste Management Plan at JB MDL follows required solid waste management requirements stipulated by AFI 32-7042 (MACTEC, 2011). The plan includes guidance for the management of solid waste, compost material, construction and demolition debris, and industrial solid waste. The 87 CES/CEIE Environmental Division is primarily responsible for implementing the plan.

All non-recyclable municipal solid waste is collected by a contractor and disposed in landfills off-installation. Refuse operations at JB MDL are handled under one single refuse contract and waste is disposed of at the Ocean County Landfill and Burlington County Landfill. Disposal of solid waste at JB MDL is conducted through a facility support contract with a licensed waste hauler. Solid waste from Lakehurst is transported to the Ocean County landfill in Manchester, NJ, which has permitted capacity until 2029. Solid waste from Dix

and McGuire is transported to the Burlington County Landfill in Mansfield, NJ. The Burlington County Landfill was opened in 1989 and at the current rate of receiving wastes has a permitted capacity until 2016. The capacity of the Burlington County Landfill is 6,977,174 tons (Energy Justice, 2012). There is currently a plan for expansion, so the landfill will have permitted capacity until 2027.

The installation implements a comprehensive Qualified Recycling Program. There are two on-base recycling centers: McGuire-Dix and Lakehurst. Recyclable waste generated by construction and demolition contractors is managed by the contractor, and weight tickets are submitted to the Contracting Officer to ensure proper disposal. Dix and Lakehurst operate composting operations. In FY 2010, 41 percent of refuse and 43 percent of construction and demolition debris was recycled across JB MDL.

3.11 Human Health and Safety

3.11.1 Definition of the Resource

Health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity. It can also be defined as "a resource which permits people to lead an individually, socially and economically productive life." Safety is "the condition of being protected from or unlikely to cause danger, risk, or injury" and occupational health and safety is the promotion of a safe and healthy environment to support the physical and mental well-being among humans in the workplace. Human health and safety addresses both workers' health and public safety during facility demolition, construction, and subsequent operation of newly constructed facilities. Workplace Safety applies to on-the-job safety and implements the requirements of 29 CFR Part 1910 et seq. These requirements include protective clothing and equipment, hazardous materials communication, health and safety standards for the workplace, on-the-job reporting requirements, and myriad other requirements designed to protect the health and safety of workers. The health and safety of on-site military and civilian workers are safeguarded by numerous DoD, USAF, Navy, and Army regulations designed to comply with standards issued by the OSHA and the USEPA. These standards specify the amount and type of training required for industrial workers, the use of protective equipment and clothing, engineering controls, and maximum exposure limits for workplace stressors.

Each branch of the military has its own policies and regulations that act to protect its workers, despite their work location:

- AFI 91-301, *Air Force Occupational and Environmental Safety, Fire Protection, and Health (AFOSH) Program* implements AFPD 91-3, *Occupational Safety and Health*, by outlining AFI 91-301. The purpose of AFI 91-301 is to minimize loss of USAF resources and to protect USAF personnel from occupational deaths, injuries, or illnesses by managing risks. In conjunction with the USAF Mishap Prevention Program, these standards ensure all USAF workplaces meet Federal safety and health requirements.
- The Army Regulation 385-10, *Army Safety Program*, governs Army policies, responsibilities, and procedures to protect and preserve Army personnel and property against accidental injury or loss of life. The regulation provides for operational safety, safe and healthy work places, and assures compliance with applicable safety laws and regulations.
- Navy personnel are protected from occupational hazards by Secretary of the Navy Instruction 5100.10H, *Department of the Navy Policy for Safety, Mishap Prevention, Occupational Health and Fire Protection Programs*, and Office of the Chief of Naval Operations Instruction 5100.23F, *Navy Occupational Safety and Health Program Manual.*

Safety programs at JB MDL are required to include accident reporting, workplace safety, transportation safety, and (where applicable) range safety, explosives safety, aviation safety, tactical safety, and system safety. It is not possible to eliminate all safety risks associated with an activity but it is possible to minimize the risk through risk management. Risk management allows decision makers to assess the risk involved for each safety hazard, determine impacts to the mission or personnel should a hazardous event occur, and estimate the probability of the risk occurring.

