Army Installations of the Future: Urban + Shrinkage + Landscape

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Dedicated to my newborn daughter, Eleanor Grace Howell and late grandmother, Wilhelmina "Baby" Clarke.

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ABSTRACT

The US Army has set a course to transition to a future force that is adaptive, modern, and at the forefront of change. This strategic vision lacks a refined installation strategy to meet the needs of the future force. In a period of troop reductions, declining budgets, and increased facility vacancy rates the Army is required to shrink its installations.

This thesis explores how to shrink Army installations through change, policy, and design. A set of changes is proposed that focus on eliminating housing, revising security standards, increasing privatization, and growth in Enhanced Use Leasing. Current Army planning strategies based on New Urbanist principles do not address how to shrink installations. Four theories are analyzed to develop a framework for designing the future of Army installations. Parameters are established to test the results of the design. The framework is applied to develop a design proposal for Fort Belvoir, VA.

The framework generated a successful design of Fort Belvoir, VA based on the establish parameters. The framework and design process is transferable to all Army installations in the United States. Army planners can apply the process and framework as a tool to generate solutions to shrink Army installations.

Thesis Advisor: Alan Berger
Title: Professor of Landscape Architecture and Urban Design

Contents

Acknowledgements 6

Biographical Note 7

Acronym List 8

1. Introduction 10

2. Context 16
The US Army and its Relationship to Installations

3. Practice 40
Army Installation Planning

4. Precedence 60
Case Studies

5. Theory 66

6. Design 78

7. Conclusion 120

8. Sources 124

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To my family, thank you for allowing me to be a hermit and complete my thesis. Your understanding of this process is grateful.

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Biographical Note

Dwight Howell is a Captain in the United States Army and has a passion for urban planning, urban design, and business processes. Born in the United States Virgin Islands to parents in the military, he followed in their footsteps becoming an Army Engineer Officer. He holds a Master in City Planning from MIT, a Bachelor of Science in Planning from Arizona State University, and is a Master of Business Administration candidate at the University of North Carolina-Chapel Hill Kenan-Flagler Business School. Dwight has served his country during two combat deployments in Afghanistan and Iraq. He is known for his "out of the box" ideas and bringing ingenious solutions to fruition as seen in his tactics and armor design modifications. Dwight has served in a myriad of positions including platoon leader, company commander, and Aide-de-Camp. Throughout his career, Dwight has clearly demonstrated his abilities as a professional Engineer Officer. For eight years he has influenced the Engineer Regiment, and his exemplary service is a model for all Engineers. Intelligent and articulate with unimpeachable character, Dwight continuously utilized initiative and innovative solutions to solve complex problems. He has earned numerous medals and awards including the Bronze Star Medal and Military Outstanding Volunteer Service Medal. Dwight is the 2012 General of the Army Omar N. Bradley Leadership Award winner, 2013 General Douglas MacArthur Leadership Award finalist, and 2013 MLB and PEOPLE Tribute for Heroes Award finalist. He holds professional certifications in project management (PMP) and Lean Six Sigma (LSSBB). Dwight is a loving husband to his wife, Kate, and a proud father to his daughter, Eleanor.

Acronym List

AC	Active Component
ADP	Area Development Plan
ADRP	Army Doctrine Reference Publication
AFH	Army Family Housing
AMC	Army Material Command
APG	Aberdeen Proving Grounds, MD
AR	Army Regulation
ARCENT	US Army Central
ASA (IE&E)	Assistant Secretary of the Army for Installations, Energy & Environment
AT	Antiterrorism
AVN	Aviation
BAH	Basic Allowance for Housing
BOS	Base Operations Support
BRAC	Base Realignment and Closure
CONUS	Continental United States
CSA	Chief of Staff of the Army
CTR	Center
DA	Department of Army
DASA (IH&P)	Deputy Assistant Secretary of the Army for Installations, Housing & Partnerships
DBT	Design Basis Threat
DCG	Deputy Commanding General
DCIP	Defense Critical Infrastructure Program
DoD	Department of Defense
DoDD	Depart of Defense Directive
DoDI	Department of Defense Instruction
EUL	Enhanced Use Leasing
FMV	Full Market Value
FY	Fiscal Year
GIB	General Instruction Building
IDP	Installation Development Plan
IMCOM	Installation Management Command
LOP	Level of Protection
MCA	Military Construction
MWR	Morale, Welfare and Recreation
NG	National Guard
NGA	National Geospatial Agency
NSSC	Natick Soldier Systems Center
NU	New Urbanism
OAA	Office of the Administrative Assistant to the Secretary of the Army
OACSIM	The Office of the Assistant Chief of Staff for Installation Management
OCO	Overseas Contingency Operations
OPD-MP	Strategic Plans Division Master Planning Branch
OPS	Operations
PAL	Privatized Army Lodging
PMC	Primary Military Contractor
PRV	Plant Replacement Value
PX	Post Exchange
RA	Regular Army
RCI	Residential Communities Initiative
RPA	Riparian Area
RPMP	Real Property Master Plan
RPSC	Regional Planning Support Center
SA	Secretary of the Army
SRM	Sustainment, Restoration, and Modernization
SWMU	Solid Waste Management Unit
TAC	Tactical
TOD	Transit Oriented Development
UFC	Unified Facilities Criteria
USA	Under Secretary of the Army
USACE	United States Army Corps of Engineers
USAR	United States Army Reserves
USC	Unite States Code
VCSA	Vice Chief of Staff of the Army

1. Introduction

Army 2020 is a strategic vision that will transition the United States Army, referred to as Army in the rest of the thesis, into a future force focused on developing adaptive leaders and organizations, modernizing equipment, and revolutionizing training to strengthen the Army. The Chief of Staff of the Army, General Raymond T. Odierno, states in *Marching Orders*:

> Going forward, we will be an Army in transition. An Army that will apply the lessons learned in recent combat as we transition to evolving threats and strategies. An Army that will remain the best manned, best equipped, best trained, and best led force as we transition to a leaner, more agile force that remains adaptive, innovative, versatile and ready as part of Joint Force 2020.[1]

This vision of the future force needs a refined installation strategy that will transform with the new characteristics. The current strategy for Army installations is to promote readiness of troops and increase cost savings. It plans to ensure "the best use of facilities and lowering of costs involved through critical considerations such as excess facilities, leases, proper space allocation and energy use."[2]

The US Army is currently in the process of downsizing from 520,000 to 490,000 personnel by the end of Fiscal Year (FY) 2015. Based on initial Department of Defense (DoD) guidance the end strength of the Army at the completion of FY 2017 will be in the range from 440,000 to 450,000 personnel.[3] This 15% reduction in personnel predicates that there will be a comparable reduction in square footage requirements for the Army. The reduction in square footage provides cost savings in energy, operations, and maintenance. The Army still incurs maintenance and operation costs on underutilized and vacant spaces. By FY 2019 18% of Army facilities in the continental United States (CONUS) will be under occupied or vacant and the Army continues to decline in personnel numbers.[4] Major investments to the physical footprint of Army bases are attributed to the Base

1 Odierno, "38th CSA Marching Orders."

2 Aycock, "Army Installation Stationing 2020."

3 McHugh and Odierno, *2014 Army Posture Statement*.

4 Ibid.

Realignment and Closure (BRAC) round 2005 and they need to be protected. Current design guidelines are established for growth and do not account for the demand to shrink footprints. The guidelines need to adapt in order to shrink installation footprints effectively. Furthermore, the Army will look and operate differently in the future facing disparate challenges and threats. Army installations will be forced to adapt to the future force of 2025 and beyond.

In an era with reduced budgets, significant draw down in personnel, and dissimilar security risks, now is an appropriate time to review installations for future shrinkage through careful analysis, planning, and design. Based on those factors the Army is faced with the task of how to effectively shrink Army installations.

This thesis explores this question through design and policy. Information on the Army and Army installations ensure proper understanding of the challenges and opportunities. An in-depth analysis and critique of current installation planning practices and completed projects is provided. Theory research provides a framework to develop different approaches and ideas of how to shrink, with the exact locations and prescriptions to be determined by the BRAC process. These approaches provide a framework that leads to a design proposal to shrink an Army installation. The framework is demonstrated on Fort Belvoir, VA. This design proposal is site specific, but will contain urban design strategies that are transferable across all Army installations.

The thesis is structured in five major chapters to effectively understand the context, background, and possible design strategies to shrink CONUS US Army installations.

1. The US Army and its Relationship to Installations
Background on the Army and its missions provides a baseline to understand why a solution is needed to shrink footprints. It explains the Army's mission, budget, culture, composition, installations, future Army strategy and current programs to develop knowledge informing design decisions.

2. Army Installation Planning
Current installation planning practices are analyzed to determine strengths and weaknesses. Additionally, a critique of the lack of strategies concerning declining populations and under occupied or vacant facilities is conducted. This chapter outlines proposed changes to incorporate into the design proposal.

3. Case Studies of Existing Installations
This chapter examines several projects and programs to illustrate aspects that will be incorporated in the design proposal. They are the Fort Hunter Liggett Real Property Master Plan in El Paso de Robles, CA using a regulating plan-, an office park in Aberdeen Proving Grounds, MD through enhanced use leasing, a town center at Fort Belvoir, VA by privatized housing, and housing at Natick Soldier Systems Center in Natick, MA.

4. Theory
Relevant Urban Design theory is studied to provide an understanding on approaches and methodologies that apply to shrinking cities. Four theories are analyzed to develop an approach for a design proposal. Systemic Design© and Drosscape looks at natural processes and landscape infrastructure, Design With Nature informs where to build with least environmental and cultural impacts, and Patchwork Urbanism informs how to reshape the physical fabric.

5. Design Proposal
Utilizing a developed framework based on theories to shrink Fort Belvoir, VA a design proposal is presented. The design proposal uses extensive analysis of the natural and built environments. The framework illustrates how Fort Belvoir, VA is transformed and the potential for revenue generation.

Fort Douglas, Pre1900s

Presidio of San Francisco, 1915

Camp Travis, 1917

Fort Wadsworth, 1923

Fort Hamilton, 1924

Fort Benning, 1925

Fort Keogh, 1930

Aberdeen Proving Grounds, 1940

Oakland Army Base, 1950

Figure 1. Historical photographs of Army installations in the United States
(Source: US Army, Military City USA, UC Berkeley, Kansas Historical Society, and Fort Wiki)

Fort Sam Houston, TX

Fort Bragg, NC

Fort Bliss, TX

Fort Lee, VA

Fort Benning, GA

Fort Campbell, KY

Fort Stewart, GA

Fort Drum, NY

Fort Irwin, CA

Figure 2. Present photographs of Army installations in the United States
(Source: US Army, Capitol Markets, El Paso Inc., RMH Group, Krebseng, Siding Supply, Syracuse University, Bobak Ha'Eri)

2. Context: The US Army and its Relationship to Installations

18 Army Installations in the United States

29 Current Initiatives and Programs

30 BRAC

31 Future Force

34 Budget

37 Culture

The United States Army's stoic history reaches back to its creation in 1775 by colonial militias. It serves as the primary ground force of the United States Armed Forces.[1] The Army's primary functions, stated in DoD Directive 5100.1, are to "organize, equip, and train forces for the conduct of prompt and sustained combat operations on land."[2] It is through Title 10 of the United States Code that the Army has a statutory obligation for the "construction, maintenance, and repair of buildings, structures, and utilities, and the acquisition of real property."[3] The Army's mission (see figure 3) and strategic vision (see figure 4) statements develop a well-defined picture of its purpose and core competencies. The Army has two core competencies, combined arms maneuver and wide area security. They provide an operational framework to assist with mission accomplishment. In the simplest terms, combined arms maneuver is used to fight while wide area security is used to protect.[4]

The Army's mission is to fight and win our Nation's wars by providing prompt, sustained land dominance across the full range of military operations and spectrum of conflict in support of combatant commanders. We do this by:

- Executing Title 10 and Title 32 United States Code directives, to include organizing, equipping, and training forces for the conduct of prompt and sustained combat operations on land.
- Accomplishing missions assigned by the President, Secretary of Defense and combatant commanders, and Transforming for the future.

Figure 3. Army Mission Statement (Source: US Army)

The All-Volunteer Army will remain the most highly trained and professional land force in the world. It is uniquely organized with the capability and capacity to provide expeditionary, decisive land power to the Joint Force and ready to perform across the range of military operations to Prevent, Shape and Win in support of Combatant Commanders to defend the Nation and its interests at home and abroad, both today and against emerging threats.

Figure 4. Army Strategic Vision (Source: 2014 APSG)

1 "American Military History."
2 "DoDD 5100.1."
3 Armed Forces.
4 "ADRP 3-0."

Army Installations in the United States

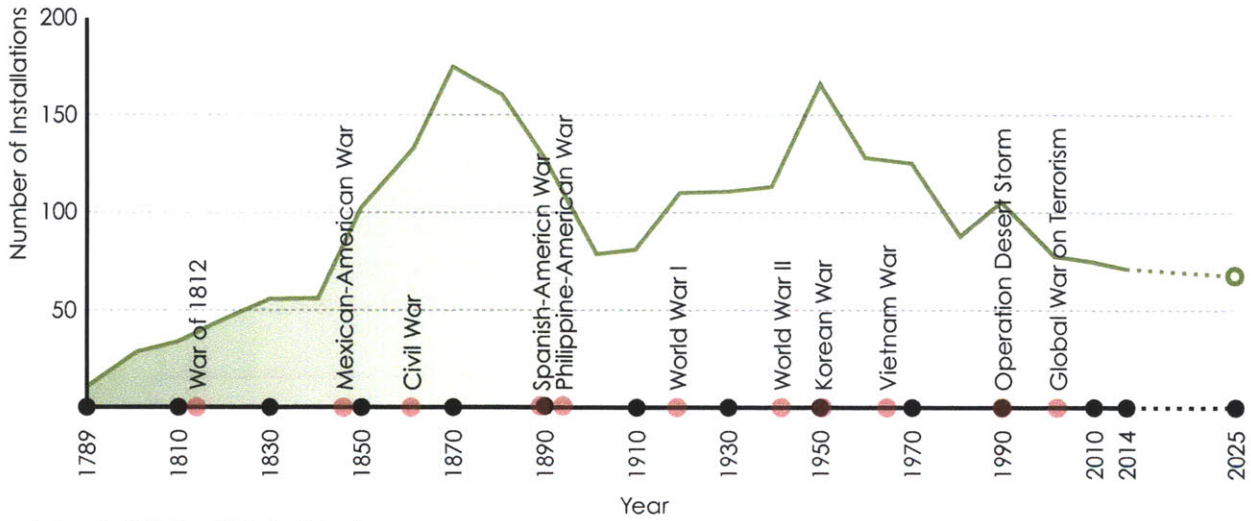


Figure 5. Army Installations Historical Timeline
(Source: DoD Base Structure Reports, Military Posts of the US, and Guide to Army Posts)

Army installations have been built to support the mission (see figure 5). The Army through World War I and World War II established numerous installations to support the war efforts. The last installation built CONUS is Soldier Systems Center in Natick, MA and it was occupied in October 1954.[5] Periods of conflict and peace in the twentieth century dictated the number of installations that were active. Since 1988, five independent BRAC rounds have closed and realigned installations in the United States.[6] Depending upon the supported mission, an installation must possess certain basic attributes to contribute to mission accomplishment.

5 Scanlan, Army Times Guide to Army Posts.
6 "About BRAC -."

In essence, if an installation cannot support the mission, contribute to mission accomplishment, and support the Army's core competencies then it has no purpose. This provides enough rationale for the shrinkage or removal of certain structures and programming of Army installations, which will be specified in chapter 3.

A military installation in a global context is generally defined as a physical location owned and operated by or for the military to facilitate training and operations. Installations vary greatly in parameters such as acreage, personnel capacity, buildings, and training facilities depending on a wide array of missions. They are located in dense urban cores to isolated rural areas containing military supplies and equipment ranging from a single building to cities of over 50,000 personnel. Installations are either permanent or temporary with access restricted or public. They can be training grounds, test and evaluation ranges, command and control centers, ports, and runways. Installations go by many other names such as base, arsenal, post, fort, camp, range, proving grounds, armory, barracks, and fields. Form and function vary among installations, but the nation or entity the military serves dictates composition and programming. Depending on the mission, installations may contain, not inclusively, administrative buildings, training areas, maintenance facilities, industrial areas, dining facilities, recreation facilities, childcare facilities, schools, gyms, retail, grocery shops, gas stations, housing, and fitness centers. In Great Britain, bases are highly privatized. An alliance of private companies run the daily operations of their nuclear submarine bases at Faslane and Coulport.[7] The Royal Navy then focuses on their core competencies. It must be noted that in some situations and countries installations consist only of training areas, motor pools, and supply storage facilities.

Army installations found their beginning with the Continental Congress making provisions for the defense of the western frontier. Henry Knox took over as Secretary of War in the cabinet of George Washington in March 1789 and found Army installations were almost nonexistent, the coastal defenses were inadequate, and the frontier was bustling with activity. There were only six establishments on the western frontier that could be considered

7 Norton-Taylor, "Trident Bases to Be Run by Private Companies."

Army installations.[8] Installations continually evolved by adding services, permanent quarters, and families. "Army installations are communities that provide many of the same types of services expected from any small city."[9]

The concept that Army installations are small cities need to be challenged. Installations and the services they provide are a privilege afforded to Soldiers and not a right. Installations serve the purpose for mission accomplishment. For the Army to achieve its mission, installations do not require needed services of a city or town. Installations are wasting precious funds, resources, manpower, and space resembling a city and providing housing. The Army is a modern business, but installations bare resemblance to old company towns, such as Pullman, Illinois. The market has provided the essential services needed to sustain the workforce outside of the installation boundary. As the Army transforms and require installation to shrink now is the optimal time to rethink how Army installations are defined.

Installation Structure and Components

The decision-making structure regarding installations is convoluted but is receptive to change. Installations are planned and managed by Installation Management Command (IMCOM) with technical support provided by USACE.[10] There is a very defined hierarchy as seen in figure 6.

8 Prucha, A Guide to the Military Posts of the United States 1789-1895.
9 "IMCOM"
10 "Master Planning, Housing and Barracks."

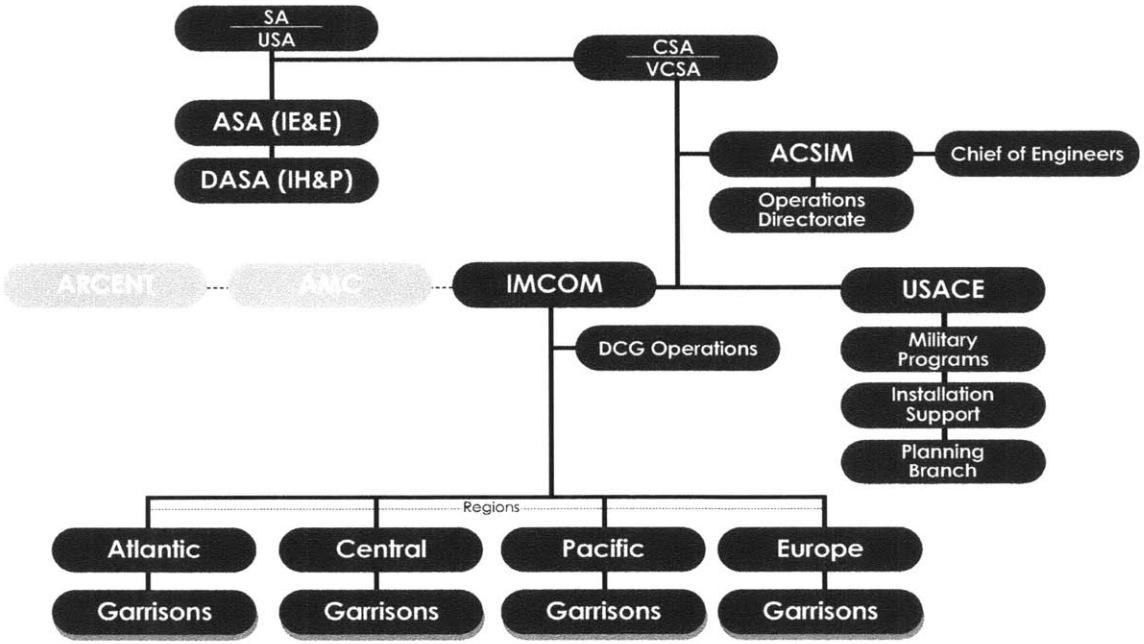


Figure 6. Army Installation Command Structure
(Source: US Army, USACE, and IMCOM)

The Unified Facilities Criteria (UFC) 2-100-01 and Army Regulation (AR) 210-20 are documents that govern planning in the Army and outlines planning processes and products to utilize. This process will be explained in more detail in the next chapter. The Army has also established a Facility Standardization Committee that is tri-chaired by IMCOM, USACE, and ASA (IE&E) that issue design guidelines for installations.[11]

11 Sproul, "The Army's Construction Program: How It Runs."

This thesis categorizes installations into five basic types: training, office, industrial, testing, and institutional. Some installations may only have one type, but throughout CONUS multiple types can appear on a single installation.

Installations CONUS can be defined by basic components (see figure 7). Most installations have these items. These components vary greatly in location, size, form, and function. Figures 8 and 9 illustrate a generic installation.

Basic Components:
- Headquarters
- Housing
- Post Office
- Dining Facility
- Chapel
- Medical Facility
- Emergency Service Facility
- Access Control Point

Common Components:
- Utility Structures
- Administrative Facility
- Recreational Facility
- Schools
- FMWR Facility
- Museums

Figure 7. Army Installations Basic Components

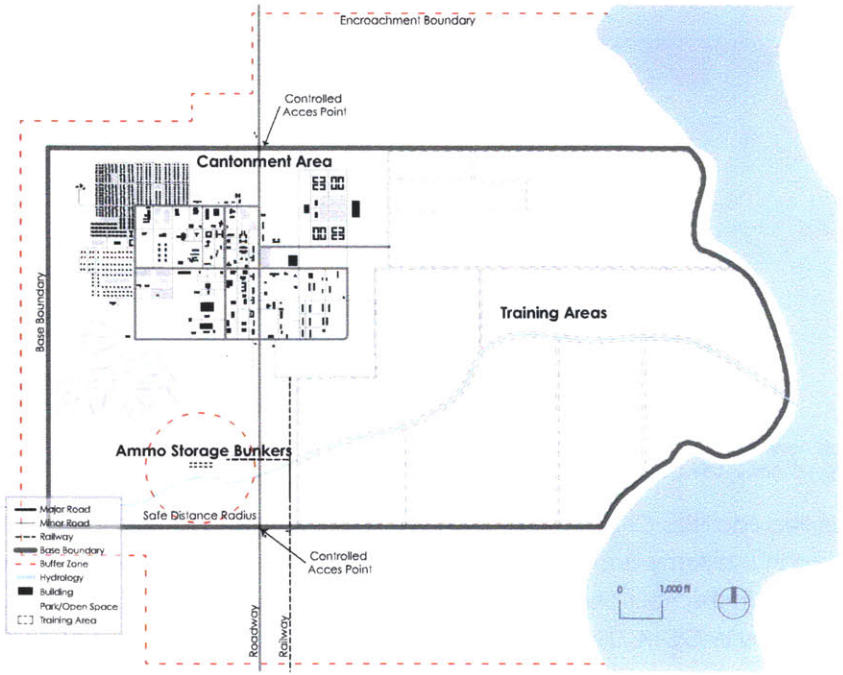


Figure 8. Generic Army Installation

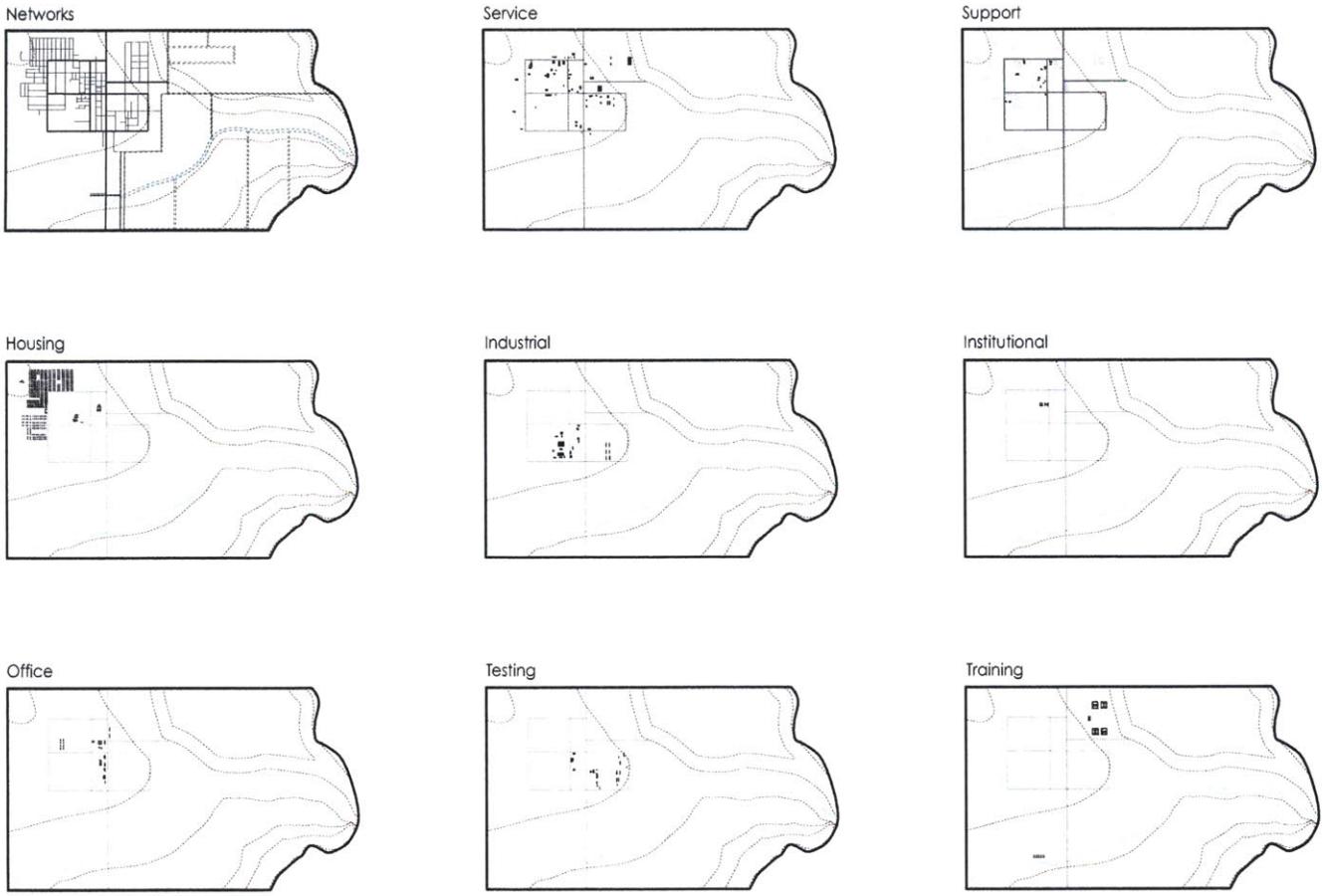


Figure 9. Generic Army Installation Design Elements

Installation Security

Army Installation provides an environment free from enemy threat. Throughout history installations protected against physical attacks, but the threat has changed and our regulations should be revised to effectively protect against them (see figure 10). The Army published rules and regulations that establish minimum

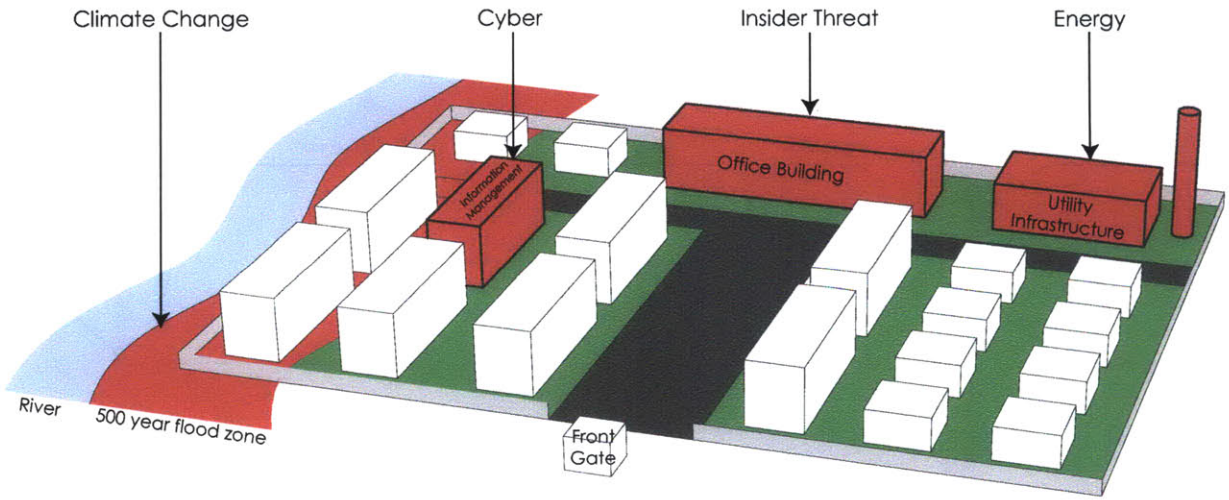


Figure 10. Installation Security Threats
(Source: RAND Corporation, Army Times, USA Today, National Defense Magazine, Fox News, Forbes, Annual Threat Assessment, and Department of Homeland Security)

parameters to protect buildings and critical infrastructure from enemy threats.[12] Due to specific required distances they often promote excessive horizontal development and larger parcel size (see figure 11).

12 "UFC 4-010-01."

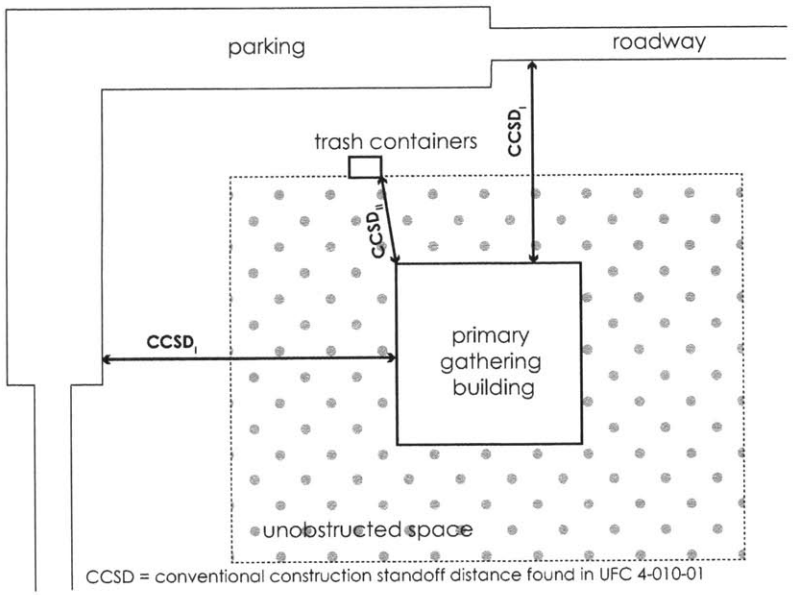


Figure 11. Required Security Standoff Distances (Source: UFC 4-010-01)

The Defense Critical Infrastructure Program (DCIP) guides the management of risk to installation assets and infrastructure.[13] It provides support to planning and strategic risk management of critical infrastructure both on and off the installation.[14] Another important regulation that governs protecting against security threats on installations is UFC 4-010-01 that defines the DoD minimum Antiterrorism (AT) standards for buildings, sets the minimum Design Basis Threat (DBT), and the minimum Level of Protection (LOP). This document utilizes physical elements of security to minimize mass casualties in Army buildings.[15] It sets standards for building siting and construction. Additionally, geographic regions may provide requirements concerning protecting the perimeter, installing access control points, and siting of high value assets. Several factors determining the standoff for a building are if the installation is located in an area with a higher DBT, the occupancy of the building, if the building is located within a controlled perimeter, and if the building is considered a critical facility.

13 "DoDD 3020.45."
14 "DoDD 3020.40."
15 "UFC 4-010-01."

Privatization

98% Army Family Housing inventory

6.4 to 1 Army Housing return on equity

Figure 12. Privatized Housing (Source: RCI)

$1 Billion
Army Lodging cost aviodance

Figure 13. Privatized Lodging (Source: PAL)

The Army has taken on efforts that have privatized certain aspects of installations. Army family housing has been privatized through the Residential Communities Initiative (RCI).[16] RCI is a major component to the elimination of inadequate family housing (see figure 12). Privatization of housing gives the Army the ability to obtain private sector capital and expertise to operate, sustain, renovate and construct housing over the long term.[17] Building upon the success of RCI the Army privatized the operations of lodging CONUS in 2011. The Privatized Army Lodging (PAL) program aims to improve the quality of lodging facilities by leveraging private sector capital and best practices (see figure 13).[18] The Army has also privatized 144 utilities systems with experienced local providers saving the government substantial costs in future upgrades. These three programs have produced favorable results and greatly improved the quality and operation of family housing, lodging, and facilities.

16 "Information Paper."
17 Ibid.
18 "Privatized Army Lodging."

Enhanced Use Leasing (EUL) is another tool that can be utilized. Through this authority, the Army can lease land to the private sector to leverage capital and generate income for the installation and the Army. The Army has completed five projects and one project is being constructed (see figure 14).[19] According to the FY 2015 Army Budget request an estimated revenue stream of $6,378,733 are from leased assets.[20]

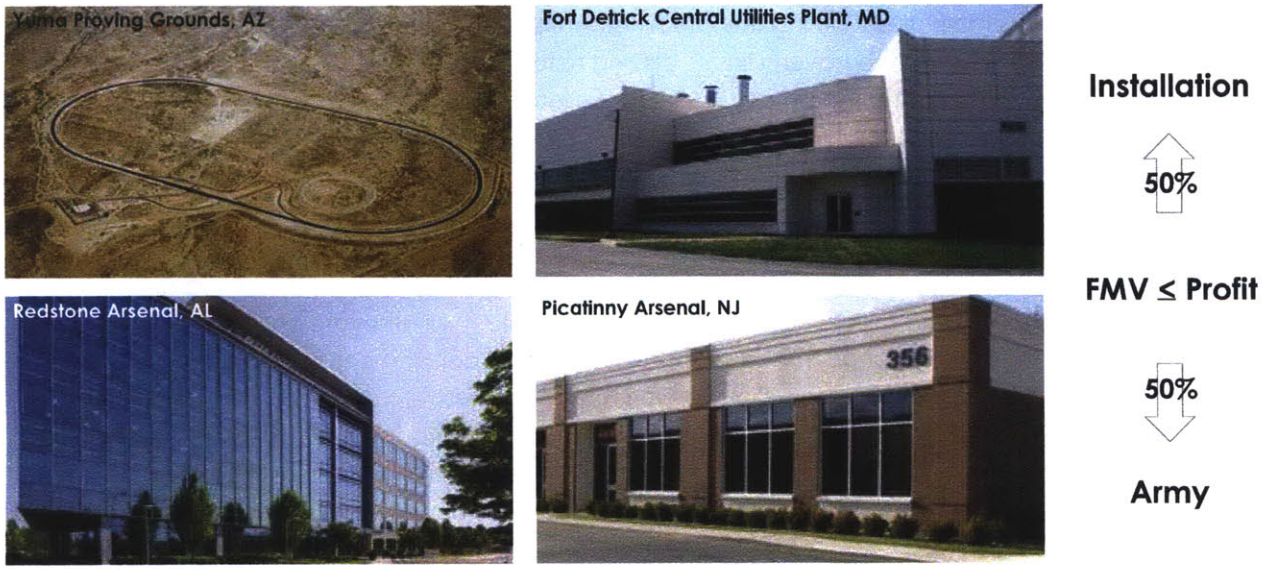


Figure 14. EUL Projects
(Source: USACE)

19 "Enhanced Use Leasing."
20 "FY15 Army Budget Request."

PX & Commissary

Two major staples of Army installations are the Commissary and Post Exchange (PX). They are used as a recruitment tool and incentive for Soldiers. Both are government entities operating on different systems that sell products at reduced prices to Soldiers, retirees, and their families. The stores were established to supplement Soldier substandard pay. Their establishment during the late nineteenth century was during a period where the majority of Soldiers earned wages below the poverty line.[21] Utilizing historical poverty levels and base pay it was not until 1972 when Soldier's pay exceeded the poverty levels for an individual and a family of three.[22] The PX and commissary made profound economical impacts on the lives of Soldiers. These impacts do not negate the facts that privatizing these stores will provide better services to customers and reduce costs to the Army.

The PX and Commissary are intended to enhance the quality of life for those in the Army. These stores are located inside the perimeter of installations and the PX has an established online store. Commissaries are similar to commercial grocery stores and Title 10 heavily regulates items sold.[23] All other merchandise not sold in commissary stores are sold in the PX. PXs range from a shoppette to a large department store. Appropriated funds are used to cover the operating expenses of PXs and Commissaries. These stores do not charge sales tax, but Commissaries charge a five percent surcharge on sales. This surcharge is used for the construction, repair, maintenance, and improvement of Commissary buildings and facilities. Some profits from PX stores are used to support Army Family and Morale, Welfare and Recreation (MWR).[24]

21 "History of U.S. Military Commissaries."
22 US Census Bureau, "Poverty Data - Historical Poverty Tables"; "Military Pay Tables."
23 Armed Forces.
24 Ibid.

Current Initiatives and Programs

The Army has established initiatives and programs that directly and indirectly apply to installations. The vast majority of these initiatives and programs involve energy and sustainability. The Army's Energy Strategy and Campaign Plan established in 2005 sets the energy goals until 2030 across five major initiatives (see figure 15).[25]

1. Eliminate energy waste in existing facilities
2. Increase energy efficiency in new construction and renovations
3. Reduce dependence on fossil fuels
4. Conserve water resources
5. Improve energy security

Figure 15. The Army's Energy Strategy and Campaign Plan Initiatives
(Source: ASA (IE&E))

- Alternative Fuel Vehicles
- Distributed Energy Generation
- ENERGY STAR™
- Energy Strategy
- Installation Management Campaign Plan
- Installation Management Portfolios
- Metering Implementation
- Net Zero
- Renewable Energy
- Sustainable Design
- Sustainable Installations
- Utilities Contracting
- Utilities Modernization
- Utilities Privatization
- Water Resource Management

Figure 16. Army Energy Programs that Influence Installations
(Source: ASA (IE&E))

Understanding the potential changes that will occur through these initiatives illustrate changes to installations and allow planners to design within frameworks. Installations spend over $1.3 billion annually on utilities.[26] The reduction in this bill through design is advantageous to Army and provides more funds for other installation services. The campaign plan is the catalyst for numerous programs that have a significant influence in the planning of installations (see figure 16). These programs aim to make Army installations sustainable, reduce the reliance on fossils fuels, reduce energy consumption, and correct environmental damage.[27]

25 "Army's Energy Strategy and Campaign Plan."
26 Hammack, "2014 Green Book."
27 "Programs / Planning."

Base Realignment and Closure

BRAC is a congressionally authorized process that DoD has used to realign and reorganize its base structure. The Defense Base Closure and Realignment Act of 1990, provides the framework for the BRAC process.[28] BRAC is an essential element in the future of Army Installations. A successful BRAC enables an installation to shrink its footprint or grow. The projected BRAC round 2017 will have a major focus on consolidation.[29] To address shrinking and consolidation the Army is working with Congress to determine the criteria for BRAC round 2017. The BRAC process is a proven, fair, and cost effective means to address capacity among installations. Crucially important is effective design solutions to reduce the capacity and protect a net $13 billion in investment from BRAC round 2005.[30] In order to be most efficient and effective with the upcoming BRAC round, urban planners and urban designers are essential to achieving the goals of consolidation.

There have been five rounds that changed base structure to more efficiently and effectively support the Army and increase operational readiness.[31] In essence BRAC has three major steps before any closure or realignment is confirmed. First the Secretary of Defense must go to Congress to request the authority to analyze the problem. Then, after thorough analysis the Secretary of Defense provides recommendations to Congress. A nine member independent panel is appointed by the President to evaluate the recommendations. The BRAC commission is afforded the opportunity to add or remove bases form the list. The commission then provides the evaluated list to the President for approval or disapproval. After the recommendations are final the Secretary of Defense has to request permission to implement them through Congress.[32]

28 Armed Forces.
29 Sheftick, "Congress Told Army Needs Another BRAC Round."
30 McHugh and Odierno, 2014 Army Posture Statement.
31 "Base Realignment and Closure."
32 "DoD 4165.66-M."

Future Force

An understanding of how the Army will transform and look in the future is fundamental to any effective plan or design solution for Army installations. The strategic vision outlines the characteristics the Army requires to complete its mission. The concept is established along three lines of effort; "prevent conflicts, shape the security environment, and win decisively when called."[33]

In order for the future force to meet its obligations and accomplish the mission it has to bear certain qualities that will require installations to fundamentally change. The strategic guidance from the President and Secretary of Defense outlines 11 priority missions for the DoD. The Army has a significant role in 10 of those 11 missions.[34] The ramifications of the strategic concept and its supporting concepts of regionally aligned and mission tailored forces cut across many of the basic functions of the Army, including installations. Installations will go through a transformation to meet the demands and rigor of the future force.

The future of the Army is established through five strategic priorities (see figure 17). The first three priorities have a direct correlation to installations and establish a requirement to change. Installations are required to shrink its footprints due to excess capacity, but it must also adjust in a manner to align with the future force.

A significant portion of the future force is the reduction in Army personnel. The Army is currently in a process of reducing the Active Army troop strength by 14% from a wartime high by the end of FY 2015 (see figure 18). DA Civilians are not immune to fiscal challenges as seen when the Army furloughed 204,000 Army Civilians during the fourth quarter of FY 2013 and they are undergoing an 8% reduction by the end of FY 2015.[35]

33 "2014 ASPG."
34 Ibid.
35 McHugh and Odierno, 2014 Army Posture Statement.

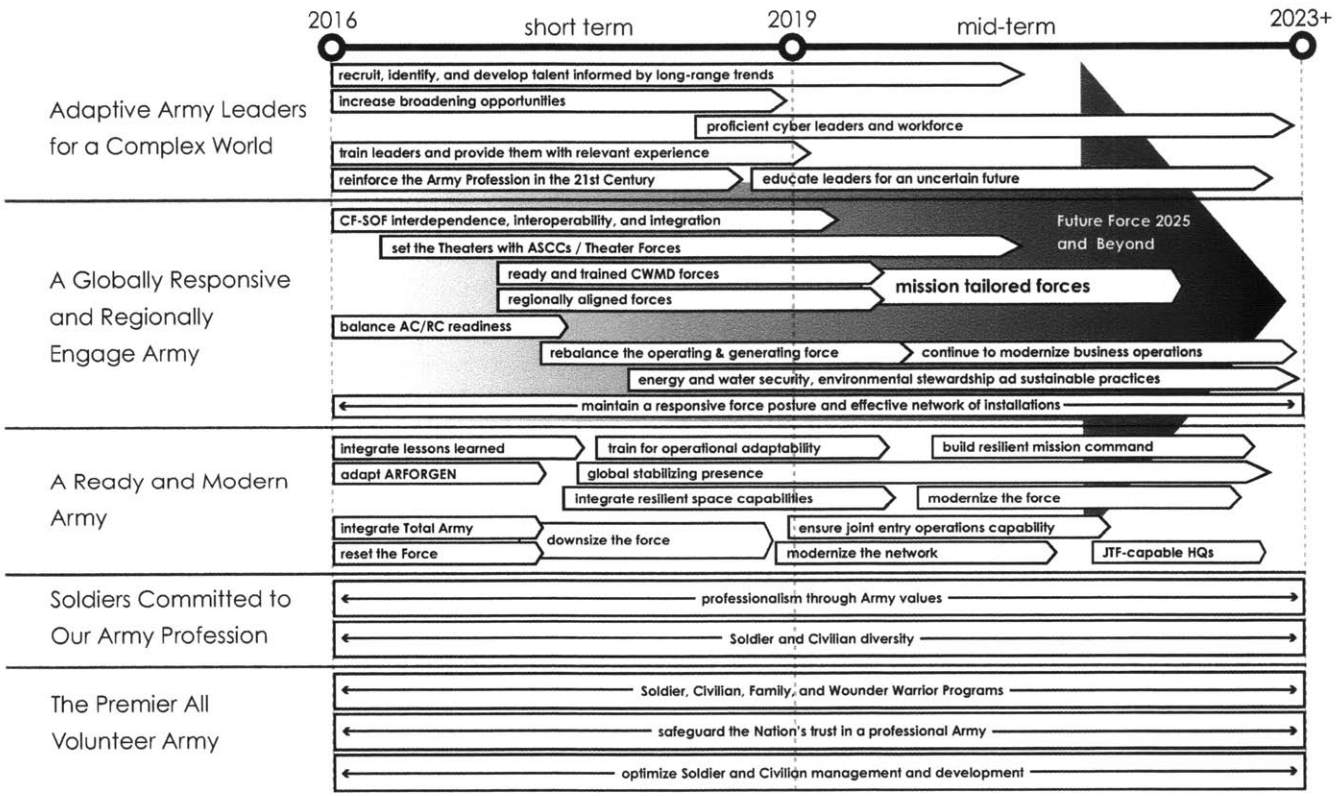


Figure 17. Army Strategic Priorities (Source: US Army)

In addition to a massive drawdown of personnel, the Army has gone through a significant reorganization aimed to rebalance assets to execute the mission. Budgetary limitations in the short and near term will require the Army to reduce further by FY 2023.[36]

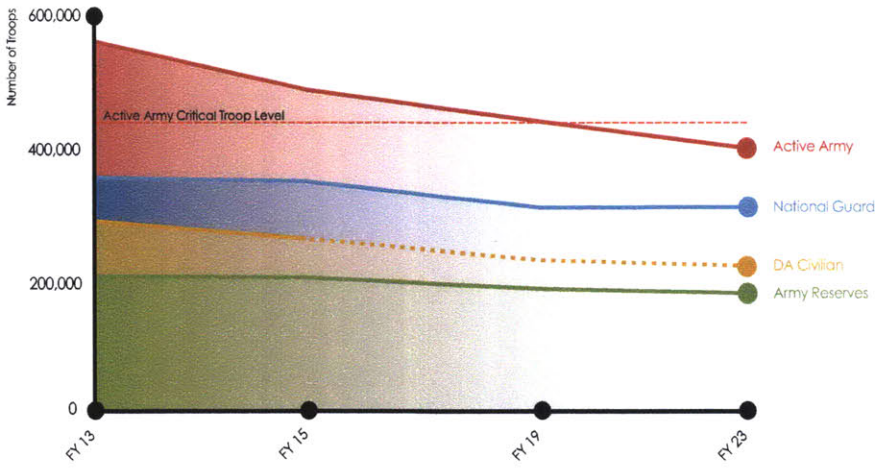


Figure 18. Army Force Reductions to FY 2023 (Source: 2014 APSG)

The shape of the future force starts with planning and forward thought today. Even though the future cannot be predicted, it is certain to be complex, volatile, and dangerous. Addressing future challenges will require an expeditionary, strategically adaptive, and campaign-quality Army that prevents conflict, shapes the security environment, and when necessary, decisively wins conflicts to attain the strategic ends and policy goals that govern all military action.[37] Inherent to the future force are installations that provide the requisite components to allow the Army to achieve its vision. As the future of the Army transforms, installations must be at the forefront of that change.

36 Ibid.
37 "2014 ASPG."

Budget

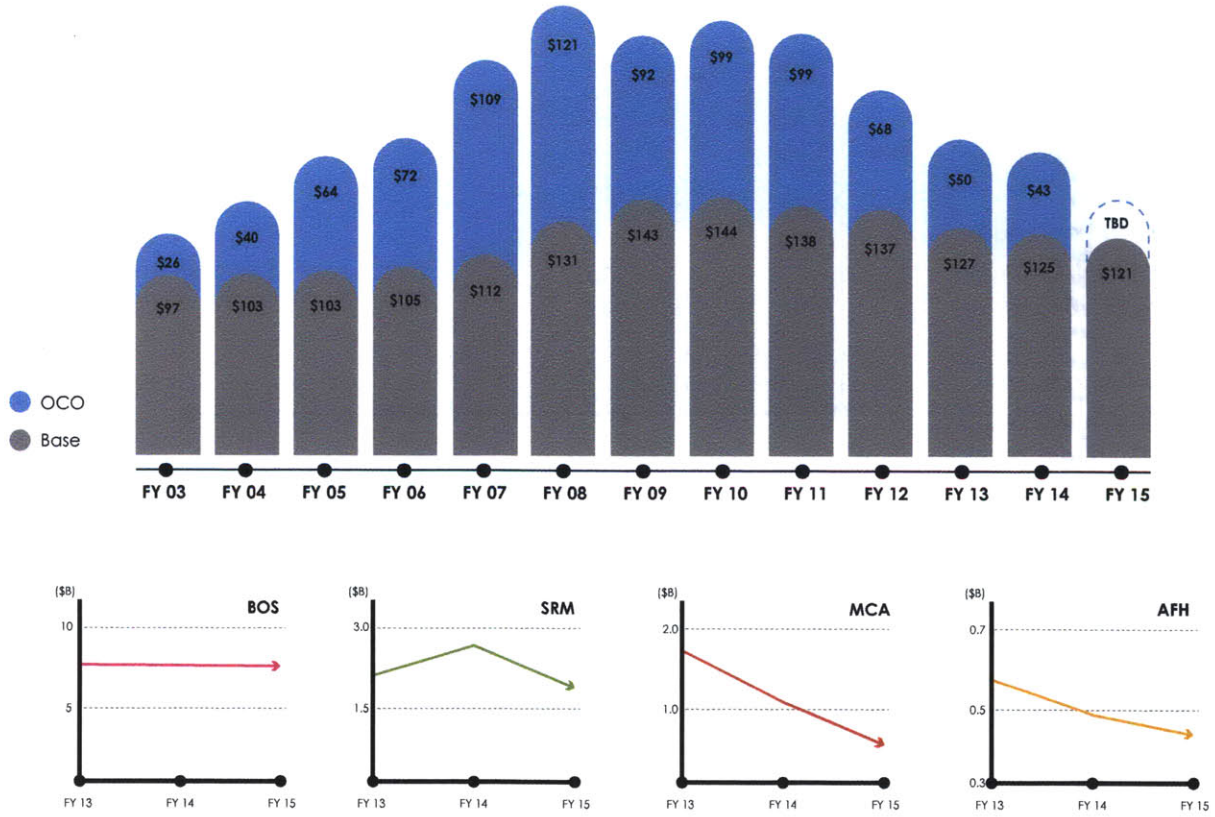


Figure 19. Army Budget. SRM Funding increased in FY 2014, which enabled investment in facility readiness for critical infrastructure repair as well as high priority restoration and modernization projects.
(Source: ASA (FM&C))

The austere and uncertain fiscal environment has created numerous hardships affecting installations. Budget reductions are occurring even while conducting missions required by the 2012 Defense Strategic Guidance. In the 2014 Army Posture Statement it articulates that installations will need to shrink their footprints or precious funds will be wasted to maintain underutilized buildings and infrastructure. The Army slowed the rate of military construction to the most critical projects and reduced the budget to operate installations to support life, health and safety.[38]

The Army budget has a direct relationship to installations deferring "critical upkeep on thousands of buildings across Army installations due to a reduction of $909 million in SRM funding."[39] Planning plays a vital role in ensuring diminished installation funding is used proficiently. Physical plans that shrink installations prioritize projects and contain implementation strategies to allocate funding. In an era of fiscal uncertainty it is imperative that plans direct the use of funds ensuring the future of Army installations meet the needs of the future force. Planning provides a flexible framework for phasing and implementation based on political climate and funding to transform installations at drastically different time frames. If installations do not shrink to match the reduction in troop strength there will be an estimated 12% to 28% excess facilities depending on class at the end of FY 2019. This amounts to $500 million a year of more than 160 million square feet in unnecessary operations and maintenance.[40] Reduced funds over the same number of installations and facilities without shrinking results in diminished facility and installation conditions.