3.11.2 Existing Conditions

3.11.2.1 Police and Fire Protection

When JB MDL became operational in 2009 the three previous bases merged their civilian and military security forces to create the 87th Security Forces Squadron. JB MDL is the only security forces squadron that has merged DoD civilian police officers, Air Force security forces, and Navy Master-at-Arms. The 87th Security Forces Squadron possesses an integrated unit postured to protect the personnel and resources on JB MDL (Flores, 2010). JB MDL is connected to the 911 Emergency System should an emergency requiring police protection occur. The JB MDL Police Force provides primary response to emergencies. The JB MDL Fire and Emergency Services Division provide fire suppression, crash, rescue, emergency medical, hazardous substances, and structural fire protection for all personnel at JB MDL. There are four fire stations located throughout JB MDL, one on Lakehurst and McGuire each and two on Dix.

3.11.2.2 Medical

The 87th Medical Group is an outpatient medical treatment facility operating on JB MDL. Its mission is to deliver mission-ready medics, a medically-ready force, patient-centered care and a healthy Joint Base community. The ambulatory care clinic is located on Neely Road. The medical group prepares service members to serve in home station and deployed environments, while meeting healthcare needs of nearly 17,000 TRICARE Prime enrollees and over 42,000 DoD beneficiaries in Central NJ. There are also several medical clinics located throughout JB MDL on all three areas for military use. Additional regional medical facilities around the base include Buttonwood Hospital in Pemberton, Virtua Memorial Hospital in Mount Holly, and the Community Medical Center in Toms River.

3.11.2.3 Construction and Demolition Safety

All contractors are required to conduct construction activities in a manner that does not pose any risk to workers or personnel and are responsible for following ground safety regulations, worker compensation programs, and industrial hygiene programs. Industrial hygiene programs address exposure to hazardous materials, use of personal protective equipment, and availability of material safety data sheets. Contractor responsibilities are to:

- review potentially hazardous workplace operations; to monitor exposure to workplace chemical (e.g. asbestos, lead, hazardous materials), physical (e.g. noise, high exposure to heat or cold, working from heights, tripping hazards), and biological (e.g. infectious waste, insect bites) agents;
- recommend and evaluate controls (e.g. ventilation, respirators) to ensure personnel are properly protected or unexposed; and
- ensure a medical surveillance program is in place to perform occupational health physicals for those workers subject to any accidental chemical exposures or engaged in hazardous material handling work.

The contractors' first priority should always be to eliminate the hazards; however, if the hazards cannot be eliminated they should find safer ways to carry out those tasks by substituting less harmful substances or changing the work environment through engineering controls. For each construction and demolition project on JB MDL, a site-specific construction and operation health and safety plan is required that meets the requirements in USACE EM385-1-1, *Safety and Health Requirements Manual.* Contractors are also required to follow the fire protection requirements in National Fire Protection Association 241: *Standard for Safeguarding Construction, Alteration, and Demolition Operations.*

Demolition work involves many of the same hazards that arise during other construction activities; however, demolition also involves additional hazards due to a variety of other factors. Some of these include: LBP, ACM, and sharp or protruding objects. The demolition contractor is responsible for planning the wreckage of the structure, the equipment to do the work, informing workers of hazards and safety requirements, and public safety. Planning should include necessary safety equipment such as specific respirators, hearing protection, fall protection, warning signs, eye and face protection, and any other hazard protection device needed for the job.

In NJ in 2011, the rate of injury cases per 100 full-time workers in the heavy and civil engineering construction sector was 3.7, which was down from 4.7 the previous year (BLS, 2012).

3.11.2.4 Ordnance, Explosives, and Munitions Safety

Explosive safety QD arcs are imaginary arcs surrounding facilities used for the storage, handling, and maintenance of munitions to provide a safety buffer in case of a detonation inside the bunker. Certain activities and personnel density limits are instituted within these arcs to protect people and facilities from explosion and fragmentation. On JB MDL, Air Force Manual 91-201 establishes the size of the clearance zones based upon QD criteria or the category and weight of the explosives contained within the facility. Office of the Chief of Naval Operations Instruction 8020.14, *Department of the Navy Explosives Safety Policy*, implements mandatory ammunition and explosives safety standards for the Navy. Areas that require QD safety zones include munitions facilities, firing ranges, and FAA restricted areas. There are several areas constrained by QD arcs throughout JB MDL.

- On the McGuire area, there are QD arcs associated with the munitions storage area near the end of Runway 24 (500-foot QD arc), the hazardous cargo parking pads near Taxiways M and L (1,250-foot QD arcs), the Explosive Ordnance Training area (300-foot QD arc), and the Flightline Munitions Holding Area/HCLA 8 (1,320-foot QD arc) (MAFB, 2005a).
- On the Dix area, the ammunition storage complex in the 8500 area has an associated QD arc. Ninety percent of Dix is used for range and training areas. The ammunition storage complex and range and training areas are restricted only to those personnel handling or overseeing munitions or involved in training activities (Fort Dix, 2000).
- On the Lakehurst area, existing ordnance facilities consist of a fenced magazine compound containing five magazines (Buildings 180, 181, 182, 183, and 184) (HQ AMC, 2008).