The FY 2015 Budget request, excluding Overseas Contingency Operations (OCO) funding, is $120.5 billion with 9% used in support of Army installations (see figure 19).[41] This budget allows the Army to reduce and reorganize force structure, but installations suffer risk. Compensation reform indirectly affects installations due to slowing

38 McHugh and Odierno, 2014 Army Posture Statement.
39 Ibid.
40 Hammack, "2014 Green Book."
41 "FY15 Army Budget Request."

the growth of housing allowances (from 100% to 95% total housing costs) and reduction of the annual direct subsidy provided to military commissaries (increasing costs to patrons).[42]

The severity of the fiscal environment poses numerous challenges and issues that effect the Army. If the trend in budget reductions continue the Army will "have to fund...only the most minimal level of upkeep to installations."[43] Urban planning and urban design allows the use of minimal funds in the best way possible to reach an overarching end state.

42 McHugh and Odierno, 2014 Army Posture Statement.
43 Ibid.

Culture

One of the main issues to consider when discussing ways to shrink federally funded installation operations and facilities by leveraging nearby private-market real estate solutions is the difference in culture of the Army and Civilian sector (i.e. non profit organization, Corporate America). The basic understanding of those differences is essential in order to provide design and programming solutions that are implementable. Similar to Army installations numerous cities in the United States (Detroit, MI & Flint, MI for example) have faced the realities of shrinking by substantial loss in population and a substandard economic base. The Army provides a canvas for urban planning and urban design that is unmatched and can be a playground for theories and innovative ideas to be explored. Solutions created for shrinking Army installations will have profound effects on the future of these cities. The designs that are implemented for the future of Army installations can establish a framework for cities to effectively shrink.

One of the most promising aspects of the Army in regards to culture is seen through social experimentation. President Harry Truman in 1948 issued an executive order desegregating the military. This was a necessary element that led to civil rights legislation in 1960.[44] Recently the Army has continued to be at the forefront of change with the repeal of "don't ask, don't tell" and providing same sex married couple with benefits. The Army has also opened up many combat positions for women that were previously prohibited to them. These two actions are leading change in sexual and gender equality. Similar to the Army being a steward of social change it has the unique opportunity to lead change in urban planning and urban design by showing cities how to effectively shrink by example of Army installation footprints.

Resisting Change

Changing minds in the Army is no easy task and can be extremely difficult. One avenue to convince leaders that change is necessary is to provide compelling design and programming of the future installation

44 "Military Drives Social Change."

that compliments the future force. In order to advocate for change in a controlled and stable cultural environment urban planners and urban designers must deliver persuasive argument and demonstrate how the design solve the issues. Furthermore, new Army leaders resisting change allow for the reception and acceptance of innovative and creative solutions. Stephen Gerras and Leonard Wong postulate that creating an Army that facilitates the ability to change will take a series of deliberate, long-term actions.[45] To understand the difficulty of change, a person's frames of reference is crucial. Frames of reference is defined as, "the complex knowledge structures we develop through personal and professional experiences that influence – and often limit – the way we approach issues."[46] For the Army to truly challenge its culture and subsequently imbedded frames of reference they will have to continue individual officer self awareness through assessments, provide more broadening opportunities to expose leader to diverse ideas and people, and develop advisory groups that challenges frames of reference.[47] In order for installations to change there will have to be a fundamental change in culture.

In a study conducted by Dr. James Pierce, Director of Publications, Strategic Studies Institute, U.S. Army War College and retired U.S. Army colonel, in September 2010 suggest a significant lack of congruence between the US Army's organizational culture and the results of its professional development programs for future strategic leaders. The data shows future strategic leaders of the Army believe the organization structure is characterized by an overarching desire for stability and control, formal rules and policies, coordination and efficiency, goal and results oriented, and hard-driving competitiveness. These leaders then emphasize the culture should possess flexibility and discretion, participation, human resource development, innovation and creativity, risk taking, long-term emphasis on professional growth, and the acquisition of new professional knowledge and skills. The future strategic leaders clearly outline a set of values and behaviors that better align to meet the future demands of the Army and contribute to the future of the force. Dr. Pierce recommends that

45 Gerras and Wong, "Changing Minds In The Army."
46 Ibid.
47 Ibid.

the leaders of the Army initiate an organizational culture change effort for the betterment of the future.[48] The current leadership understands that change is paramount and essential for continued success. Currently the Army has been afforded an extraordinary group of senior leadership that understand the Army of the future will look drastically different and require new ways of doing business.

48 Pierce, "Is the Organizational Culture of the U.S. Army Congruent with the Professional Development of Its Senior Level Officer Corps?"

3. Practice: Army Installation Planning

41 Planning Strategies, Process, and Products
46 Planning Structure
48 Planning Review
50 Planning Critique
54 Change for the Future

Planning Strategies, Process, and Products

Planning in the Army is a defined process of inputs and outputs. The end state is the Real Property Master Plan (RPMP). Planning is the responsibility of the installation garrison commander, but the Master Planner is essential to its development.[1] Technical assistant for the RPMP is derived from USACE Regional Planning Support Centers (RPSC) and contractors.[2] AR 210-20 that is currently being updated due to a major revision to UFC 2-100-01 governs Planners. The Department of Defense Master Planning Institute sponsored by USACE instructs individuals to make plans, develop graphics, and connect their planning efforts with DoD policies.[3]

The planning process and minimum requirements for a RPMP are defined using DoD Instruction 4165.70, UFC 2-100-01, and AR 210-20. The process uses the RPMP to provide continuous and iterative planning of installations in support of the mission. The process necessitates that construction and acquisition regarding the physical installation adhere to the approved RPMP. The compilation of the three documents outlines a total process for Army installation planning.

Area Development Planning	**Sustainable Planning**
Natural, Historic and Cultural Resource Management	**Network Planning**
Healthy Community Planning	**Form-Based Planning**
Defensible Planning	**Facility Standardization**
Capacity Planning	**Plan-Based Programming**

Figure 20. Army Planning Strategies (Source: UFC 2-100-01)

Ten planning strategies are used to illustrate Army installation planning philosophy (see figure 20). The philosophy seeks to develop sustainable installations in support of successful execution of the mission in the most effective and efficient manner. ***None of strategies, however, discuss or provide guidance to develop sound plans for shrinking installations.*** The process includes continuous engagement with internal Army and external stakeholders for information and input.

1 "IMCOM Organization."
2 "Master Planning, Housing and Barracks."
3 "The Department of Defense Master Planning Institute Catalog."

The planning process is conducted in four phases as seen in figure 21. The Real Property Master Planning process and RPMP are derived from the successful execution of the phases.

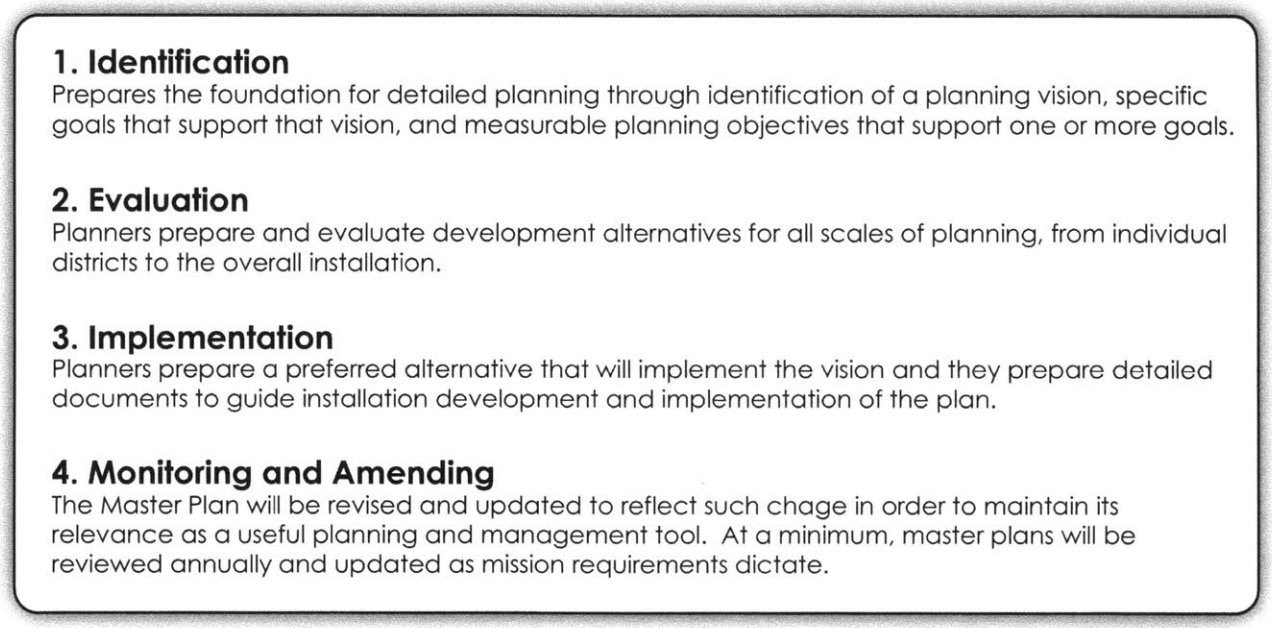


Figure 21. Army Planning Phases
(Source: UFC 2-100-01)

An installation's Real Property Master Plan is produced using a planning process and a standard set of products (see figure 22 and 23).

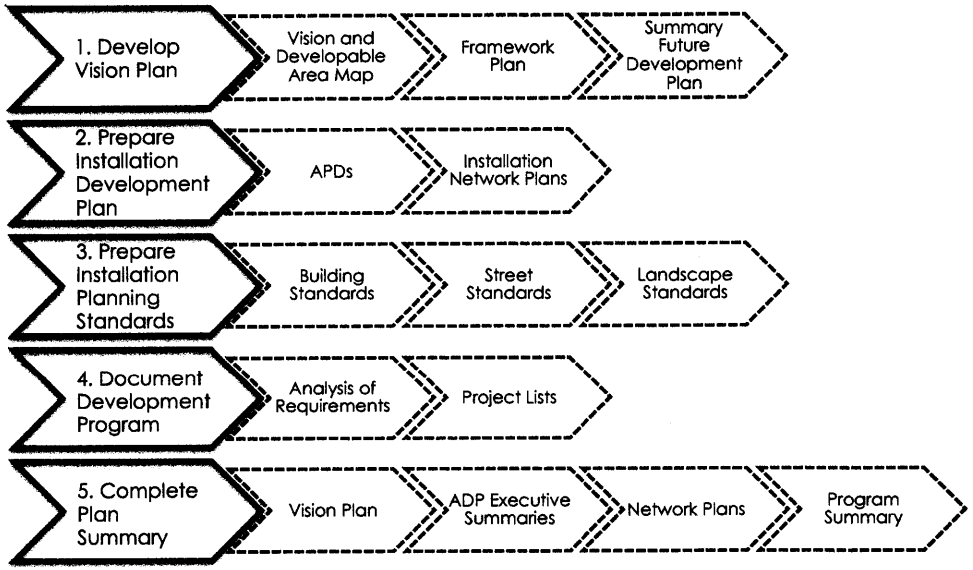
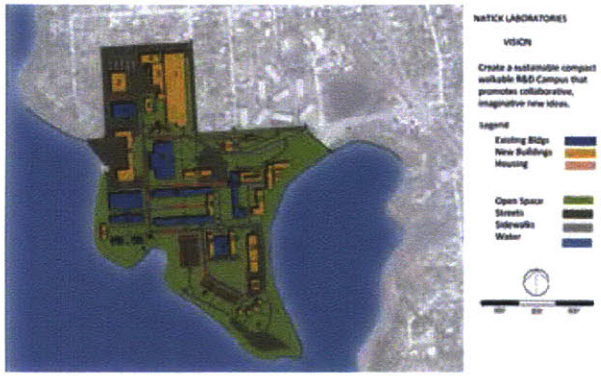


Figure 22. Army Planning Process and Products
(Source: UFC 2-100-01)

The installation's Real Property Master Plan is approved by the IMCOM Region Director and must be endorsed by the senior mission commander. The RPMP provides flexibility to allow for either portions or the complete document to be approved. Additionally, DoDI 4165.70 require master plans to cover a minimum time frame of ten years and updated every five years.[4]

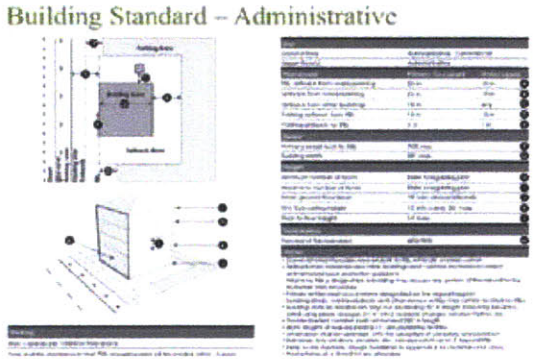
4 "UFC 2-100-01."

Vision Plan



Area Development Plan

Installation Design Standard



Project List

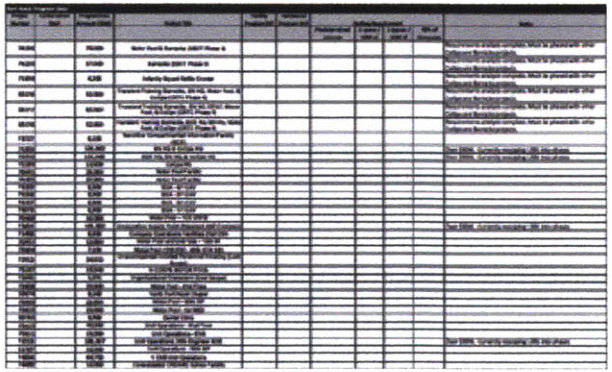


Figure 23. Example of Army Planning Products
(Source: USACE and UFC 2-100-01)

Vision Plan. The Vision Plan includes a statement of the planning vision, planning goals, and planning objectives

as well as an overall constraints and opportunities map(s), a developable area map, a framework plan for the entire installation, a land pattern matrix if applicable, and a summary future development plan.

Installation Development Plan: The Installation Development Plan (IDP) includes Area Development Plans, as well as appropriate Network Plans. The bulk of the installation planning effort should occur at the scale of an ADP, which is a detailed plan for a district that includes an Illustrative Plan, Regulating Plan, and Implementation Plan. The Regulating Plan provides specific information on permitted development for each building parcel within a district.

Installation Planning Standards: Installation planning standards provide a clear set of guidelines to ensure that the installation's vision and planning objectives for development are achieved. These standards are developed to meet sustainability and energy efficiency requirements. At a minimum, these will include building standards, street standards, and landscape standards.

Installation Development Program: The program is the overall installation strategy for using and investing in real property to support installation missions and Army objectives. It describes permanent comprehensive and holistic solutions, as well as short-term actions necessary to correct deficiencies and meet current and future mission needs.

Plan Summary: Once the planning processes and products are completed, the Master Planner prepares a plan summary document that will include the Vision Plan, executive summaries of the Area Development Plans, appropriate Network Plans, and a summary of the development program.

The Army has been able to overcome two and a half decades of outdated planning practices. It adopts

Planning Structure

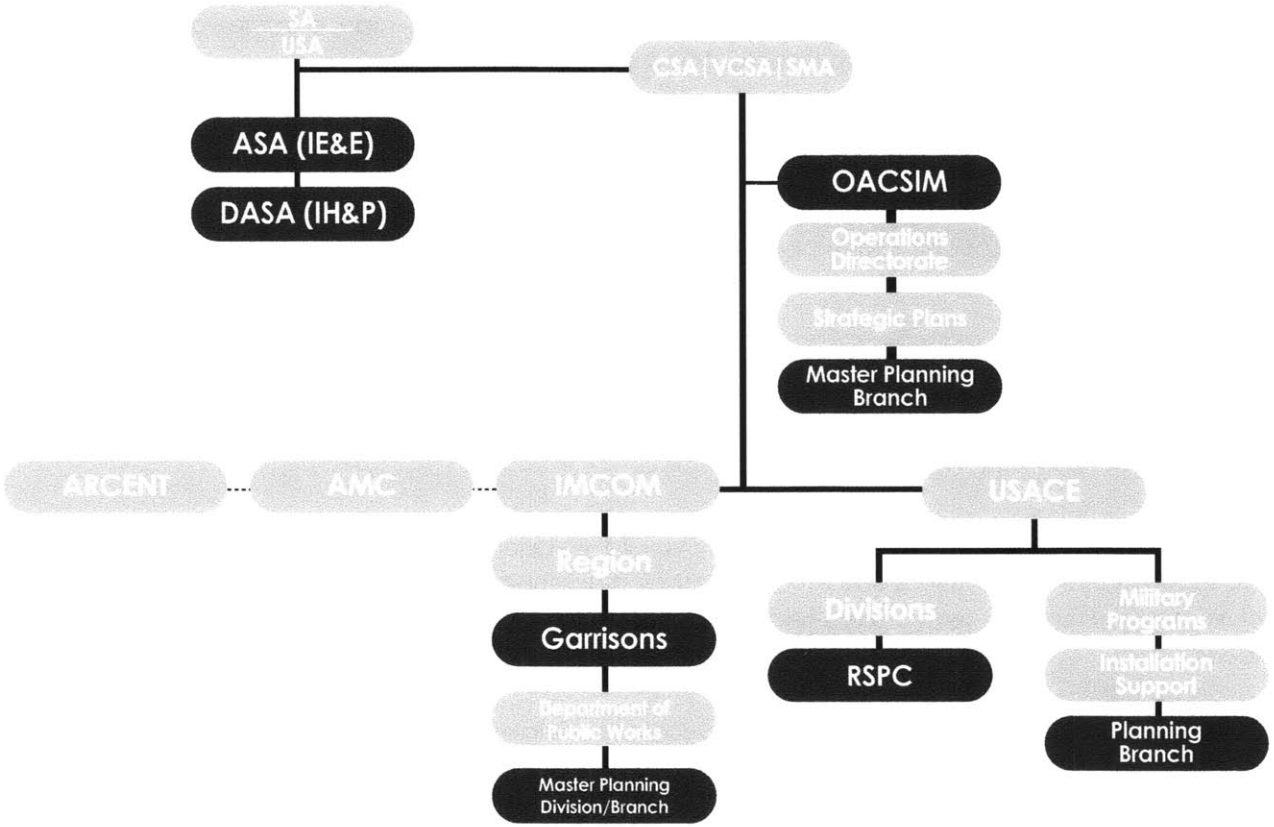


Figure 24. Army Planning Structure. Master Planning for Army installations occur at the installation level. These entities bolded are important and necessary for effective Master Planning. Each provides components that the Master Planner at the installation level requires and leverages in developing the RPMP.
(Source: US Army, USACE, and IMCOM)

ASA (IE&E)

ASA (IE&E) establishes policy, provides strategic direction and supervises all matters pertaining to infrastructure, Army installations and contingency bases, energy, and environmental programs to enable global Army Operations.

OACSIM

The Office of the Assistant Chief of Staff for Installation Management (OACSIM) is Army's installations expert and integrator of installation services that develops and implements strategies, policies, programs, and resources for an effective network of installations and capabilities.

DASA (IH&P)

The Office of the Deputy Assistant Secretary to the Army for Installations, Housing, and Partnerships (DASA-IH&P) that justifies and secures the necessary resources to sustain Army installations and establish policies and oversight that ensures efficient and effective use of the resources in realizing the vision and accomplish the mission.

Master Planning Branch

OPD-MP's charge is to develop and implement Master Planning policy, programs, and instructions for Army installations ensuring the master plans are synchronized with and in support of the Army Campaign Plan.

Garrisons

Garrison commanders are responsible for the RPMP.

Master Planning Division/Branch

Master Planners develop the RPMP at the installation.

Planning Branch

RSPC

USACE Planning Branch and RPSCs provide broad planning support from completing various planning products, preparing the sustainability component of the Master Plan, and assist to formulate planning execution strategies.

Planning Review

leading business practices for sustainability and energy efficiency. Army Master Planning utilizes modern principles from New Urbanist ideals such as Smart Growth and SmartCode. The Army's planning philosophy is moving from horizontal development to more compactly built mixed-use development. It is an iterative and continuous process that is updated with changing missions and requirements. The process allows the revision of the RPMP based on changes in mission, socioeconomic conditions, or political environment. The products outlined in planning regulations are important because they create visual references and help stakeholders see how the installation will transform their surrounding context. This makes it easier to convince others to re-envision their image of how to plan and design installations for the future. Based on the current organization, Master Planners can utilize OPD-MP since they examine Army policies for issues that affect installations. The programmed reviews established doctrinally ensure RPMPs continually evolve. The planning processes and products allow for some flexibility and variation giving Master Planners the ability to develop creative and unique solutions. The regulations governing installation Master Planning provides a framework for development, sustainability, security, standardization, and resource management rather than specificity. Master Planners produce a minimum set of products to illustrate the RPMP, but even those products only requires the intent be conveyed. This ensures RPMP are designed for the specific installation and not the same installation duplicated across the United States. Jerry Zekert, Chief of Master Planning at Headquarters, USACE, sums up the benefits of planning nicely:

> Master Planning is more important now than ever. We have to establish a sustainable master plan that supports the missions of today, anticipates the unforeseen missions of tomorrow and preserves our installations military capability by preserving training areas. The master plan will adopt common-sense sustainable solutions that will reduce the use of energy, water and waste in a way that is executed in an integrated investment strategy. The plans will repurpose what we have by leveraging Sustainment, Revitalization and Modernization (SRM) resources and by exploring innovative public-private funding ventures.[5]

The Army Master Planning Process and Products have afforded many opportunities concerning installations, but

5 "Master Planning, Housing and Barracks."

many constraints and challenges exist.

Master Planning has recently evolved in the Army to reflect one narrow planning methodology: New Urbanism

Planning Critique

(NU). Many of the processes align with the rules and tenets of what some planners and designers refer to as the Smart Growth, SmartCode, and Transit Oriented Developments (TOD).[6] The review of how the Army adopted NU planning and design standards provides critical feedback to make a better process and product for the Army and challenge limiting aspects of NU principles.

Current Planning strategies, based on NU, do not address reduction. The most relatable to shrinkage is a subset of the sustainable planning strategy named infill development. This type of development conserves limited land resources to plan development within the core and on previously developed land.[7] This concept falls short of matching the needs for a shrinking army (refer to chapter 2, where the situation is described) because it still requires growth to provide solutions on compacting installation footprints. The reality is that installations will enter a period of shrinking and consolidation. It is paramount that a strategy or set of strategies be developed or adapted from current practices to plan the future of Army installations based on shrinkage, not expansion.

Adopting components of NU leads the Army to promote growth. Smart Growth concentrates on growth in compact walkable urban centers in order to prevent horizontal development. TODs focus on mix-uses in a defined radius to maximize access to public transportation and reduce dependency on automobile use. SmartCode is formed based land use development regulation that combines zoning, urban design, and basic architectural standards. Army installations lack three significant components in achieving Smart Growth, SmartCode and TOD.[8] There is no robust transportation system to make it achievable. Transportation on Army installation is generally non-existent. Even if an installation has a transportation network it is substandard. Commuter options are usually during specified periods in the morning and afternoon. Housing in normally located on the periphery of workplaces and installations do not support housing for approximately 70% of the

6 Duany, The Smart Growth Manual.
7 "UFC 2-100-1."
8 Duany, The Smart Growth Manual.

Soldier workforce and the entire civilian workforce.[9] Significant investment in transportation and residential product types are required in order for Smart Growth and TOD to be achieved. SmartCode fails because it places numerous constraints to building design already dictated by facility standardization. Buildings and facilities lack character and differentiation commonly found on Army installations. It eliminates flexibility in design by predetermining elements such as entrances, footprints, and materials.[10] Overall NU claims of benefits to residents and businesses are not feasible.[11] Major investment and growth would be needed clearly juxtaposing the Army's need for shrinkage.

Antiterrorism standards provide a hindrance to planners and promulgate horizontal development. Installation master plans must comply with AT standards for all new and existing facilities. This predominantly takes the physical form of wide standoff distances from parking, base perimeters, and entry control points / access control facilities, but it can also include utilities, vantage points, and the location of high value assets.[12] These standards are used to provide security and protection from terrorist attacks, but providing blanket standards does not actually analyze the specific threats.

Security threats faced by installations vary based on location, mission, critical assets, and many other factors. Planning should provide an updated evaluation of the best protection methods for an installation based on analysis and design. AT standards must be tailored to each installation's specific requirements rather than a formulaic process. This ensures installations are protected against threats directly faced currently and perceived threats in the future. Effective solutions should leverage advances in technology to provide

9 Jowers, "BAH Cuts Could Hurt Privatized Housing, Too."
10 Duany, The Smart Growth Manual.
11 "New Urbanism Principles."
12 "UFC 4-010-01."

adequate security protection. The major threats facing installations within the US today are Cyber and Climate Change and require distinct protection methods (refer to figure 10).[13]

Several elements that planners can use to protect against security threats are the integration of private sector, localized access control, and microgrid infrastructure. Integrating the private sector creates a ubiquitous landscape of buildings. This provides protection from enemy targeting and attacks due to integration (see figure 25). The need for access control to the installations is inadequate. Citizens can access installations with the use of government identification. Based on that fact access control needs refocusing to localized controlled access to buildings and sections. This change will be more indicative of federal buildings in Washington D.C. and other major cities. Certain complexes and buildings will require more stringent measures due to security classification and importance to national security, but the principle of localized access control remains. In addition to localized control these specific locations should integrate microgrid infrastructure to defend against an emerging threat of targeting utility and energy infrastructure.[14] The microgrid infrastructure allows these locations to operate connected to the larger grid, but when necessary operate in isolation.

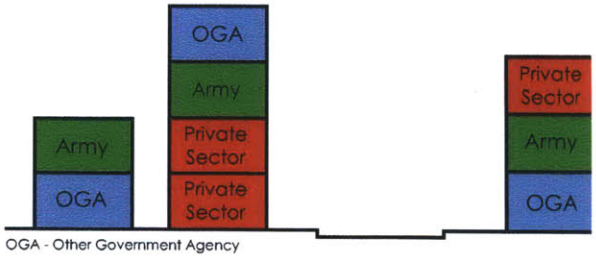


Figure 25. Integration of Sectors in Buildings

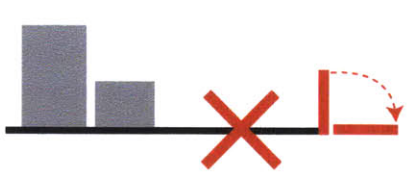
Planning processes require an increased focus on the Army's core competencies ensuring RPMP first and foremost enable them and the mission. The lack of mission integration in certain strategies can become problematic if planners forget the purpose of the installation is to support the mission. A focus on the mission

13 Flynn, Annual Threat Assessment; Davenport, "Pentagon Signals Security Risks of Climate Change."
14 Microgrid Study: Energy Security for DoD Installations; Flynn, Annual Threat Assessment.

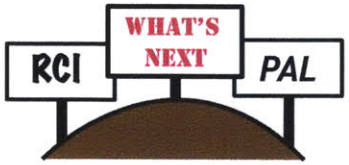
and core competencies better ensures the RPMP will shape the installation with these items as the primary function. Creation of the Vision Plan and Area Development Plan can be problematic due to insufficient amount of time. Five day courses result in the production of those plans.[15] The instructors then covert the students work into final products. In order to truly produce these products a significant amount of time is necessary to analyze, critique, and make the process iterative. It makes a product that is grounded in research and analytical methods. The practicum courses should provide a start to the process of the products and RPMP, but Master Planners should finalize the plans.

15 "The Department of Defense Master Planning Institute Catalog."

Change for the Future



Revise Antiterrorism Standards



More Privatization

Increase Enhance Use Leasing

Eliminate On-Post Housing

Figure 26. Four Major Changes for Army Installations

To move forward in providing a design proposal to illustrate the future of Army installations, I posit that certain components need to change. I have already stated that AT and security standards need revision. The Army needs to look at privatization of more services, enhanced use leasing, and elimination of family housing on installations. These seem like drastic steps, but after explaining the rational it will become apparent how the proposed changes will enable the future success of planning and designing for Army installations. Installation footprints will shrink based on end-strength reductions and space requirements while allowing more

privatized services including transference of the PX and Commissary, enhanced use leasing to generate additional income, removal of installation housing, and increased area for training. All of these items collectively reduce cost and have potential to generate positive revenues (see figure 26).

Privatize

The Army has seen success partnering with housing, lodging, utility, and energy efficiency developers.[16] Leveraging private sector capital and their core competencies installations and the Army benefit. Efficiencies on installations are gained allowing a refocus of limited resources to critical missions and training. A more in-depth analysis is required to determine how much of installations become privatized. It is suggested the PX, commissary, and MWR facilities be strongly considered due to these entities do not directly contribute to mission accomplishment and support the Army's core competencies. Since the infrastructure for these entities are established on installations the Army simply transfers operation to private companies. The Army defrays operation, maintenance, and utility costs to allow for more efficient use of facility funding. Private companies whose core competencies are retail and groceries will operate the PX and Commissary. The stores will be an extension of the surrounding community and charged rent that would be payable to the installation for core services and modernization expenditures. Since the stores will be operated on federal land that is already owned by the US Government, rents will be established below local rental rates. Leases will be determined for a specified number of years. At the end of the lease period if the service is determined not adequate or substandard the Army will have the opportunity to lease to another company. This ensures prices will be discounted for Soldiers, retirees, and their families. Civilians can utilize the stores depending on the configuration and security of the installation with Soldiers, retirees, and their families still receiving discounted prices with the use of military issued identification cards. For example, the PX could be run by Wal-Mart, the gas

16 Medici, "Army Seeks To Expand Privatization Efforts."

station and convenience store by Exxon Mobil, the shoppette by Wawa, the commissary by Safeway, the recreation center by Gold's Gym, and the Child and Youth Services by KinderCare.

EUL

As future installation shrinks its footprint and security standards are changed increased land is available redevelopment. First and foremost the land will be evaluated to increase training areas and ranges. If the land is not positioned for those uses, planners will use the regulating plan to identify land uses. Master Planners will then employ Enhanced Use Leasing. Developers construct new buildings and facilities for lease. The buildings and facilities constructed through EUL are utilized by both private and government organizations. This differs from privatization because those entities already exist on installations and operation is transferred. Certain portions of the installation can provide a seamless transition to the neighboring town or city. EUL utilizes unoccupied land to generate revenue for the Army and the installation. Additionally, transportation networks will be created or improved through the use of Municipal Service Partnerships.[17] Collectively, EUL provides a source of revenue for installations. Installations will be able to reduce operating budgets and find supplemental revenue through EUL, which has 50% of revenue cycled back to the installation and the remaining 50% to the Army.[18]

Elimination of Housing

The privatization of housing has been lauded as a great success and introduced the benefits of such partnerships to the Army. Housing on Army installations facilitate about 30% of families with the remaining 70% to find residences in the local communities.[19] This housing is designed for Soldiers with families and in very rare

17 "Municipal Services Partnership Pilot Program."
18 "Enhanced Use Leasing."
19 Jowers, "BAH Cuts Could Hurt Privatized Housing, Too."

Figure 27. Housing Density Comparison of Fort Belvoir and Fairfax County, VA
(Source: Fort Belvoir DPW and Fairfax County)

circumstances, such as White Sands Missile Range; DoD civilians can reside on the installation. There is also an inefficient use of space by allowing housing because the density of installations are usually at rural thresholds (see figure 27). Soldiers receive a Basic Allowance for Housing (BAH) that provides equitable housing compensation based on housing costs in local civilian housing markets, pay grade, and dependency status. If Soldiers reside in family housing or in barracks, BAH goes directly to the entity responsible for property management. The compensation system is in place to eliminate housing on military installations. Special considerations are taken for high-ranking officials, but it must be noted that members of congress and cabinet secretaries live in local communities. Through EUL, housing will be fully transferred to RCI after conducting analysis of housing that is suitable to remain on the installation. Other housing will be deconstructed and materials used for other projects. The cleared land will turn into training areas, ranges, or be used for revenue generation through EUL. This housing will not be segregated for Soldiers. Due to a major shift in eliminating housing and barracks the real estate market will bolster its supply to serve the Army population affected. Transportation networks are essential to this transition and need to function to ensure Soldiers have adequate access to work. New mixed-use construction implemented through EUL can allow for work-live-play locations as prescribe in current planning practices. These locations are not guaranteed to specifically serve Soldiers and their families.

The changes proposed are drastic, but essential to transform installations in the future. As installations shrink the Army must protect investments from $18 billion cost of BRAC round 2005 and transform to meet the needs of the

future force.[20] Developing solutions to this problem require innovative and creative designs. The planning and design of Army installations of the future is an opportunity to proactively rethink the future of Army planning, and disrupt the paradigms of the past.

20 Hammack, "2014 Green Book."

4. Precedence: Case Studies

61 Fort Hunter Liggett RPMP

62 The Government and Technology Enterprise

64 Fort Belvoir Town Center

65 Natick Soldier Systems Center

The conceptual changes to Army installations are not created in a vacuum. There are several examples that already exist. The planning processes and products of these cases have given valuable insight to the thoughts and recommendations found in this thesis.

Fort Hunter Liggett RPMP

Fort Hunter Liggett, CA

- Regulating Land Use

The Urban Collaborative updated Fort Hunter Liggett's master plan to transform the cantonment area into a small town with a central town square. The installation promotes sustainable buildings and infrastructure and fosters a connected, healthy community. This plan illustrates the Army's new planning strategies, practices, process, and products. The RPMP illustrate the use of a regulating plan for installations. The plan is used to implement land use recommendations. It identifies the building Envelope Standard for each building and any specific characteristics assigned to it. Standards for each building type is identified along with uses, placement, shape, height, fenestration, and parking.[1] Moving forward the regulating plan will be the standard for development of EUL designated sites.

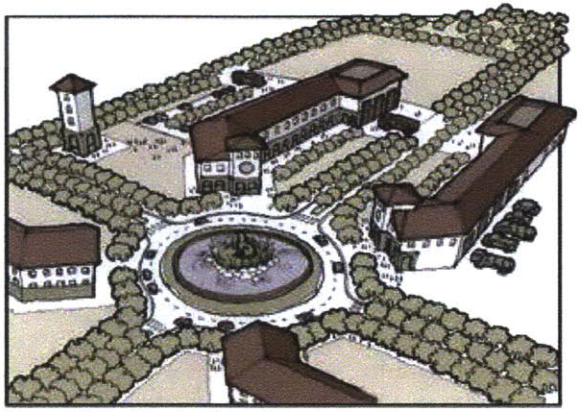


Figure 28. Fort Hunter Liggett Illustrative Plan (Source: FHL Blackhawk Hills ADP)

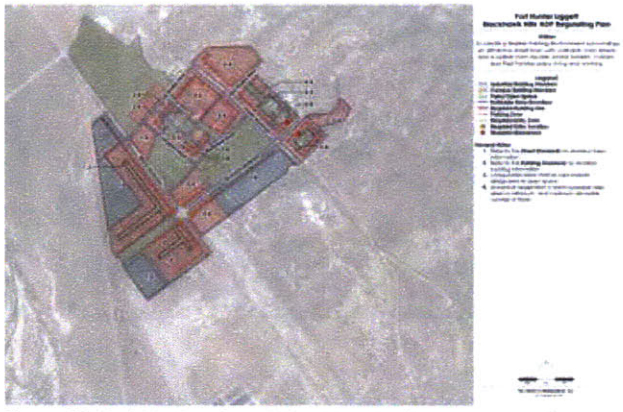


Figure 29. Fort Hunter Liggett Blackhawk Hills APD Regulating Plan (Source: FHL Blackhawk Hills ADP)

1 Gillem, "Fort Hunter Liggett Installation Design Guide."

The Government and Technology Enterprise

Aberdeen Proving Grounds, MD

- Enhanced Use Leasing

In 2005, Aberdeen Proving Grounds (APG) executed an Enhanced Use Lease partnership with Opus East, LLC. (a subsidiary of Opus Corporation), a commercial real-estate development company. In June 2009, Opus East assigned its EUL development rights to St. John Properties, Inc., a Baltimore-based commercial real estate development firm. APG leased the land of the installation and uses the proceeds for facility improvements and maintenance on the installation. Under the EUL, St. John Properties entered into a long-term lease of federally owned property for the development of the GATE Office and Technology Park. "The Gate" as it is referred to, comprises 416 acres, 11 land bays, and up to 3,000,000 square feet of development potential both inside and outside the secure perimeter of APG. High-quality buildings and facilities were built for tenants and their supporting government contractors who relocated to APG because of the BRAC round 2005.

Figure 30. 3 Story Office at the GATE
(Source: St. John Properties)

Figure 31. The Entrance at 6210 Guardian Gateway
(Source: St. John Properties)

In addition to office and R&D buildings, St. John Properties is developing an office and retail component just outside APG's security gate. The GATE is developed to meet anti-terrorism and force-protection standards, and will include sustainable-design elements that achieved varying levels of LEED certification. The GATE is strategically located to allow private military contractors (PMCs) doing work for various military commands on APG to be closer to their client. The first building at The GATE was delivered in 2008 to CACI, an information-technology security PMC. In October 2010, L-3 Communications took occupancy of a 75,000 square feet building at The GATE, as did Raytheon Company, another 75,000 square feet building. In 2011, Boeing occupied a 6,000 square feet. Development of The GATE project is ongoing. St. John Properties is developing a significant first class retail amenities centers in addition to more than two million square feet of office and R&D, and flex space.[2]

2 "The Gate."

Fort Belvoir Town Center

Fort Belvoir, VA

- Mixed-Use Development
- Privatization / RCI

Fort Belvoir applied New Urbanist principles to the development a mixed-use town center. The Army, Clark Pinnacle LLC, developer, and Pinnacle, property management, formed a public private partnership known as Fort Belvoir Residential Communities LLC. They worked with architects Torti Gallas and Partners to plan the pedestrian-scale mixed-use development. The town center is ground floor retail and services with 25 residences over stores.[3] It has been hailed at a success and paved the way for continued mixed-use developments among other Army installations. The concept and sustainable design has earned national and international recognition. The project has received numerous awards and sets a precedent for the power of privatization and changing frames of reference concerning installations.[4]

Figure 32. View of Fort Belvoir Town Center (Source: Torti Gallas and Partners)

Figure 33. Fort Belvoir Town Center (Source: Torti Gallas and Partners)

3 "Fort Belvoir Town Center Case Study."
4 "Fort Belvoir Town Center."

Natick Soldier Systems Center

Natick, MA

- Housing

Natick Soldier Systems Center (NSSC) is the only remaining active duty Army installation in the New England States. Founded in 1954 in Natick, MA NSSC is responsible for researching, developing, fielding, and managing food, clothing, shelters, airdrop systems, and Soldier support items.[5] The installation contains no housing and all Soldiers utilize there BAH to live in a high cost Boston Metropolitan Service Area. NSSC has 78 government operated housing units in five separate locations off the installation. This illustrates a Soldier's compensation package provides enough monies to live on the economy. Immediately surrounding NSSC are single family and multi-family residences.

Figure 34. Aerial View of NSSC and Surrounding Residential Context (Source: Bing Maps)

Figure 35. Government Owned Housing in Needham, MA (Source: USAG-Natick)

5 "About the NSSC"; Scanlan, Army Times Guide to Army Posts.

5. Theory

68 Systemic Design and Drosscape

71 Design With Nature

74 Patchwork Urbanism

77 Thesis Framework

The future of Army installations relies on the ability for a reduction in capacity and shrinking footprints. Fundamentally, installations can shrink in two ways: demolish individual buildings or separate an installation into sections and demolish sections until capacity meets demand (see figure 36). This results from a lack of strategies for shrinkage in current Army planning doctrine based on NU principles.

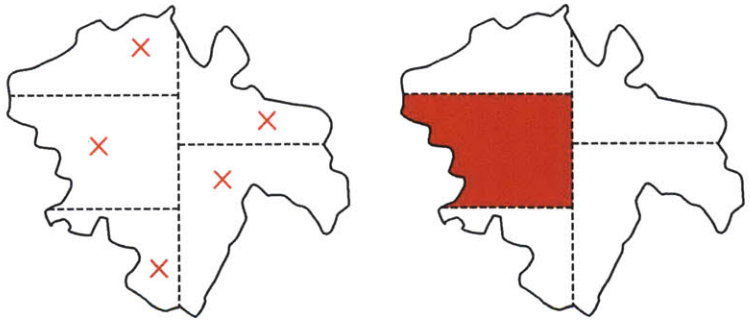


Figure 36. Two Models of Shrinking Army Installations Based on Current Practices

On a much broader scale, we can learn about how to shrink installations from cities across the US that have been affected by declining populations and face tremendous challenges due to excess development capacity. These cities have implemented a vast array of tools in an attempt to effectively shrink to meet today's demands. In order to better understand how cities shrink themselves, urban design theory is examined to provide a framework for the design proposal. Four theories are selected that are postured to address the issues of shrinkage. Elements of the theories are extracted to generate a design solution for shrinking Army installations. This thesis builds upon existing theory to suggest applicability to the planning of future Army installations. No one theory is uniquely situated to solve the problem of shrinking Army installations therefore elements from the theories is utilized. Each theory is explained and then illustrated through a redesign of a generic installation.

Systemic Design and Drosscape

"If…sites were mapped and understood…at regional scales, they could be transformed in ways that could spur redevelopment, cleanse ecologies, and link broken landscape systems" – Alan Berger

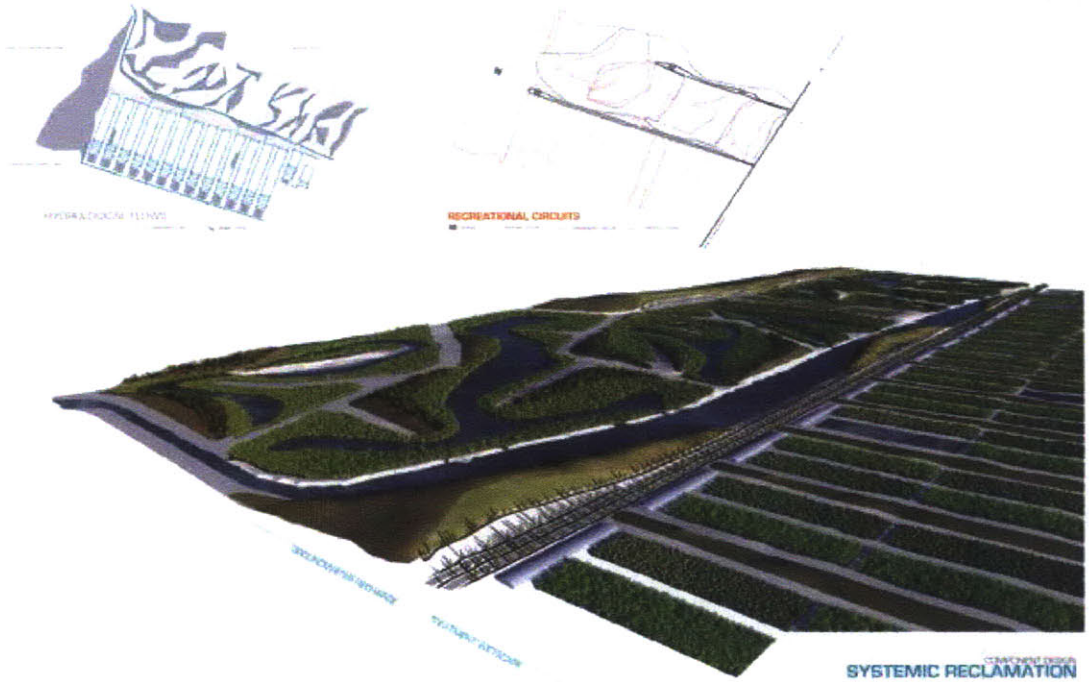


Figure 37. Wetland Machine Simulated Aerial Perspective, Alan Berger (Source: P-REX)

Alan Berger's books, Systemic Design© Can Change The World, and Drosscape: Wasting Land In Urban America, contain seminal theories for the design and planning fields to rethink environmental challenges on underutilized urban land. Both publications integrate regional thinking to reassemble landscape assets from disparate parts of cities leftover as liabilities by previous development processes. These include polluted land, abandoned areas, blighted structures and properties, and areas of disinvestment.

Systemic Design©, "merges the existing stresses on a particular urban area or site with multi-layered, time-based strategies."[1] Through his research design approach Berger interacts with the environmental, economical, and programmatic conditions regionally rather than only singular objects. Understanding how natural and artificial systems function in regions and at the object scale provides the foundation for intelligent sustainable design projects. This analytical research promotes innovative visualization and mapping techniques to reveal and define the extent of the problem or network of relationships needing alteration. Systemic Design© begins with broad and indefinite information gathering in order to examine the vast array of issues surrounding an area. As the research is analyzed, relational information begins to cluster into systemic bundles. These bundles connect a region to a site. These clusters are specific issues to the area that are vital and require examination. Berger demonstrates Systemic Design© through numerous projects that illustrate proactive solutions, rather than reactionary ones.[2]

Berger's theories focus on natural systems that serve as the primary element of the design. Development and human interaction is an afterthought. Some projects may contain no development if it doesn't fit the system. This is problematic because a significant component of shrinking cities are people and buildings. Effective designs require large swats of lands to allow natural processes to work. Small sites make implementing the theories challenging. Systemic Design© recognizes working within defined constructs, but fail to provide a philosophy to transverse the system.

1 Berger, Systemic Design Can Change the World
2 Ibid.

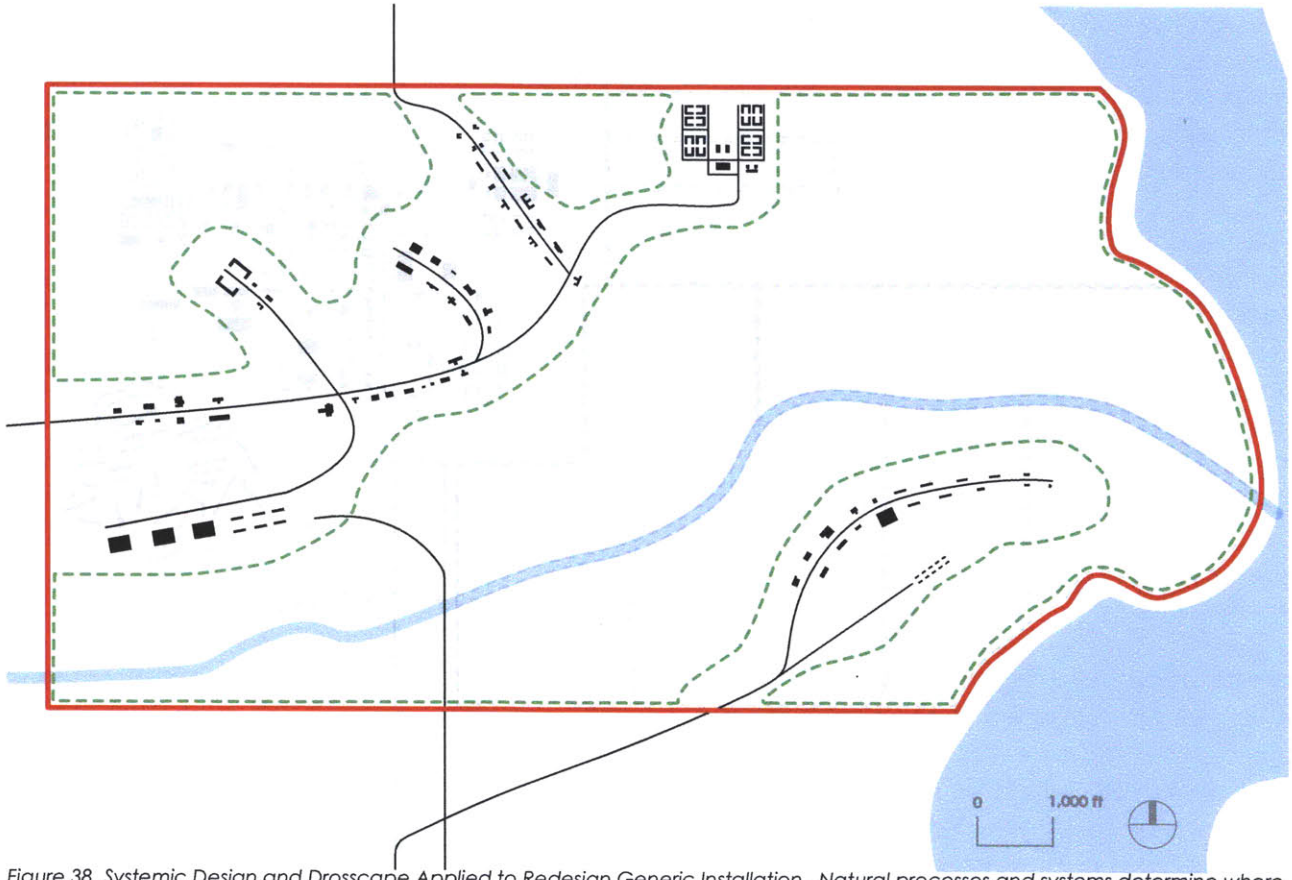


Figure 38. Systemic Design and Drosscape Applied to Redesign Generic Installation. Natural processes and systems determine where to shrink.