UXO are any munitions, weapons delivery systems, or ordnance items that contain explosives, propellants, or chemical agents. UXO consists of munitions that (1) are armed or otherwise prepared for action; (2) are launched, placed, fired, or released in a way that they cause hazards; or (3) remain unexploded either through malfunction or design. UXO presents an immediate safety danger from explosion and a long-term health threat from toxic contamination. Areas where munitions are stored, handled, or trained could potentially have UXO, such as those areas previously identified with existing QD arcs. Old munitions storage areas or ranges could also have UXO remaining on-site.

JB MDL military and civilian personnel are routinely advised and reminded not to handle any suspected UXO and to report suspicious ordnance to the Director of Public Safety. JB MDL has mapped areas known to contain UXO under two designations: "sweep required" and "use caution". Prior to any digging in areas mapped as sweep required, a specific UXO sweep must be performed in order to ensure no safety hazards are present. Areas mapped as use caution are less likely to contain UXO, but caution is still advised when disturbing soils and personnel on-site must be capable of recognizing any UXO potentially encountered. When UXO is found, the Explosive Ordnance Disposal team usually detonates it in place, or at a designated safe area, by applying another explosive material to it.

3.12 Socioeconomics and Environmental Justice

The existing conditions for socioeconomics and environmental justice describe population, income, housing, and labor force characteristics in a comparative manner in the immediate vicinity of the sites (municipalities, counties, States, and the U.S. depending on the parameter reported). This comparative approach provides a general idea of how characteristics immediately surrounding the site, which has the greatest potential to be impacted by the Proposed Action, relate to trends in larger geographic areas. This approach is particularly important to ascertain the potential for disproportionate adverse impacts to populations for environmental justice concerns.

3.12.1 Definition of the Resource

3.12.1.1 Socioeconomics

Socioeconomics is defined as the basic attributes and resources associated with the human environment, particularly characteristics of population and economic activity. Regional birth and death rates and immigration and emigration affect population levels. Economic activity typically encompasses employment, personal income, and industrial or commercial growth. Changes in these fundamental socioeconomic indicators typically result in changes to additional socioeconomic indicators, such as housing availability and the provision of public services. Socioeconomic data at county, State, and national levels permit characterization of baseline conditions in the context of regional, State, and national trends.

Demographics, employment characteristics, and housing occupancy status data provide key insights into socioeconomic conditions that might be affected by a Proposed Action. Demographics identify the population levels and the changes in population levels of a region over time. Demographics data might also be obtained to identify a region's characteristics in terms of race, ethnicity, poverty status, educational attainment level, and other broad indicators. Data on employment characteristics identify gross numbers of employees, employment by industry or trade, and unemployment trends. Data on personal income in a region can be used to compare the "before" and "after" effects of any jobs created or lost as a result of a proposed action. Data on industrial or commercial growth or growth in other sectors of the economy provide baseline and trend line information about the economic health of a region. Housing statistics provide baseline information about the local housing stock, the percentage of houses that are occupied, and the ratio of renters to homeowners. Housing statistics allow for baseline information to evaluate the impacts a proposed action might have upon housing in the region.

In appropriate cases, data on an installation's expenditures in the regional economy help to identify the relative importance of an installation in terms of its purchasing power and jobs base.

Socioeconomic data shown in the subsequent sections are presented at areas of JB MDL, county, and State levels to characterize baseline socioeconomic conditions in the context of regional and State trends.

3.12.1.2 Environmental Justice

EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, requires that Federal agencies' actions substantially affecting human health or the environment do not exclude persons, deny persons benefits, or subject persons to discrimination because of their race, color, or national origin. The EO was created to ensure the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no groups of people, including racial, ethnic, or socioeconomic groups, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of Federal, State, tribal, and local programs and policies.

Consideration of environmental justice concerns includes race, ethnicity, and the poverty status of populations in the vicinity of a proposed action. Such information aids in evaluating whether a proposed action would render vulnerable any of the groups targeted for protection in the EO. The projects selected for detailed analysis would occur principally on-Post. Off-Post minority and low income populations, limited in size and proximity to the installation, would not be affected by the Proposed Action; therefore, consideration of environmental justice impacts off-Post will not be studied in detail.

3.12.2 Existing Conditions

3.12.2.1 JB MDL Economic Contribution

JB MDL spans more than 20 miles east to west with over 42,000 contiguous acres of land. It is located within two of the largest counties in NJ, Ocean and Burlington. JB MDL is bordered by 10 townships or boroughs and is bordered by 58,000 acres of State and Federally managed land.

JB MDL is one of the largest employers in NJ and accounts for 1.5 percent of total NJ gross domestic product

(JB MDL, 2011b). JB MDL has approximately 40,000 assigned personnel that are a mix of about 31 percent military and 69 percent civilian. Service members and their family members living and working on and around JB MDL contribute to an overall economic impact of $6.9 billion to the State of NJ (JB MDL, 2011c). JB MDL's annual payroll is $3 billion, with base contract expenditures of approximately $2.2 billion (JB MDL, 2011b).

3.12.2.2 Regional Economy

The percentage of persons employed in the armed forces is 0.2 percent in Ocean County, 1.1 percent in Burlington County, and 0.1 percent in NJ. The largest percentage of employees by industry across all spatial levels is the educational, health, and social services industry. The second largest industry for all spatial levels except Ocean County is the professional, scientific, and management, and administrative and waste management services industry, in which approximately 12 percent of employees are employed. The second largest industry in Ocean County is retail trade, which employs 13.8 percent of the State labor force (U.S. Census Bureau, 2011; U.S. Census Bureau, 2011a; and U.S. Census Bureau, 2011b). For complete information regarding employment by industry, see Table 3.12-1.

Table 3.12-1. Overview of Employment by Industry

Employment Types	Ocean County	Burlington County	New Jersey
Population 16 Years and Over in the Labor Force	266,374	241,331	4,596,702
Percent of population 16 years and over in labor force employed within the armed forces	0.2	1.1	0.1
Percent Employed Persons 16 years old and over in Civilian Labor Force (by industry)			
Agriculture, forestry, fishing and hunting, and mining	752	1,626	14,702
Construction	22,188	11,778	259,043
Manufacturing	15,070	18,951	396,329
Wholesale Trade	8,035	8,601	160,966
Retail Trade	33,618	24,538	469,625
Transportation and warehousing, and utilities	13,285	12,447	242,906
Information	6,735	6,074	134,690
Finance, insurance, real estate, and rental and leasing	16,607	18,737	385,143
Professional, scientific, management, administrative, and waste management services	22,926	25,732	517,257
Educational, health, and social services	59,940	51,423	942,587
Arts, entertainment, recreation, accommodation, and food services	19,962	13,222	325,783
Other services (except public administration)	11,285	9,518	186,453
Public administration	13,492	17,560	195,076

Source: U.S. Census Bureau, 2011; U.S. Census Bureau, 2011a; and U.S. Census Bureau, 2011b.

3.12.3 Environmental Justice

3.12.3.1 Geographic Distribution of Low Income Populations

The Census Bureau's 2007-2011 American Community Survey showed that (in 2011 inflation-adjusted dollars) median household income on McGuire was $49,893 which is approximately $20,000 less than the State of NJ and significantly less than Dix and Lakehurst (U.S. Census Bureau, 2011c; U.S. Census Bureau, 2011d; and U.S. Census Bureau, 2011e). The per capita income for McGuire was $17,651, which again is less than Lakehurst and NJ but more than Dix (U.S. Census Bureau, 2011c, U.S. Census Bureau, 2011d; and U.S. Census Bureau, 2011e). Approximately 9.1 percent of the population in NJ were below the poverty line which was the highest when compared to Ocean County, Burlington County and all areas of JB MDL (see Table 3.12-2) (U.S. Census Bureau, 2012).

Out of 11 census tracts reviewed that border JB MDL, the average median household income was $69,321, which is very close to the State-wide average, although the per capita income averaged $28,513, slightly lower than the State-wide and County averages. The lowest average per capita income area ($16,574) was tract 7022.4, located directly west of the Dix cantonment area. The highest per capita income tract was 7024

($40,091) located just north of tract 7022.4 to the northwest of the Dix cantonment area (U.S. Census Bureau, 2011f).