Design With Nature

"Man is that uniquely conscious creature who can perceive and express. He must become the steward of the biosphere. To do this he must design with nature." – Ian McHarg

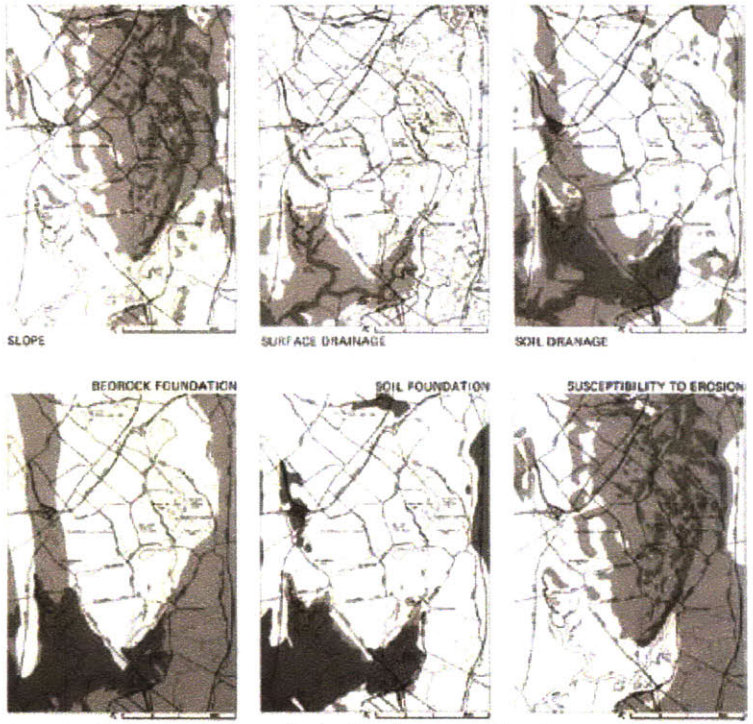


Figure 39. Richmond Parkway Project Environmental Factor Layers, Ian McHarg (Source: Design With Nature)

McHarg explores the relationship between nature and the built environment. He illustrates how to read the site from ecological factors. He details how to map the factors and recommended land uses for those factors. Through an overlay of the factors land use recommendations can are made. McHarg suggests that land use should rely on nature and not convenience or potential revenue. In a true sustainable approach it is suggested that natural processes precede building processes. He clearly points out based on his suitability analysis that land use occurs in unfitting locations. McHarg makes clear and comprehensible recommendations for reversing the destructive process of development. Design with Nature is about preservation and the reintroduction of nature into design. Its ecological viewpoint enables sustainability on a regional scale.[3]

Design With Nature totally disregards existing uses. The approach details locations based on comprehensive mapping. If development was built in an area deemed unsuitable, removal of the development is necessary. The mapping fails to predict future conditions and suitability is based on existing conditions. This approach relies heavily on map data in order to generate solutions for suitability. If data is corrupt or tainted by the originator the design could propose significantly different results. McHarg acknowledges in his approach nature comes before humans with his suitability derived from the best use of the land. Lack of a policy component to achieve his design goals weakens his argument. Design without policy makes implementation arduous.

3 McHarg, Design With Nature.

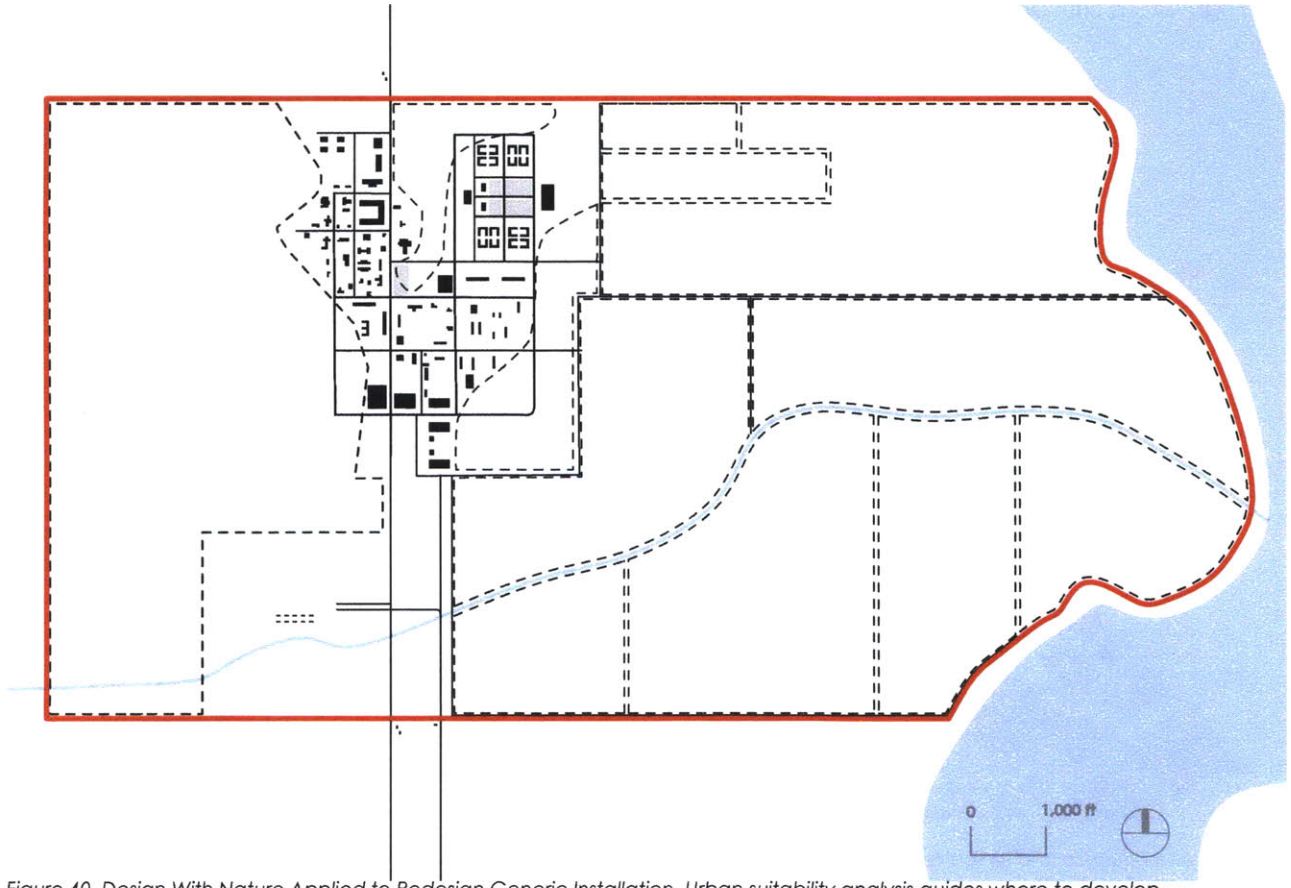


Figure 40. Design With Nature Applied to Redesign Generic Installation. Urban suitability analysis guides where to develop.

Patchwork Urbanism

"The need to right size is critical, the potential to right size is tremendous, and the time to right size is now."
–Brent Ryan

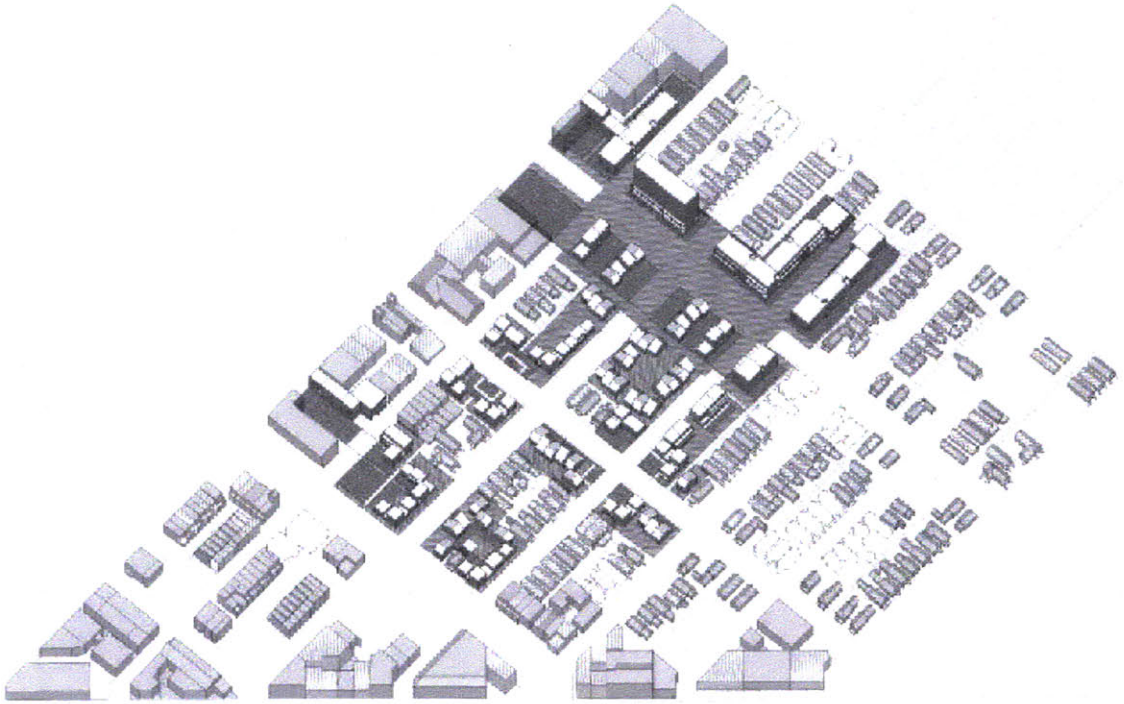


Figure 41. Reconstruction of a Typical Neighborhood During Decline, Brent Ryan (Source: Design After Decline)

Abandonment in shrinking cities occurs in a patchwork pattern that is relatively unpredictable. Ryan explains, "'rightsizing' refers to the yet-unproved process of bringing cities down to a 'right' size, meaning a size proportionate to city government's ability to pay for itself."[4] The decline of shrinking cities pose challenges to conventional urban design approaches. Brent Ryan proposes the future shrinking city should not be, "New Urbanism's ideal restored cityspace of historicist homes,"[5] but a patchwork of areas containing varying levels of densities and form. In reaction he proposes Patchwork Urbanism[6] that responds to shrinkage and allow growth. At a macro scale it creates a pattern of interwoven growth and shrinkage. Patchwork Urbanism' three components aim to achieve rightsizing are areas with extensive shrinkage, growth in isolation, and growth in connection. The different components use strategies to promote growth and accept that some areas will continue to decline. Shrinking cities evolve into a patchwork of "new, old, vanished, and banishing neighborhoods, intermingles within the bounds of the historic city."[7] Patchwork Urbanism provides a future for shrinking cities that embraces the current landscape.

This approach accepts that some areas will experience growth and others decline. It provides rational for areas in shrinking cities to stabilize and grow. Problematic is that Patchwork Urbanism leave areas of the city to become abandoned. Patchwork Urbanism fails to connect with the larger regional issues. It works within a defined construct of the city and makes no connections or utilizes regional systems. Shrinking cities fiscal austerity can be difficult concerning this approach. The lack of capital makes restructuring of neighborhoods streets, infrastructure and new strategic development difficult.[8]

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4 Ryan, "Rightsizing Shrinking Cities: The Urban Design Dimension."
5 Ibid.
6 Ibid.
7 Ibid.
8 Ibid.

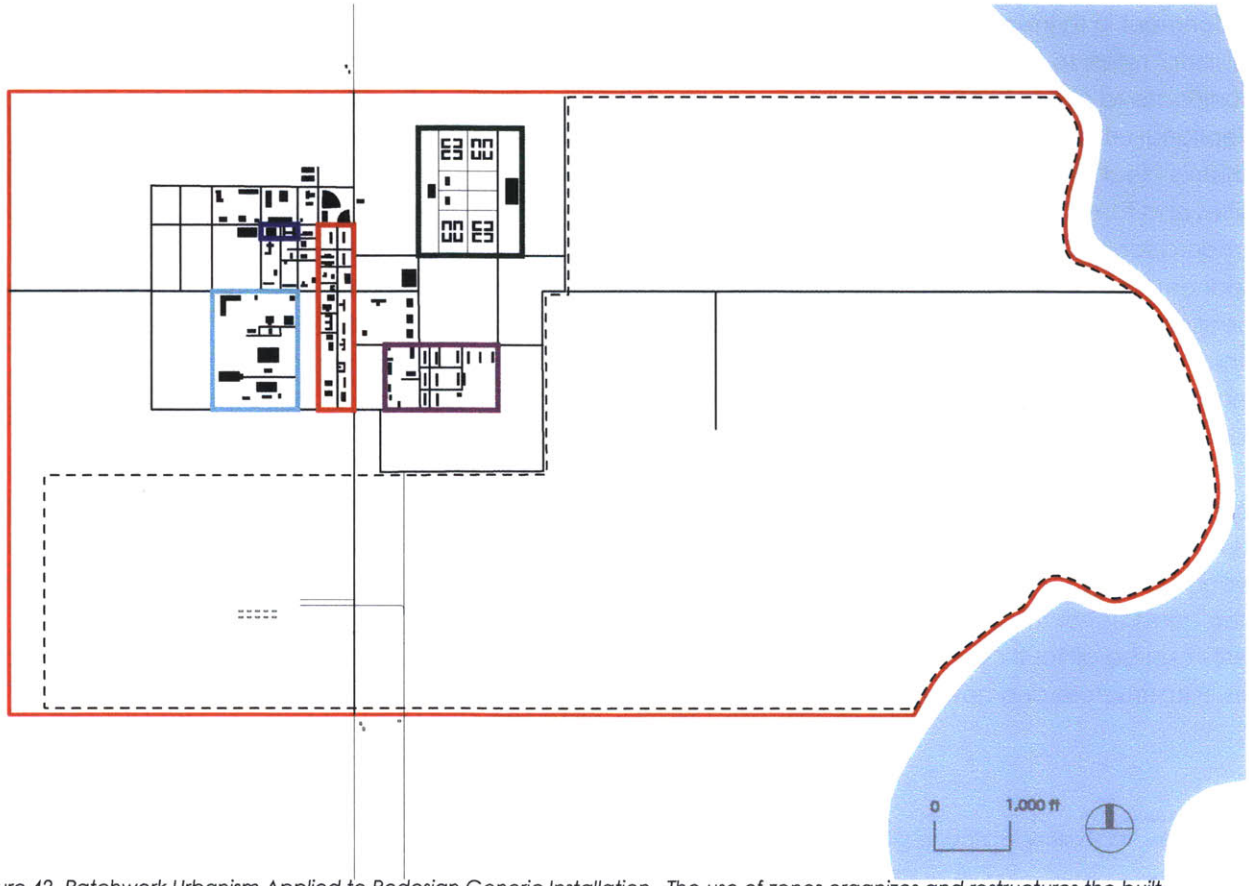

Figure 42. Patchwork Urbanism Applied to Redesign Generic Installation. The use of zones organizes and restructures the built environment.

Thesis Framework

These theories provide numerous tools that are extracted to move forward with designing a solution for the future of Army installations (see figure 43). Systemic Design© and Drosscape provide a way to interconnect neglected networks of regional natural systems and integrate them into the new plan. Installations have an opportunity through reducing capacity to become more sustainable. I use this approach to integrate sustainability, environmental processes, and landscape. Understanding that shrinking installations will not be closely relocated into a tight cluster, Berger's theory is used to provide a seamless transition from nature to development. It provides a layer of where to shrink. Design with Nature is used to read the installation and develop land use suitability. It determines where to build. Finally, patchwork urbanism is utilized to reshape the physical fabric of the installation and develop installation type clusters.

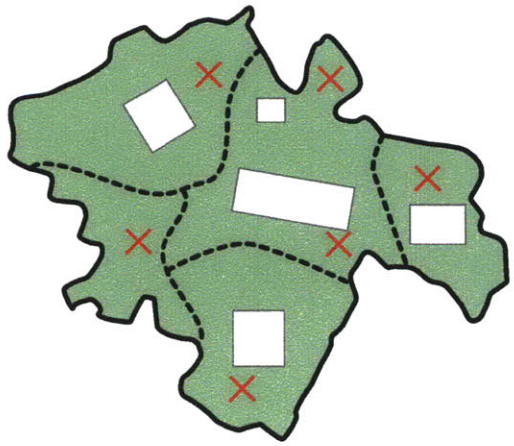

Figure 43. New Model to Shrink Army Installations. Framework derived from Urban Design Theories.

6. Design

81 Site Analysis

106 Process

118 The Plan

This chapter presents a design proposal for the future of Army installations. Installations will shrink and the Army must be prudent in developing innovative and creative solutions through design. Current design practices are based on principles that respond to the rapid growth of installations resulting from BRAC round 2005.

The goals of the design proposal are:

1. ***Effectively reduce capacity and shrink footprints while protecting substantial investments made from BRAC round 2005.*** The major component for Army installations is the need to shrink in a manner that supports the mission, protect significant investment to facilities, and meet the needs of the future force.

2. ***Reintegrate regional environmental systems and promote sustainability.*** An effort to reduce waste and promote sustainability is a major focus of the Army. Due to the need to shrink installation footprints this goal is derived to take advantage restoring natural systems that provide value and protection. Natural systems can be used to provide additional environmental buffers and remediate hazardous sites. Additionally, shrinking promotes sustainability in design and more efficient usage of space and utilities.

3. ***Provide effective locations and land uses for Enhanced Use Leasing.*** Budget decline and uncertainty greatly affects installations. Providing a source of income benefits the Army and installations.

Parameters were established based on the goals and proposed changes to measure the effectiveness of the design proposal seen in figure 44.

Parameter	Goal
reduction in housing	75%
reduction in square footage	20%
increase in EUL	15%
increase in training area(s)	10%
reserve in buildable acreage	10%

Figure 44. Design Shrinkage Parameters

Goals (in order of importance):

1. Reduction in Square Footage: Based on average projected vacancy and underutilization rates.

2. Increase in Training Area(s): Ensures that plans adhere to the Army's mission and core competencies. This acts a control measure to ensure installations shrink.

3. Reserve in Buildable Acreage: Creates a requirement to protect land and resources for future growth.

4. Reduction in Housing: Creates a requirement for substantial reduction in housing and allows for privatized or private sector housing on installations.

5. Increase in EUL: Creates a requirement to utilize a tool that provides revenue for installations and the Army.

Site Analysis

The site chosen is Fort Belvoir, Virginia. It contains all five types of installations coupled with unique security features. Fort Belvoir is a prime location to demonstrate the shrinking of an Army installation to show applicability to the wide range of installations CONUS. Fort Belvoir is a United States Army installation located in Fairfax County, Virginia founded during World War I.[1] As a result of the BRAC round 2005, Fort Belvoir's population increased substantially and has a diverse range of tenants and activities.[2]

This section is the result of research and analysis of Fort Belvoir, VA. The following figures 45 - 67 are used to illustrate the analysis conducted. The analysis is divided into two major topics, natural systems and built environment, and two minor topics, transportation and security. It informs the elements needed to apply the framework and redesign the installation.

Fort Belvoir is an Army installation located along the Potomac River. US Route 1 bisects the installations and residential development generally surrounds it. It is located 20 miles from the Nation's capital and serves a workforce of over 50,000 employees.

Natural Systems

Transportation infrastructure and development has isolated natural systems on Fort Belvoir. Fort Belvoir contains two wildlife refuges, but the region lacks a cohesive conservation effort. The installation contains diverse topographic features that serve as habitat to rare, threatened, and endangered species. Numerous water resources provide areas prone to flood risk.

1 Scanlan, Army Times Guide to Army Posts.
2 "Fort Belvoir, Virginia."

Built Environment

Fort Belvoir contains over 2,000 buildings with over 50% attributed to housing. The installation received a substantial increase in buildings due to BRAC round 2005 and has a substantial overage in administrative facilities. A historic overlay zone preserves buildings from World War I and II.

Transportation

US Route 1 runs through Fort Belvoir and serves as a major access route. Interstate 95 runs Northwest of the installation and is accessible by the Fairfax County Parkway. Fort Belvoir contains a bus route that connects to major employment centers. Numerous governmental and municipal entities provide commuter access to major transit hubs in Northern Virginia. Fort Belvoir's road network adequately connects the installation through paved and unpaved roadways. The rail spur on the installation is currently inactive.

Security

Fort Belvoir contains numerous access control points to enter the installations. Several locations require additional access and have security perimeters. Gates located throughout the post are for restricting access.

Figure 45. Locational Reach. Fort Belvoir is located in Northern Virginia within 20 miles from the Nation's Capital. (Source: ESRI and DISDI)

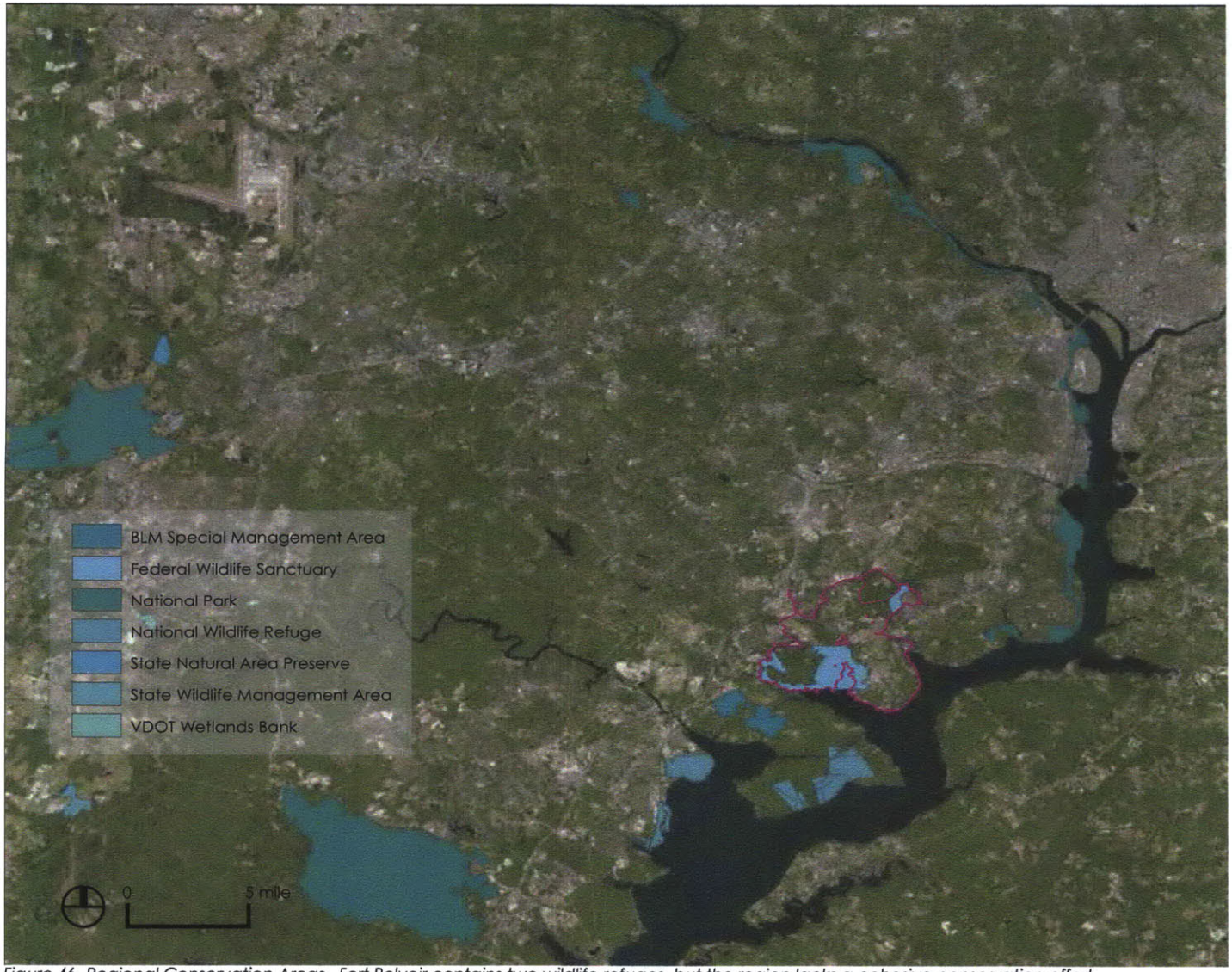

Figure 46. Regional Conservation Areas. Fort Belvoir contains two wildlife refuges, but the region lacks a cohesive conservation effort. (Source: ESRI, DISDI, and Fairfax County)

Figure 47. Regional Land Cover. Fort Belvoir's natural systems are interrupted by transportation infrastructure and development. (Source: ESRI, DISDI, and NLCD)

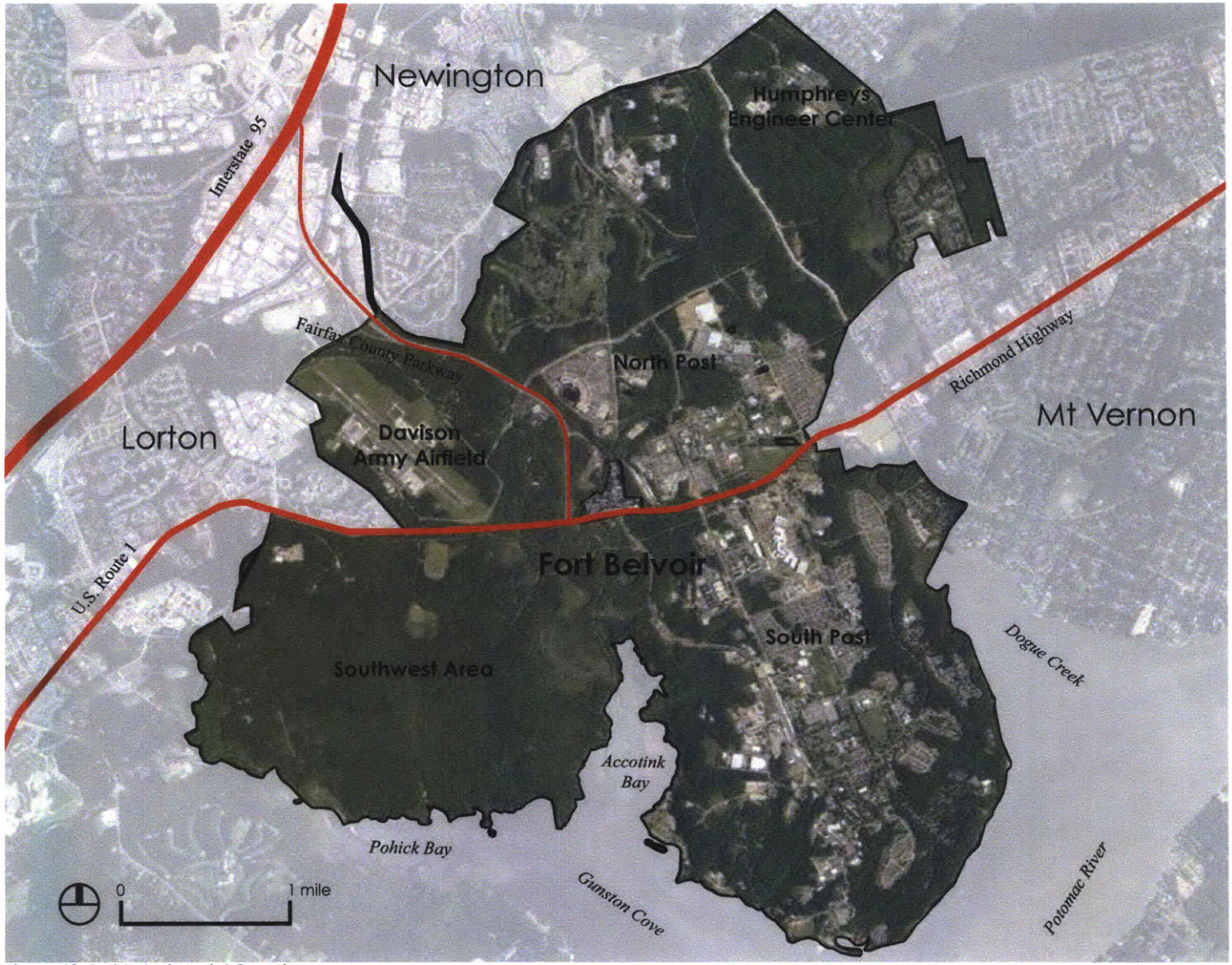

Figure 48. Fort Belvoir Aerial Overview.
(Source: ESRI, DISDI)

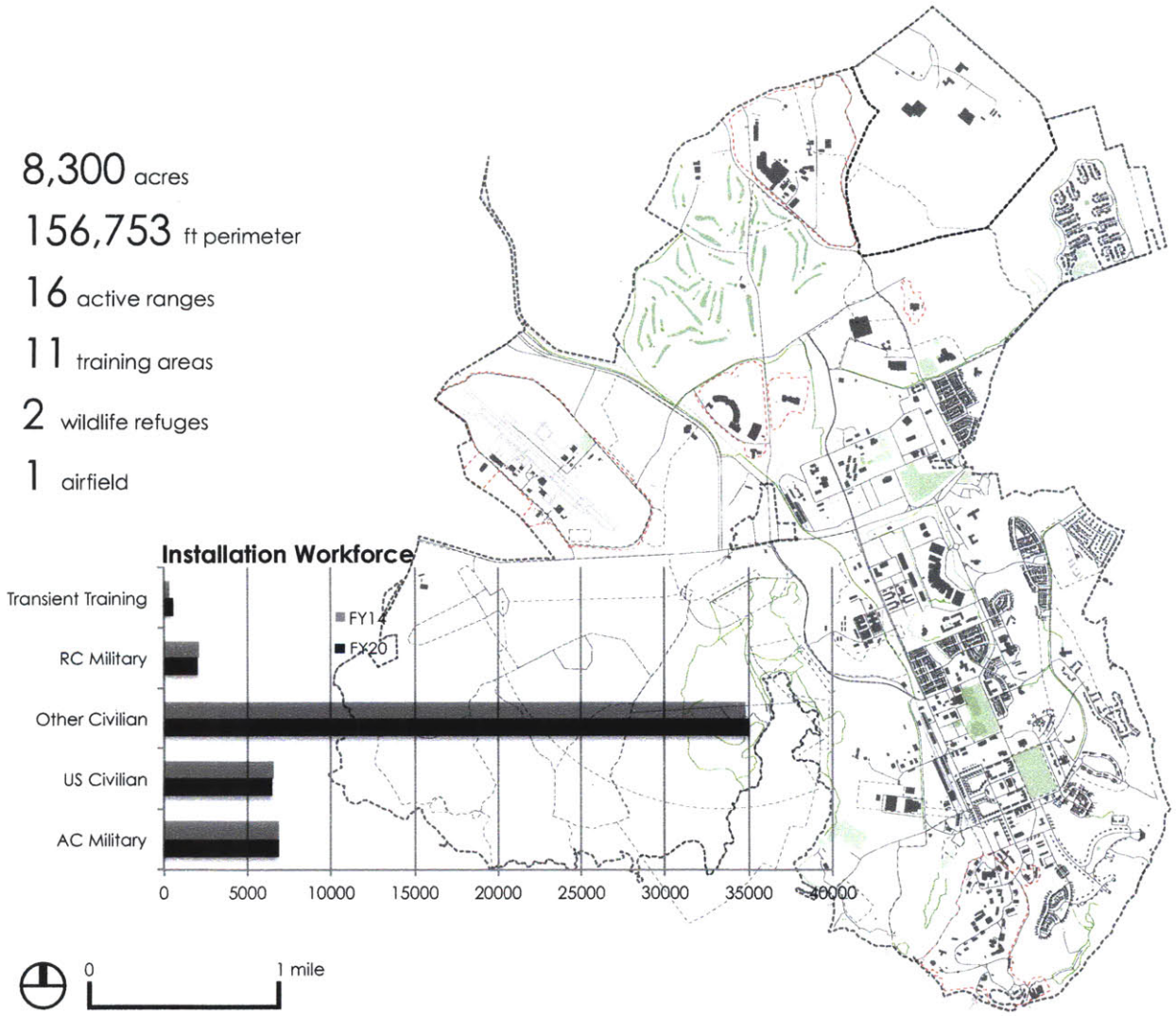

Figure 49. Installation Overview. The majority of the workforce is civilian. (Source: Fort Belvoir DPW and Army Installation Quick Reference Guide)

Figure 50. Site Photos

Figure 51. Site Photos

Figure 52. Site Photos

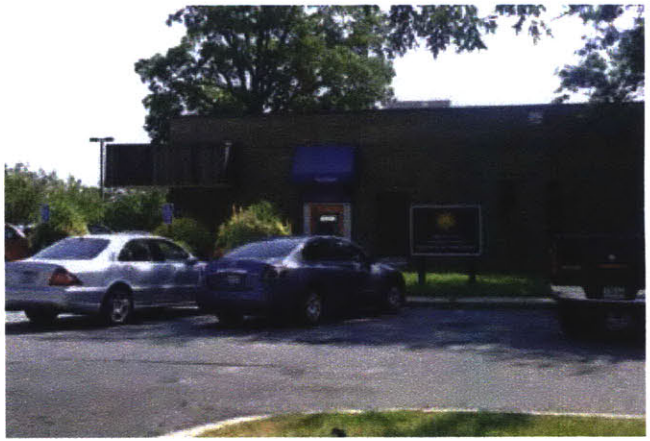

Figure 53. Site Photos

Figure 54. Water Resources. The airfield and Humphrey's Engineering Center are areas of concern being located in the flood zone. (Source: Fort Belvoir DPW, 2014 Fort Belvoir DEIS, and Fairfax County)

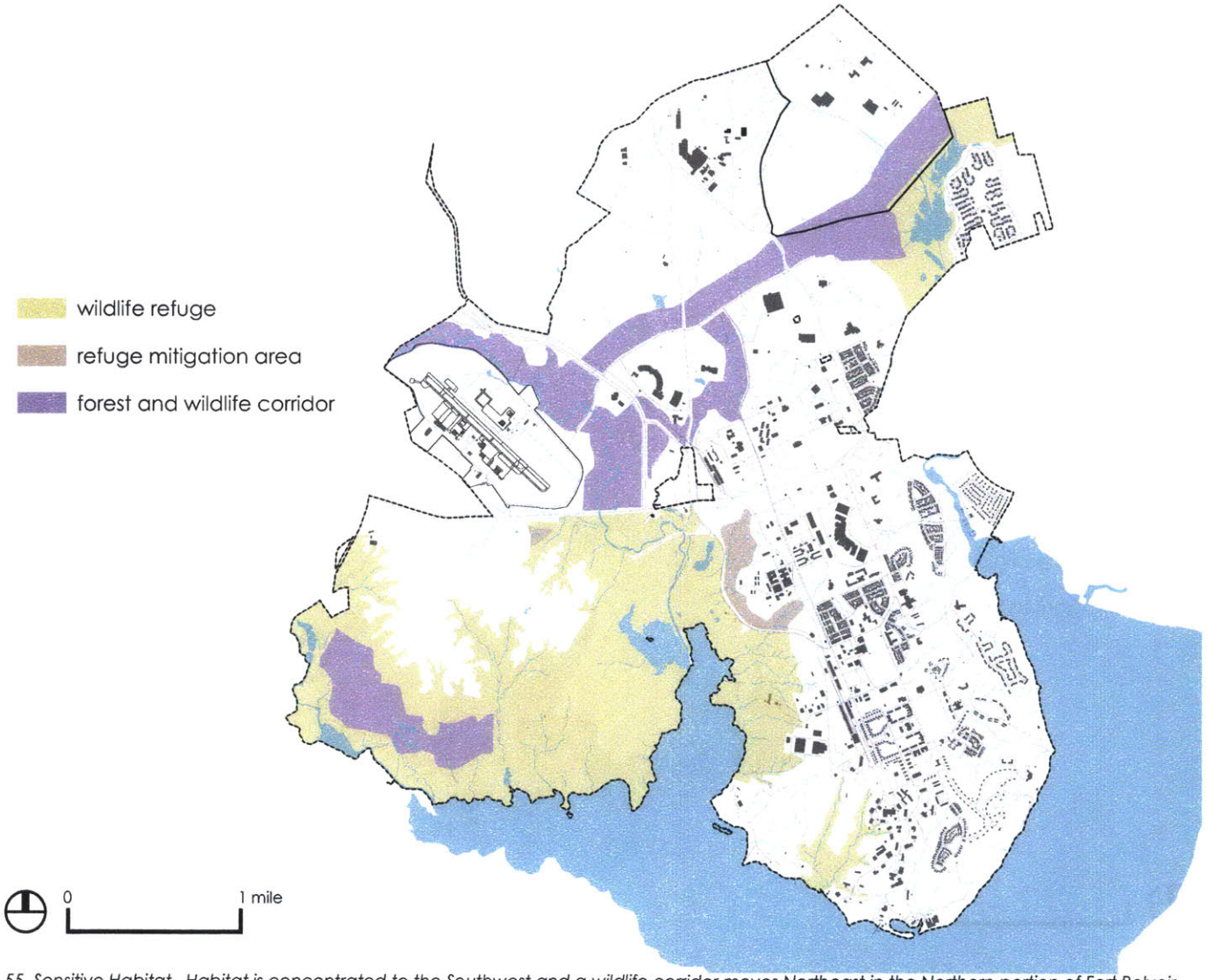

Figure 55. Sensitive Habitat. Habitat is concentrated to the Southwest and a wildlife corridor moves Northeast in the Northern portion of Fort Belvoir. (Source: Fort Belvoir DPW and 2014 Fort Belvoir DEIS)

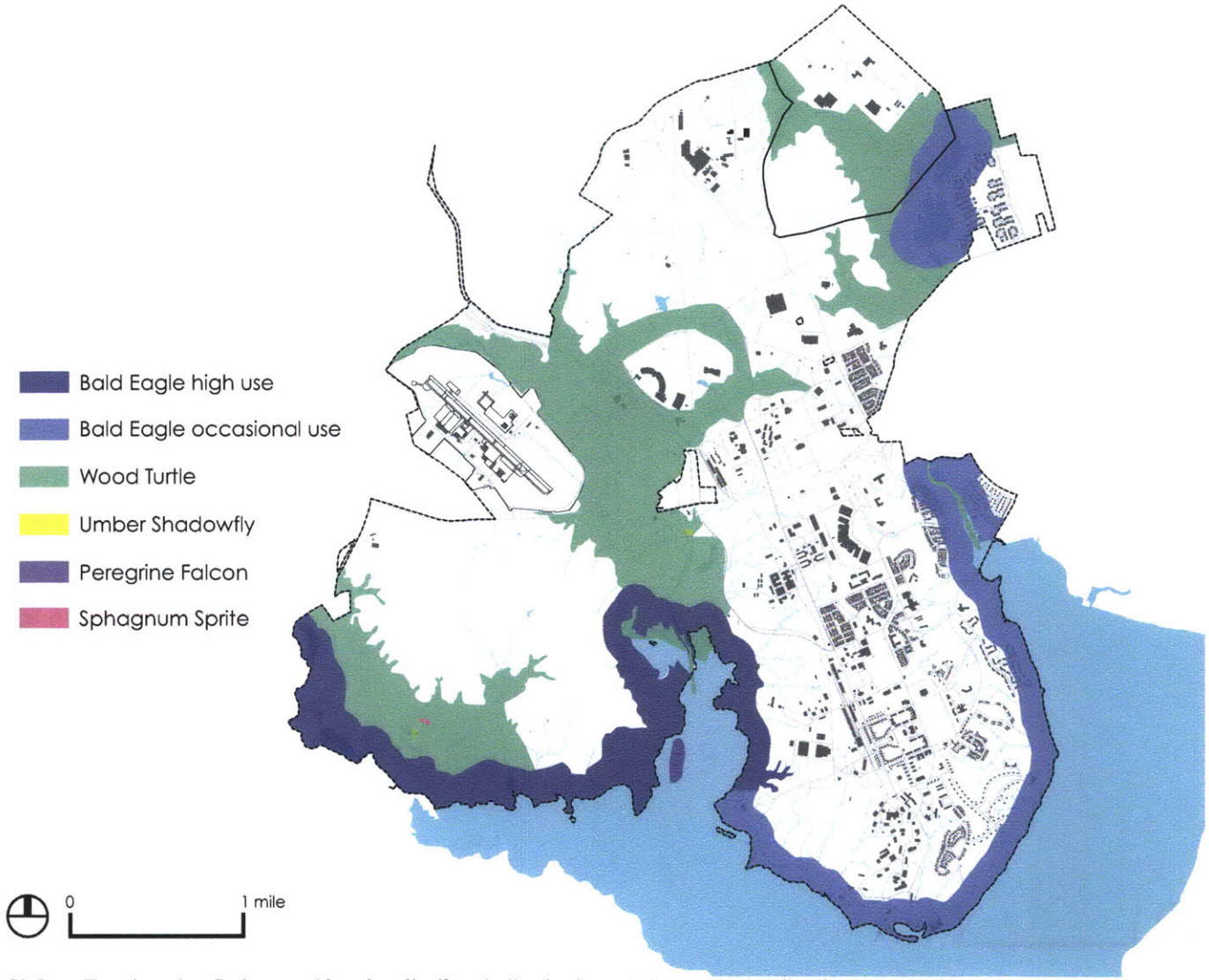

Figure 56. Rare, Threatened, or Endangered Species. Significant attention is made to preserve habitats for these species. (Source: Fort Belvoir DPW and 2014 Fort Belvoir DEIS)

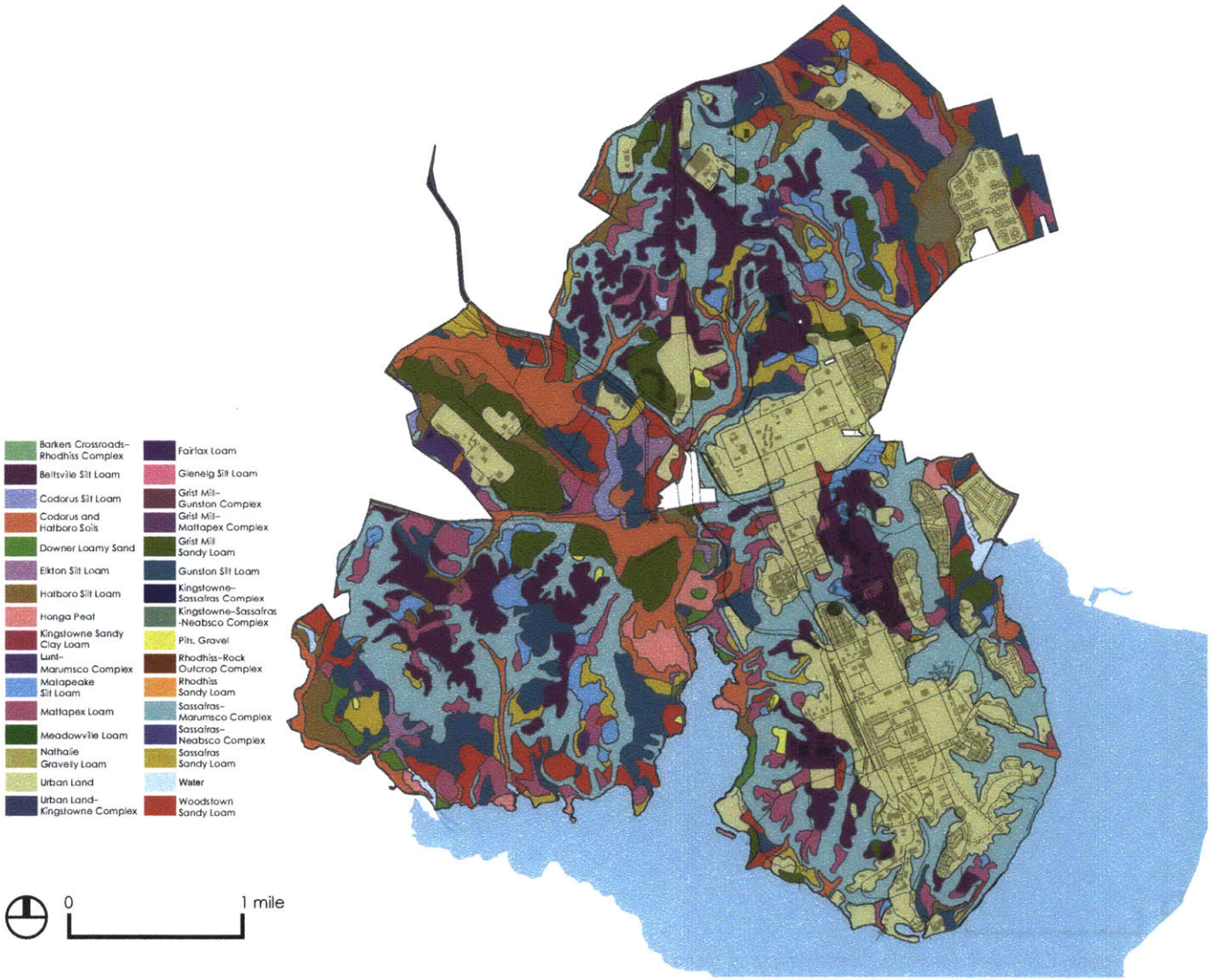

Figure 57. Soils. The different soils identify areas prone to water retention and erosion. It provides locations that are better suited for development. (Source: Fort Belvoir DPW and 2014 Fort Belvoir DEIS)

Figure 58. Topography. Cliff conditions exist on protruding spurs along the Potomac River. Severe slopes limit development to low lying areas and plateau conditions.
(Source: Fort Belvoir DPW)

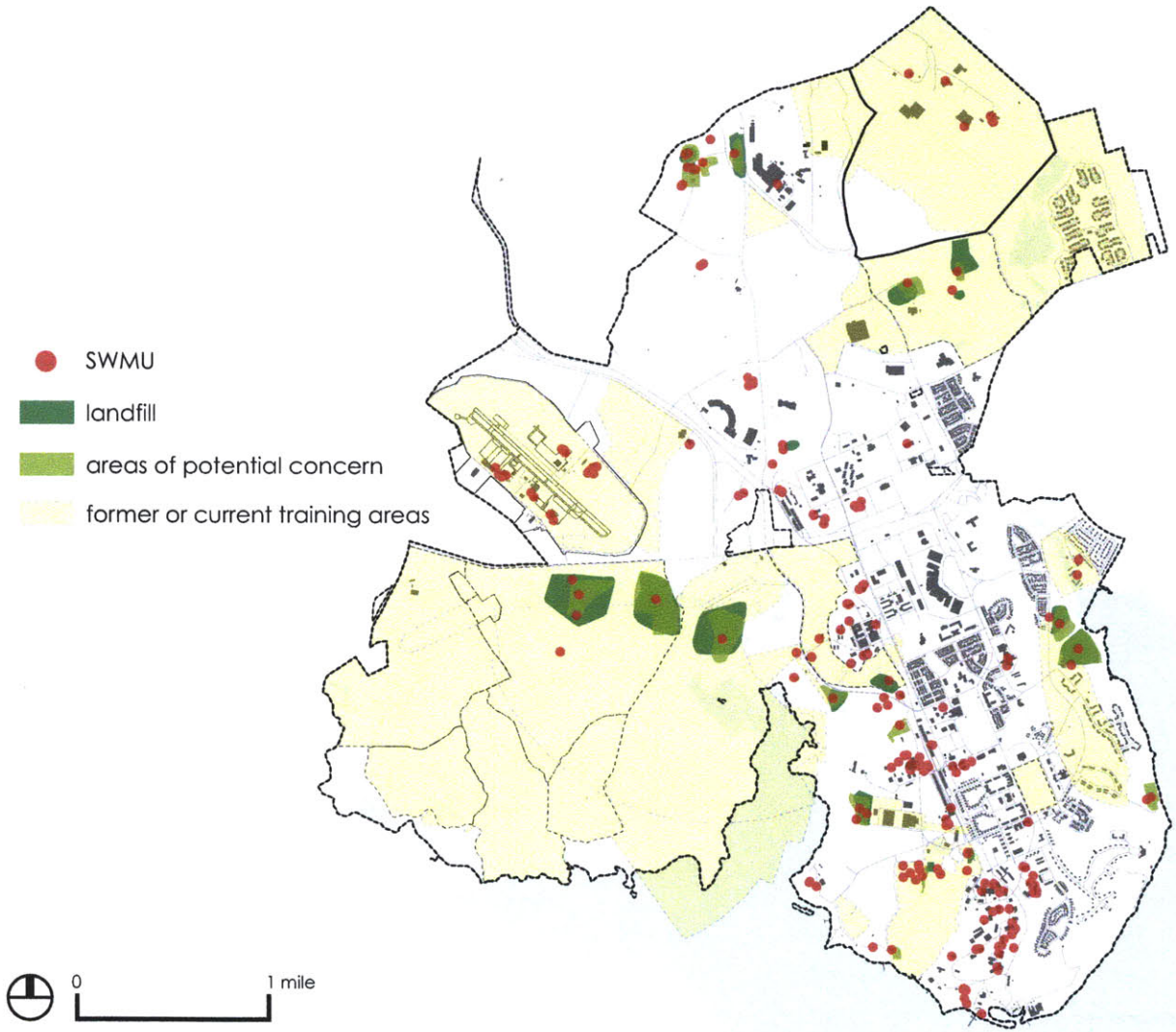

Figure 59. Hazardous Waste and Hazardous Substances. Landfills and hazardous locations are candidates for remediation through nature. (Source: Fort Belvoir DPW and 2006 Fort Belvoir EIS)

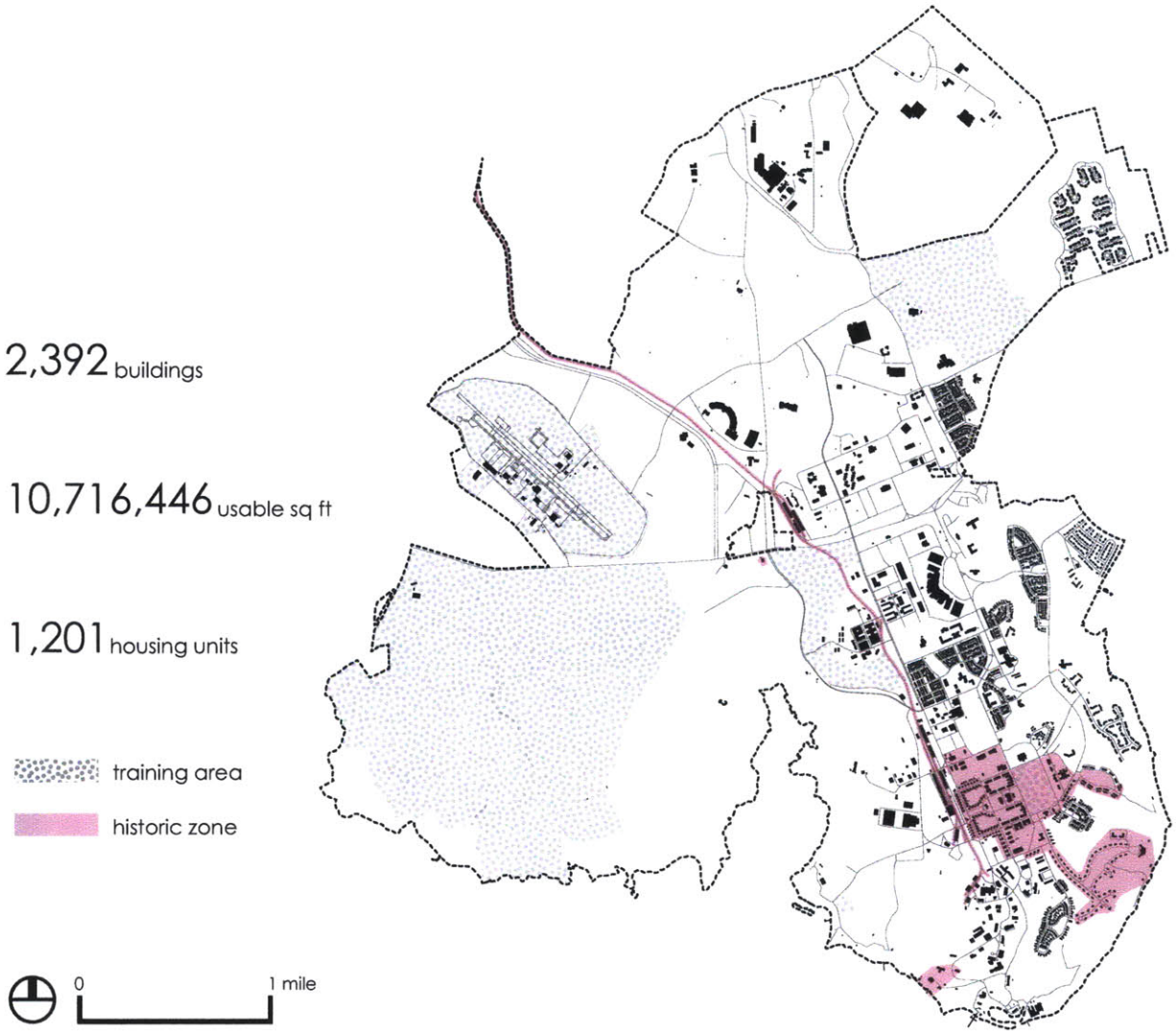

Figure 60. Buildings. Overview of Fort Belvoir showing buildings, training areas, and a historic preservation zone. (Source: Fort Belvoir DPW)