Table 3.12-2. Income Statistics for the State, County and Areas Around JB MDL

Demographic and Social Indicators	McGuire Air Force Base CDP[1]	Fort Dix CDP[1]	Lakehurst Borough	Ocean County	Burlington County	New Jersey
Total Population	3,710	7,716	2,675	579,369	449,567	8,821,155
Per Capita Income	$17,651	$12,338	$27,171	$29,826	$34,802	$34,858
Median Household Income	$49,893	$81,292	$67,872	$59,620	$76,258	$69,811
Total Number of Persons at or Below Poverty Level (ABPL)	223	316	99	52,143	23,827	802,725
Total Percent ABPL	6.0	4.1	3.7	9.0	5.3	9.1

Sources: U.S. Census Bureau, 2012; U.S. Census Bureau 2011c; U.S. Census Bureau 2011d; and U.S. Census Bureau 2011e.
1: Census Designated Place (CDP)

3.12.3.2 Demographics

The 2010 census measured populations for the State of NJ, Burlington and Ocean County, and all areas of JB MDL. As of the 2010 U.S. Census, Ocean County's population was 579,369, reflecting an increase of 12.8 percent from the 510,916 counted in the 2000 Census (Ocean County Planning Department, 2013). The population of Burlington County increased 10 percent from 1990 to 2002 and increased 2 percent from 2002 to 2010. The estimated 2011 population in Burlington County is 449,567. The population of NJ increased 8.9 percent from 1990 to 2000, and 4.7 percent from 2000 to 2010. The U.S. experienced large population growths of 13.2 percent from 1990 to 2000, and 9.7 percent from 2000 to 2010 (U.S. Census Bureau 2012 and U.S. Census Bureau, 2001). The racial makeup of Ocean and Burlington Counties and NJ are shown in detail in Table 3.12-3.

As of the 2010 Census, McGuire AFB CDP had a population of 3,710, which is a 42.7 percent decrease from the population in 2000 (U.S. Census Bureau, 2011g). Fort Dix CDP is located in portions of New Hanover Township, Pemberton Township and Springfield Township, which had a 2010 Census population of 7,716 (U.S. Census Bureau, 2011e). The Borough of Lakehurst population increased 5.2 percent from the 2,522 counted in the 2000 Census, which had in turn declined by 18.1 percent from the 1990 Census (N.J. Department of Labor and Workforce Development, 2011). The racial makeup of JB MDL areas are shown in Table 3.12-3 below. McGuire and Dix CDPs both have a larger percentage of minorities when compared to Lakehurst, the Counties, and Statewide percentages.

With regard to the location of minority populations, 11 census tracts surrounding JB MDL were examined. Tracts surrounding Lakehurst and McGuire areas showed a primarily white population, much higher than the State average (90 and 81 percent respectively). The census tracts around the Dix cantonment area and Dix Range showed much higher average percentage of Black or African American population (20 and 30 percent, respectively) than the State-wide or County averages (U.S. Census Bureau, 2011h).

Table 3.12-3. Population and Race

Demographic and Social Indicators	McGuire Air Force Base CDP[5]	Fort Dix CDP[5]	Lakehurst Borough	Ocean County	Burlington County	New Jersey
Total Population (2011 Estimate)	-[2]	-[2]	-[2]	579,369	449,567	8,834,773
Total Population (2010)	3,710	7,716	2,675	576,567	448,734	8,791,898
Percent Change	-	-	-	0.5	0.2	0.5
Race[1] (values indicate percentage of population), 2010 U.S. Census Data						
Percent White	62.0	52.6	77.2	93.2	75.2	74.1
Percent Black or African American	15.1	34.5	10.8	3.4	17.3	14.6

Table 3.12-3. Population and Race

Demographic and Social Indicators	McGuire Air Force Base CDP[5]	Fort Dix CDP[5]	Lakehurst Borough	Ocean County	Burlington County	New Jersey
Percent American Indian Alaska Native	0.4	0.7	0.6	0.3	0.3	0.6
Percent Asian	2.6	1.9	2.1	1.9	4.6	8.7
Percent Native Hawaiian and Other Pacific Islander	0.6	0.3	0.2	-[4]	0.1	0.1
Percent Reporting 2 or More Races	5.4	4.0	5.3	1.2	2.5	1.9
Persons of Hispanic or Latino Origin[3]	13.6	21.5	13.1	8.6	6.7	18.1

Sources: U.S. Census Bureau, 2012; U.S. Census Bureau, 2011c; U.S. Census Bureau, 2011d; and U.S. Census Bureau, 2011e.
Notes:

1. The racial classifications used by the Census Bureau were issued by the Office of Management and Budget on October 30, 1997. The Office of Management and Budget requires five minimum category of race, including White, African American, American Indian and Alaska Native or Pacific Islander.
2. Information was not available.
3. Persons of Hispanic origin may be of any race.
4. Value greater than zero but less than half unit of measure shown.
5. Census Designated Place (CDP)