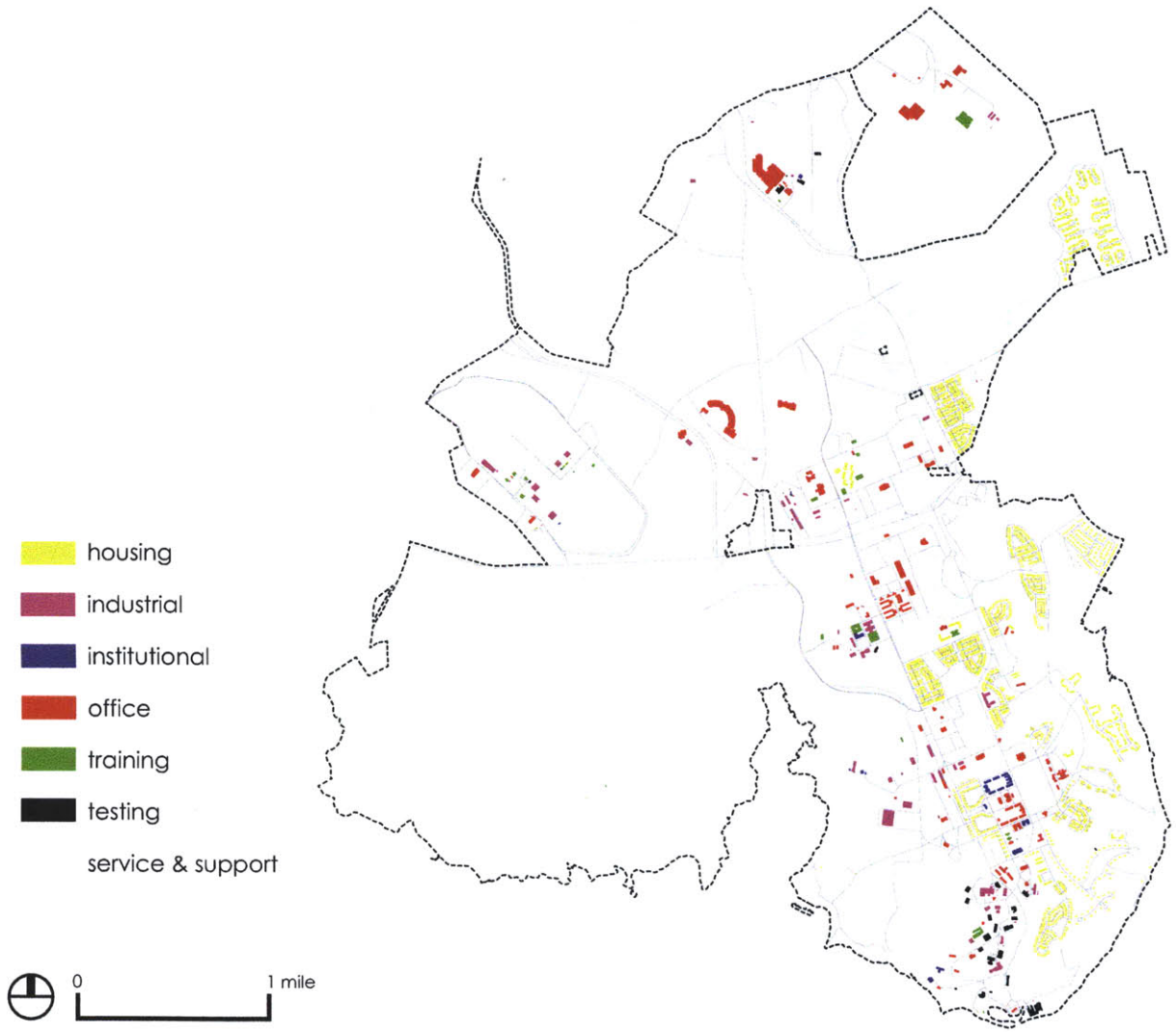

Figure 61. Building Types. Breakdown of the installation types showing the majority of buildings are for housing and service and support. (Source: Fort Belvoir DPW)

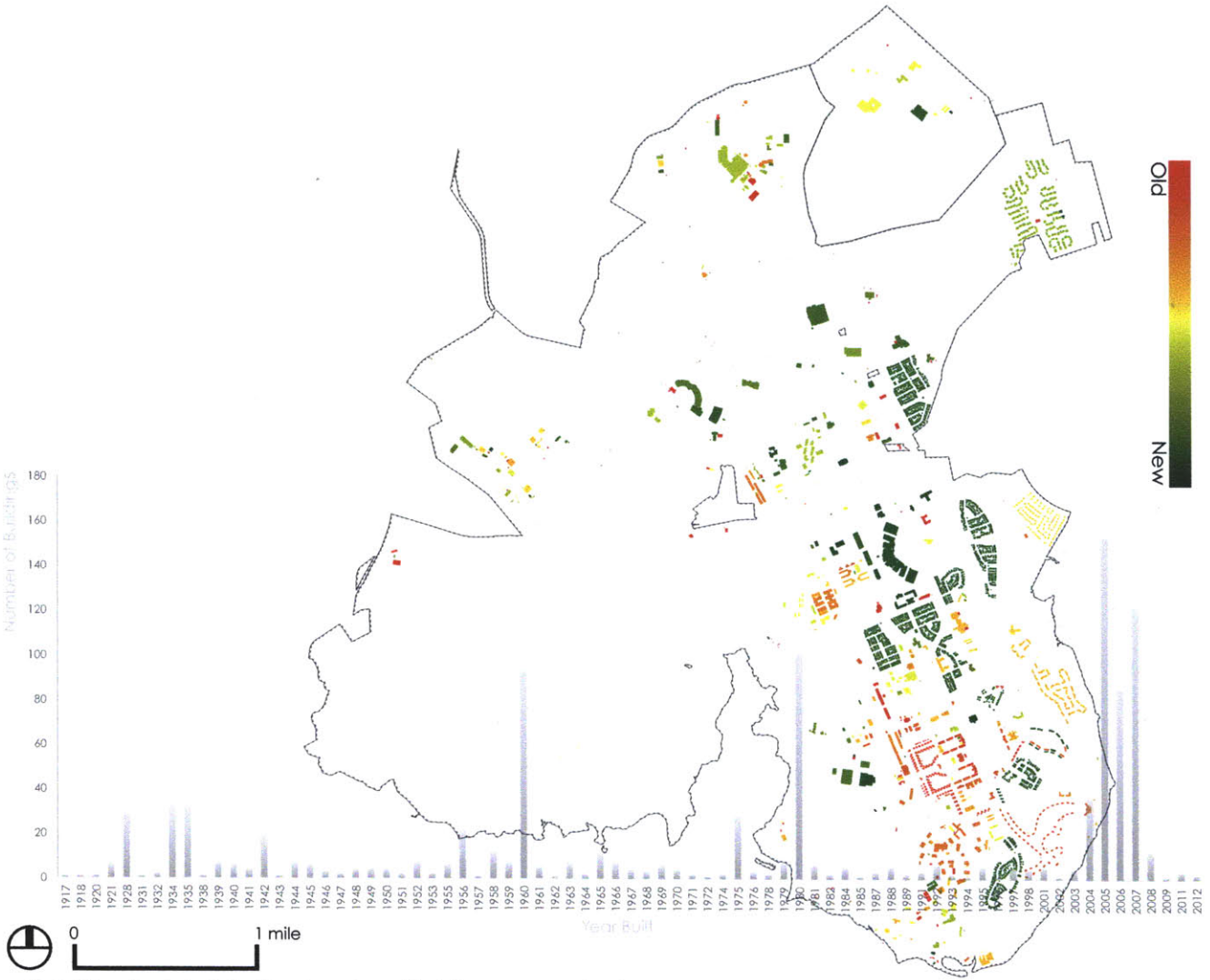

Figure 62. Building Analysis. A significant number of buildings were constructed as a result of BRAC round 2005. Roughly a third of the buildings are older than 50 years.
(Source: Fort Belvoir DPW)

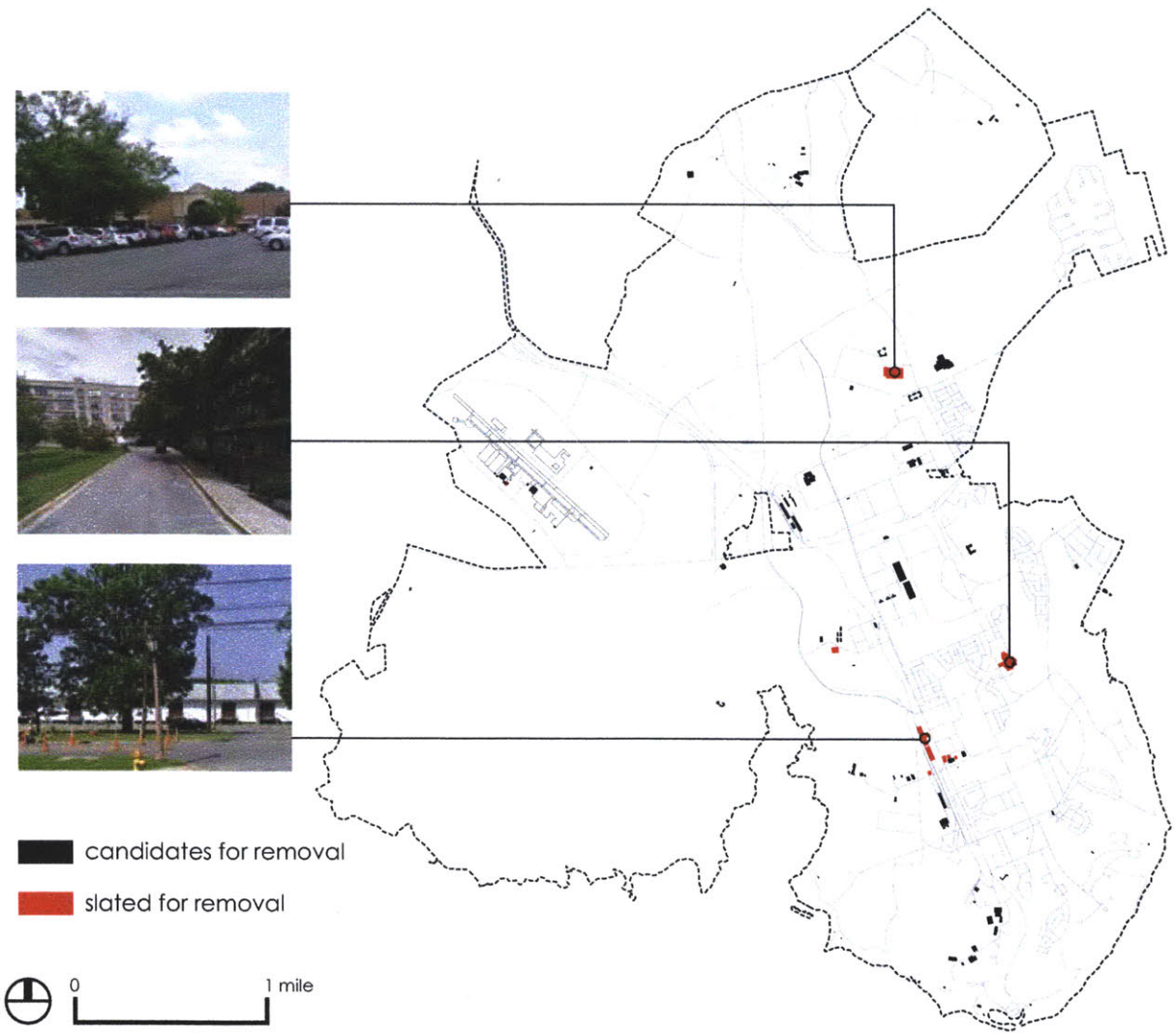

Figure 63. Structure Analysis. Shows buildings slated for demolition. Additionally, numerous buildings that are temporary structures and relocatable structures are identified.
(Source: Fort Belvoir DPW)

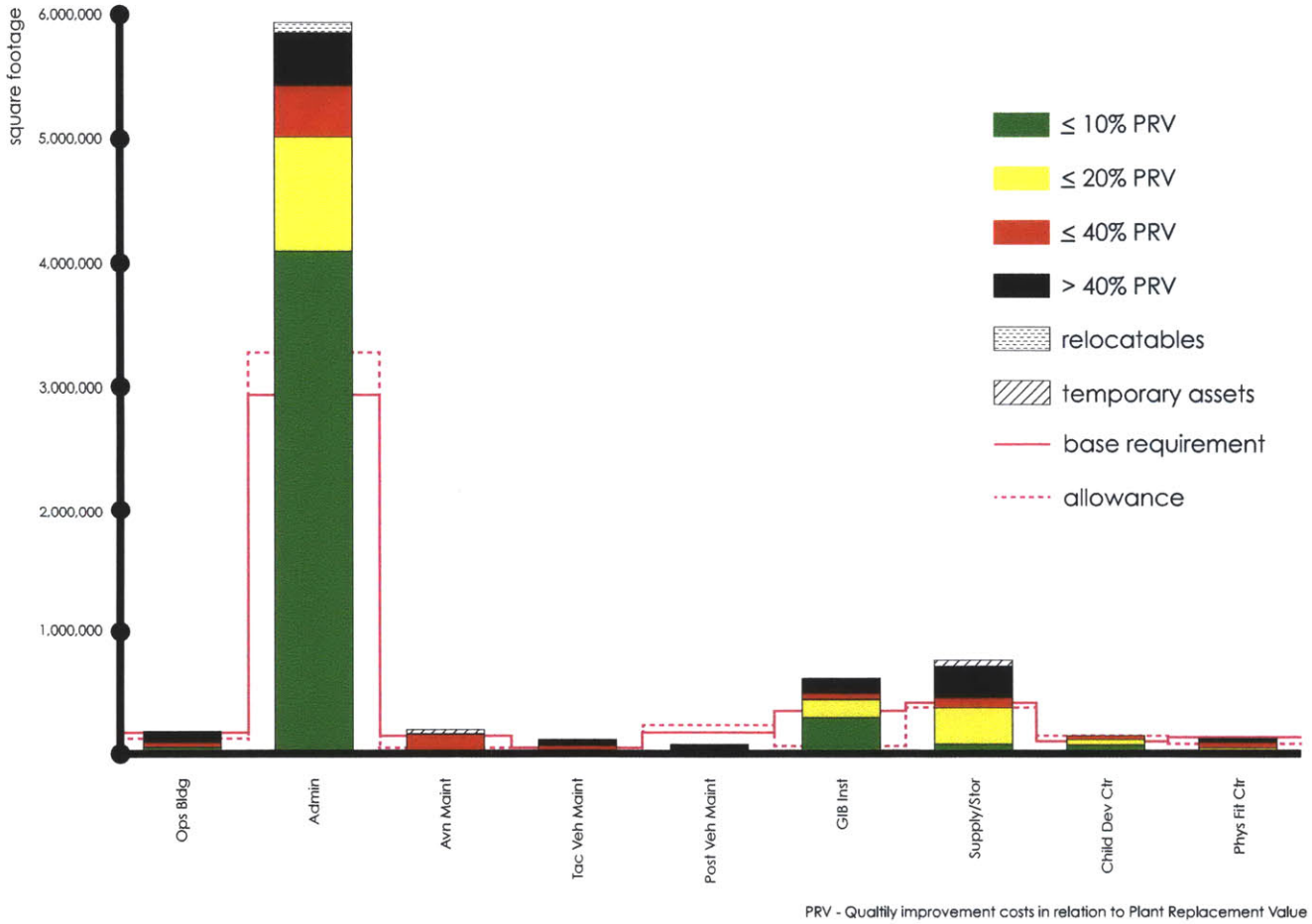

Figure 64. Facility Analysis. Illustrates a major overage in administrative facilities and poor condition of the airfield. (Source: Active Army Installation Quick Reference)

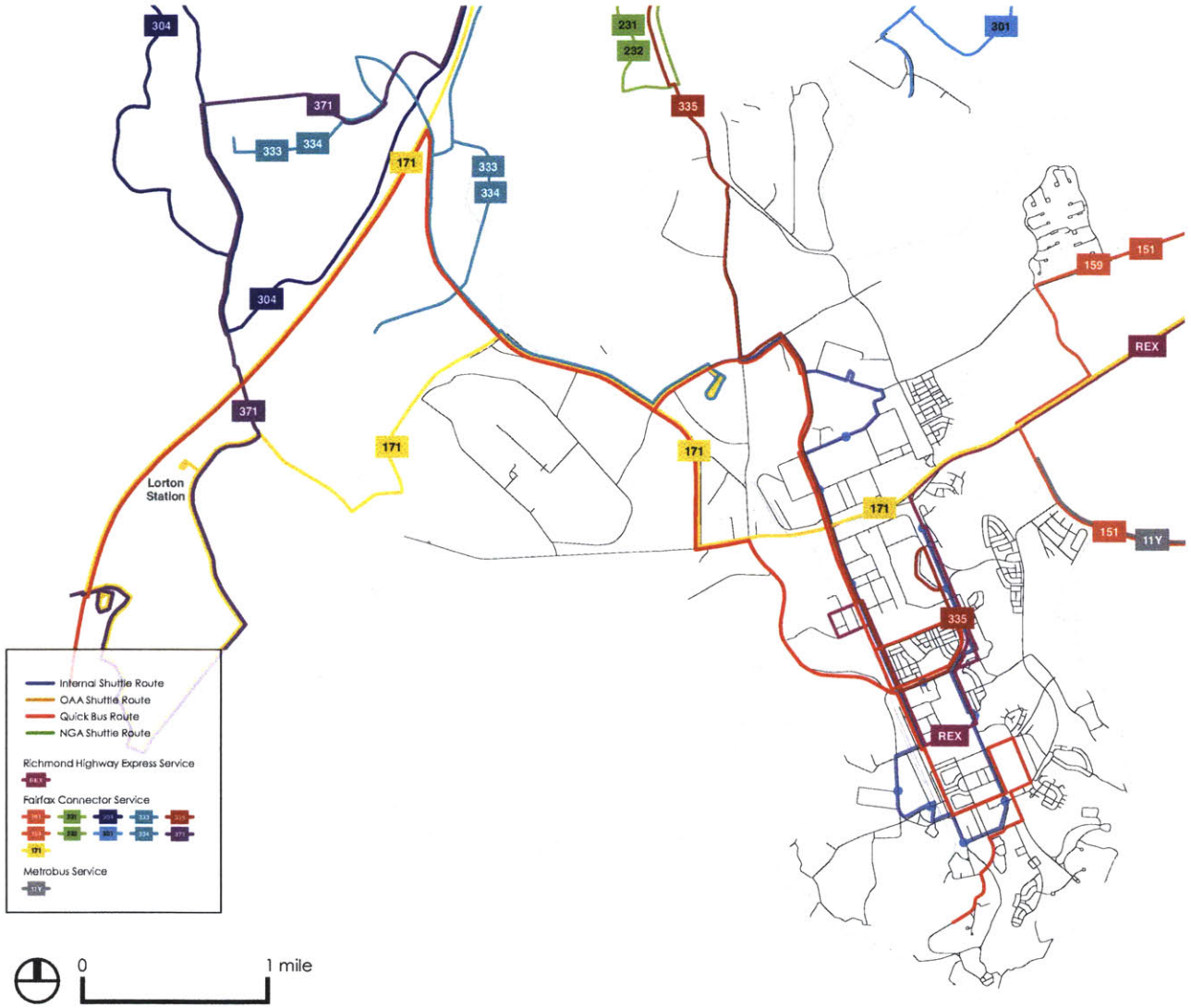

Figure 65. Transportation. Fort Belvoir is well served by commuter bus to major transit hubs. (Source: Fort Belvoir DPW and Fairfax County)

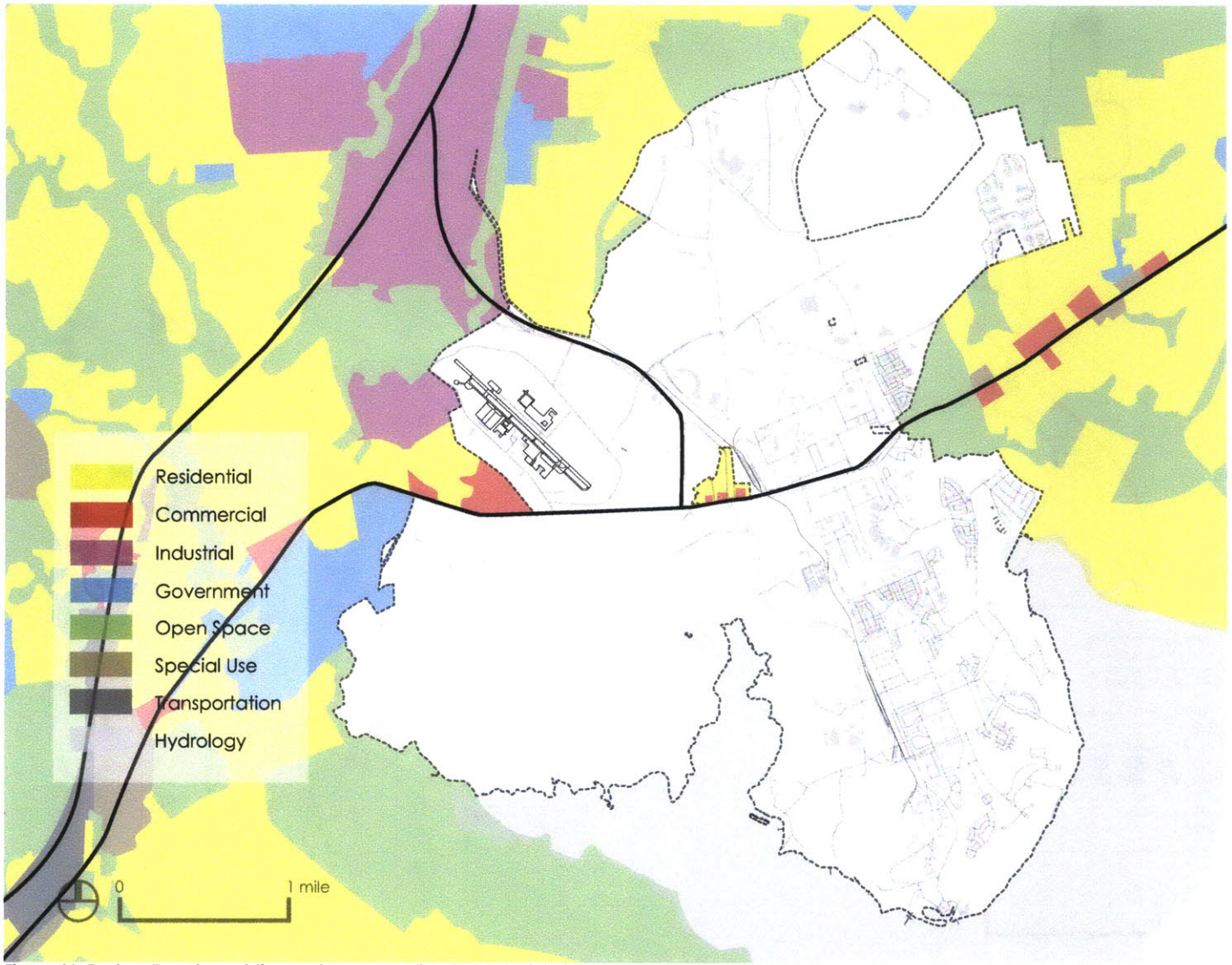

Figure 66. Zoning. Examine existing zoning surrounding Fort Belvoir to inform appropriate uses for EUL. (Source: Fort Belvoir DPW and Fairfax County)

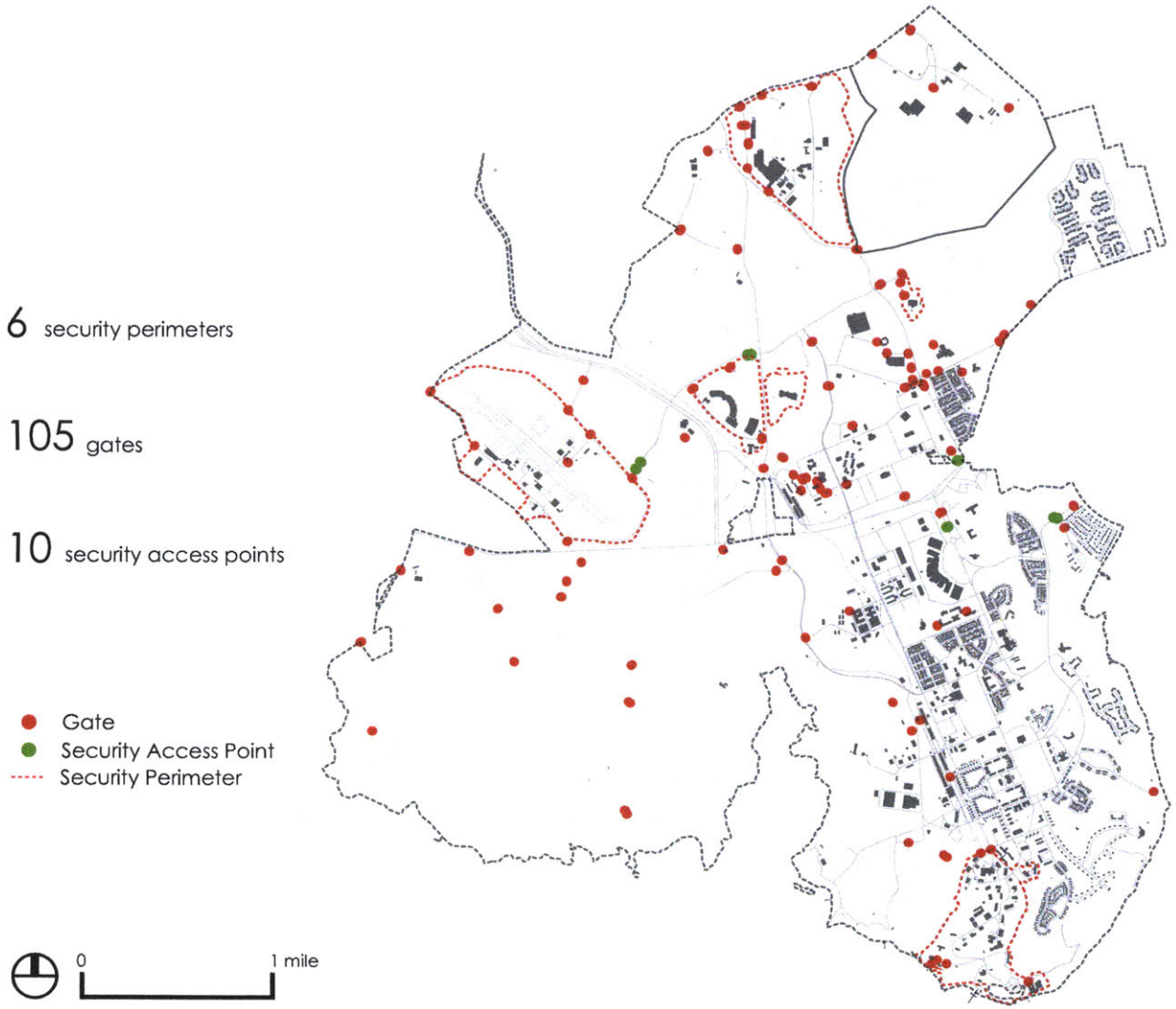

Figure 67. Access and Security. Fort Belvoir main access points are located off of US Route 1 that bisects the installation. (Source: Fort Belvoir DPW)

Process

This section outlines the process to develop the design. Research and analysis were synthesized and applied to the framework developed. The following figures 68 - 78 illustrate the process. The process follows three lines of efforts informing the redesign of Fort Belvoir. Parameters were tested to determine if the design accomplished the metrics established.

Landscape
Natural systems were zoned to identify major uses. These zones restore systems and hazardous sites, preserve habitats, reclaim forest and wetlands, and protect against flood risk on Fort Belvoir.

Shrinkage
Urban suitability analysis and landscape zoning are used to identify buildings that are candidates for removal. Building age, facility categorization, and location determine which buildings are removed. A debris analysis was conducted to determine the reuse and amount of the building materials and roadways.

Urban
A regulating plan was created from the area suitable for development. Clusters are identified based on installation types. New investments to the installation occur in these clusters. The installation is parceled and separated into Army and EUL uses. Parcels are then identified for development and a reserve is created for potential future growth.

Parameter	Goal
reduction in housing	75%
reduction in square footage	20%
increase in EUL	15%
increase in training area(s)	10%
reserve in buildable acreage	10%

1. catchment basin
2. microgrid infrastructure
3. wetland restoration
4. EUL along Route 1
5. relocate airfield
6. relocate and intertwine
7. species habitat
8. reuse historic properties
9. flood buffer
10. high value real estate

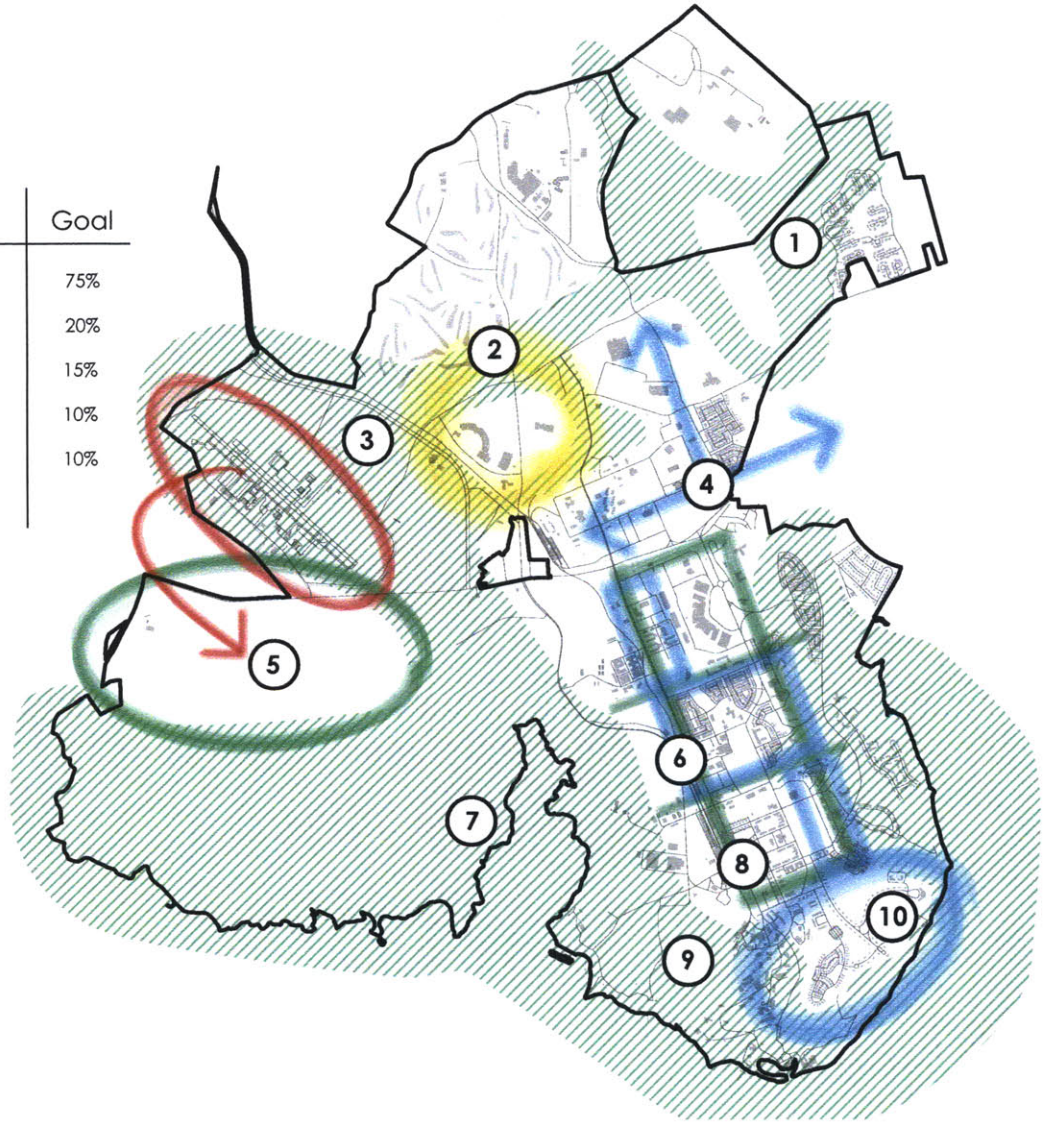

Figure 68. Conceptual Framework (Source: Fort Belvoir DPW)

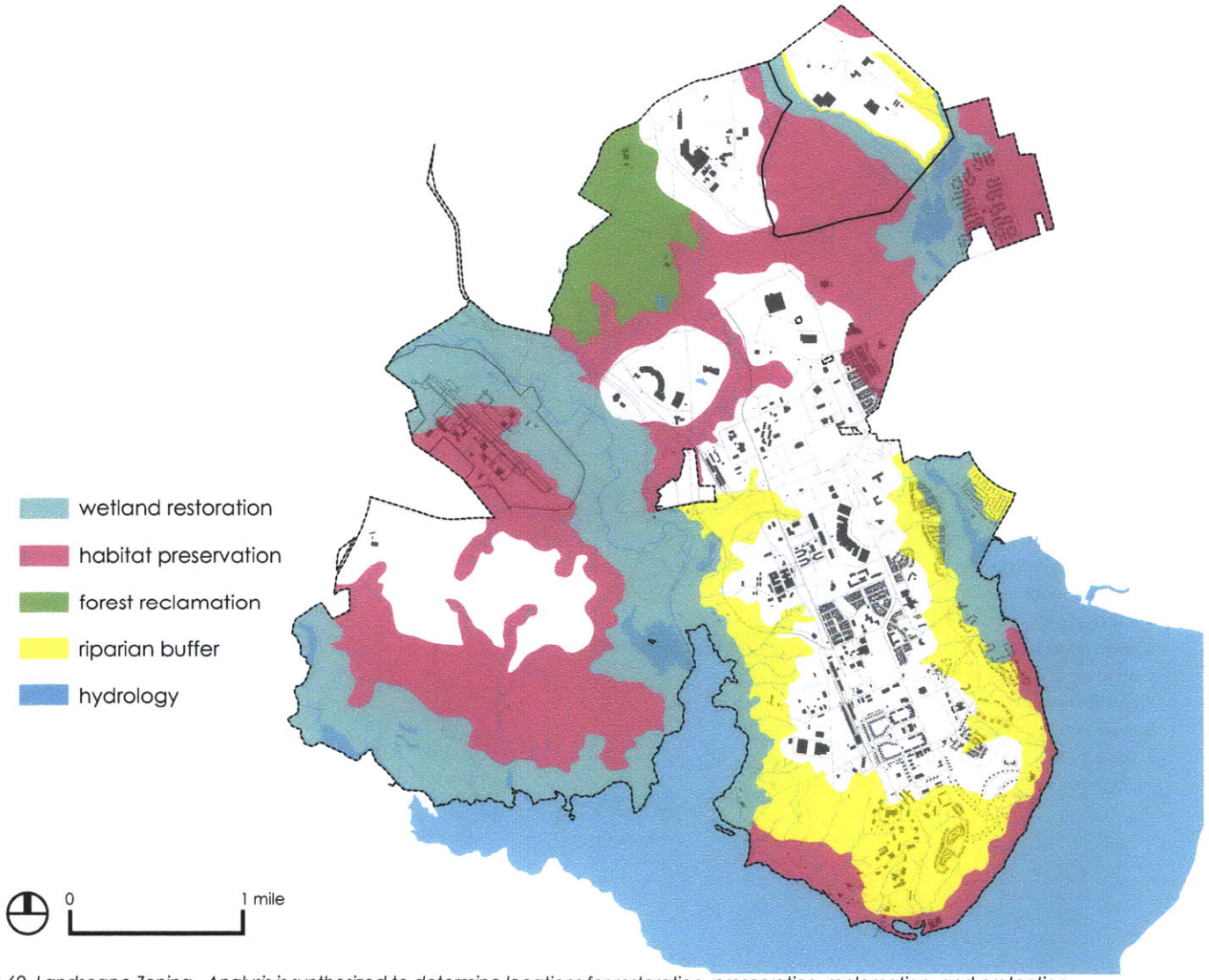

Figure 69. Landscape Zoning. Analysis is synthesized to determine locations for restoration, preservation, reclamation, and protection. (Source: Fort Belvoir DPW)

54% reduction in sq ft

2,087 buildings removed

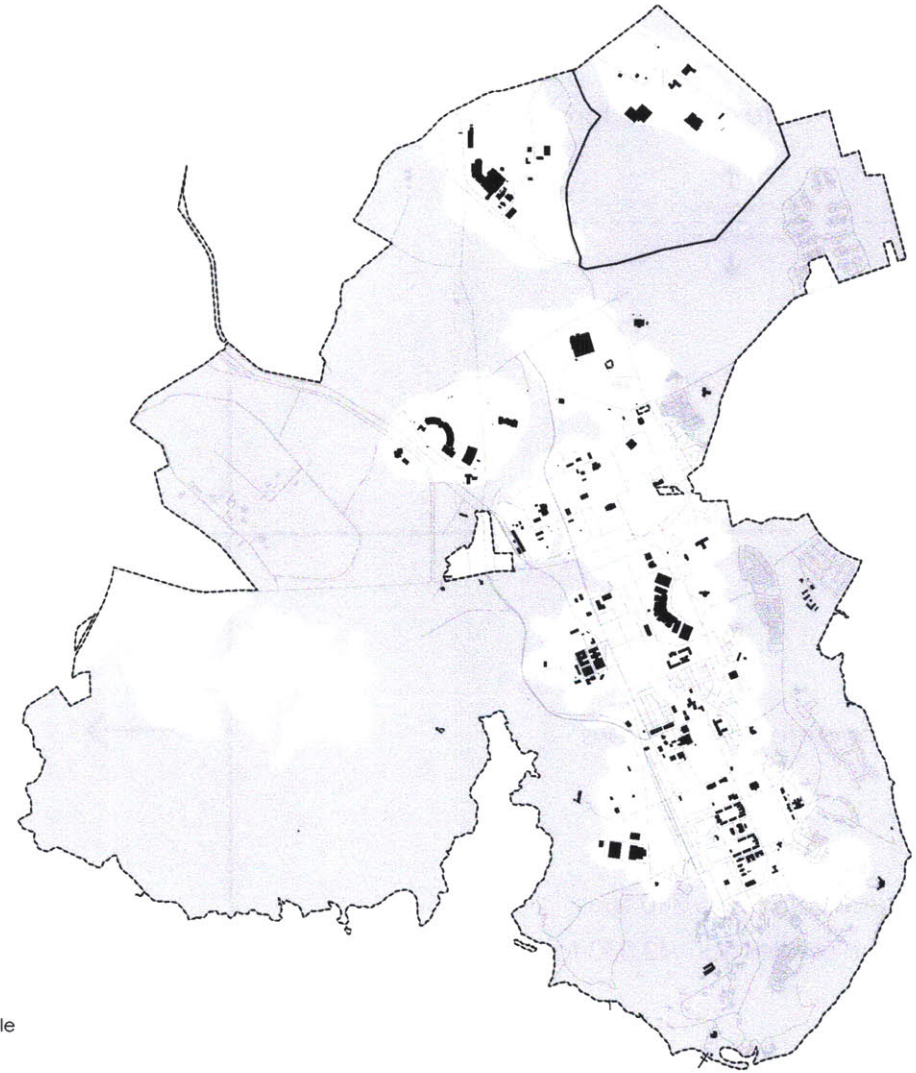

Figure 70. Shrinkage. Landscape Zoning is overlayed on the built environment to identify buildings for removal. There is also a significant portion of housing and services removed.
(Source: Fort Belvoir DPW)

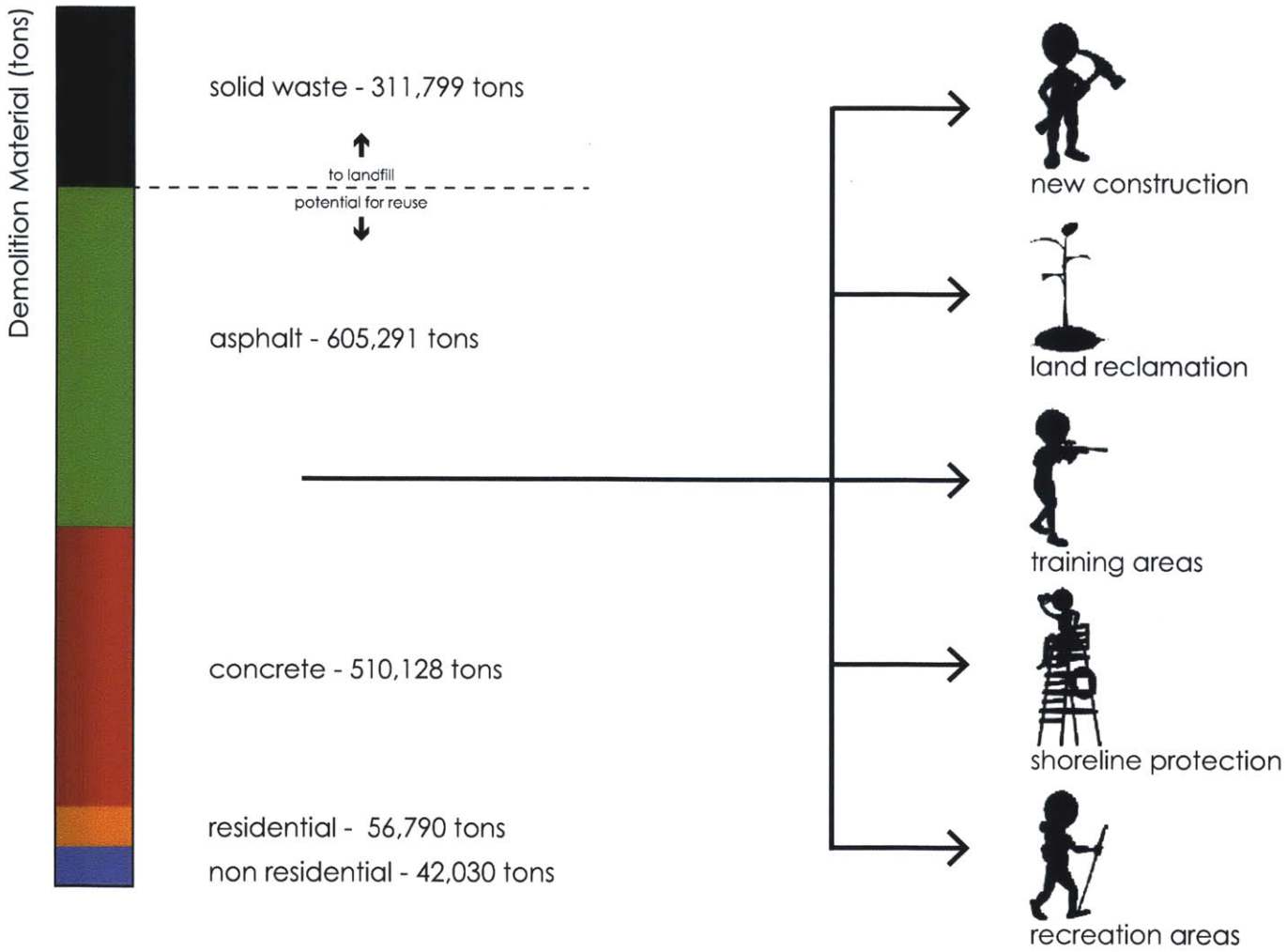

Figure 71. Debris Analysis. Demolition material calculated to determine recycled uses. (Source: Fort Belvoir DPW)

Figure 72. Regulating Plan. Fort Belvoir is parcelized and two major uses determined. New training areas were created or re-established. (Source: Fort Belvoir DPW)

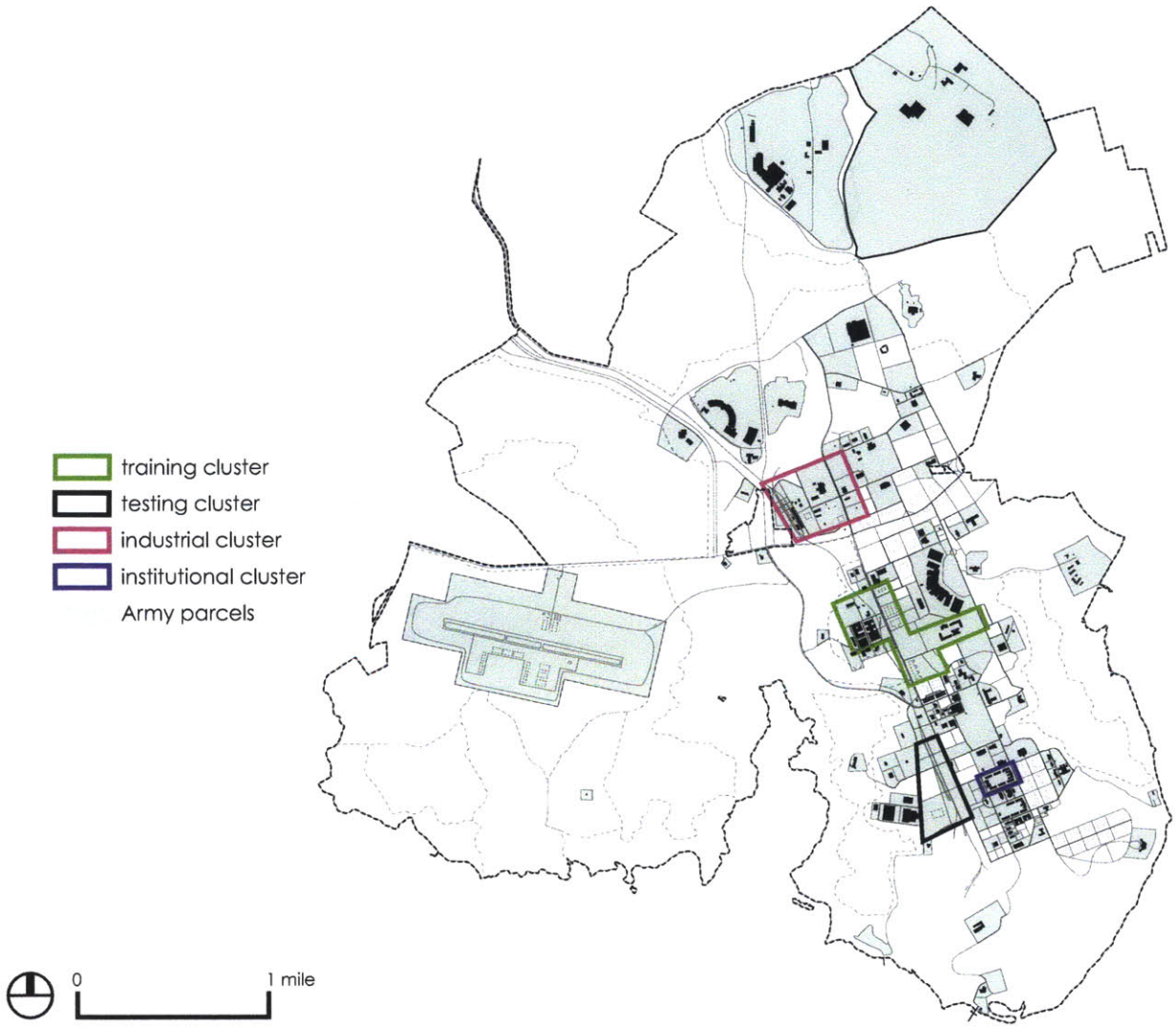

Figure 73. Army Use. Clusters of installation types are formed and a new airfield is built. (Source: Fort Belvoir DPW)

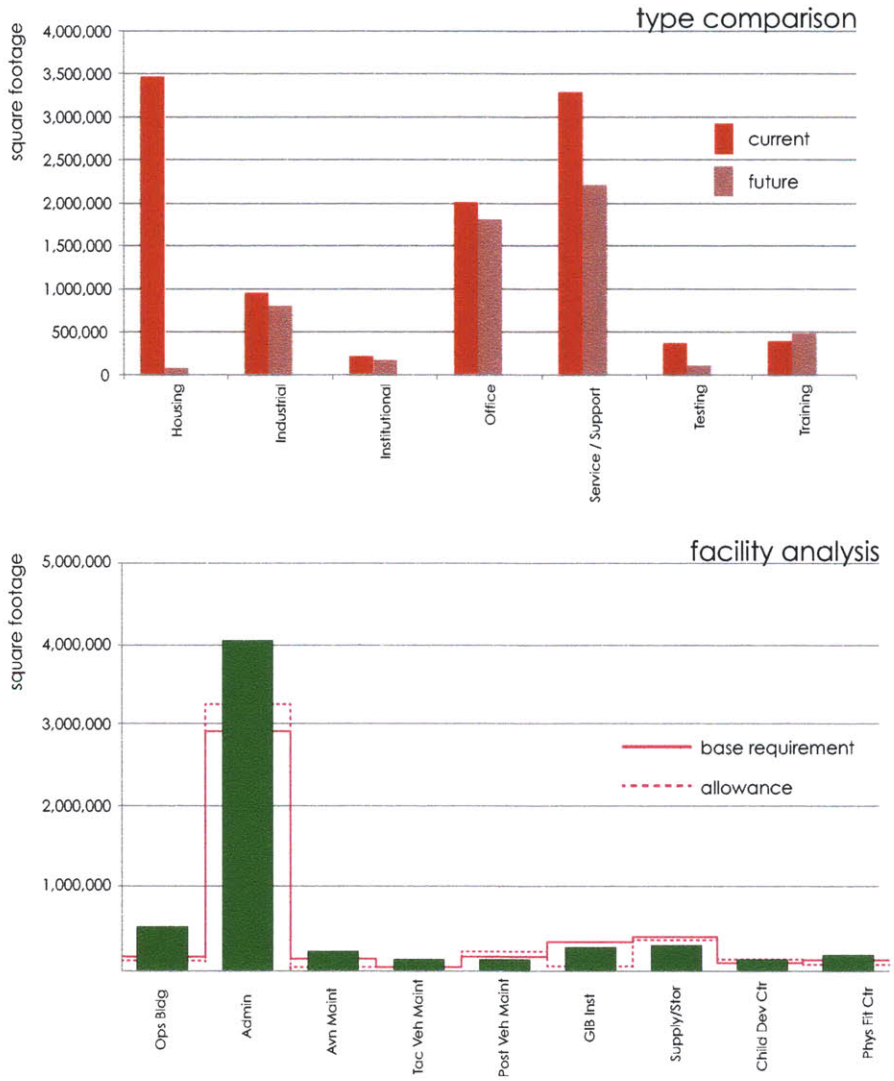

Figure 74. Updated Facility and Type Analysis. Reduction occurred across all types and facilities except for training type and operations facilities. (Source: Fort Belvoir DPW and Active Army Installation Quick Reference)

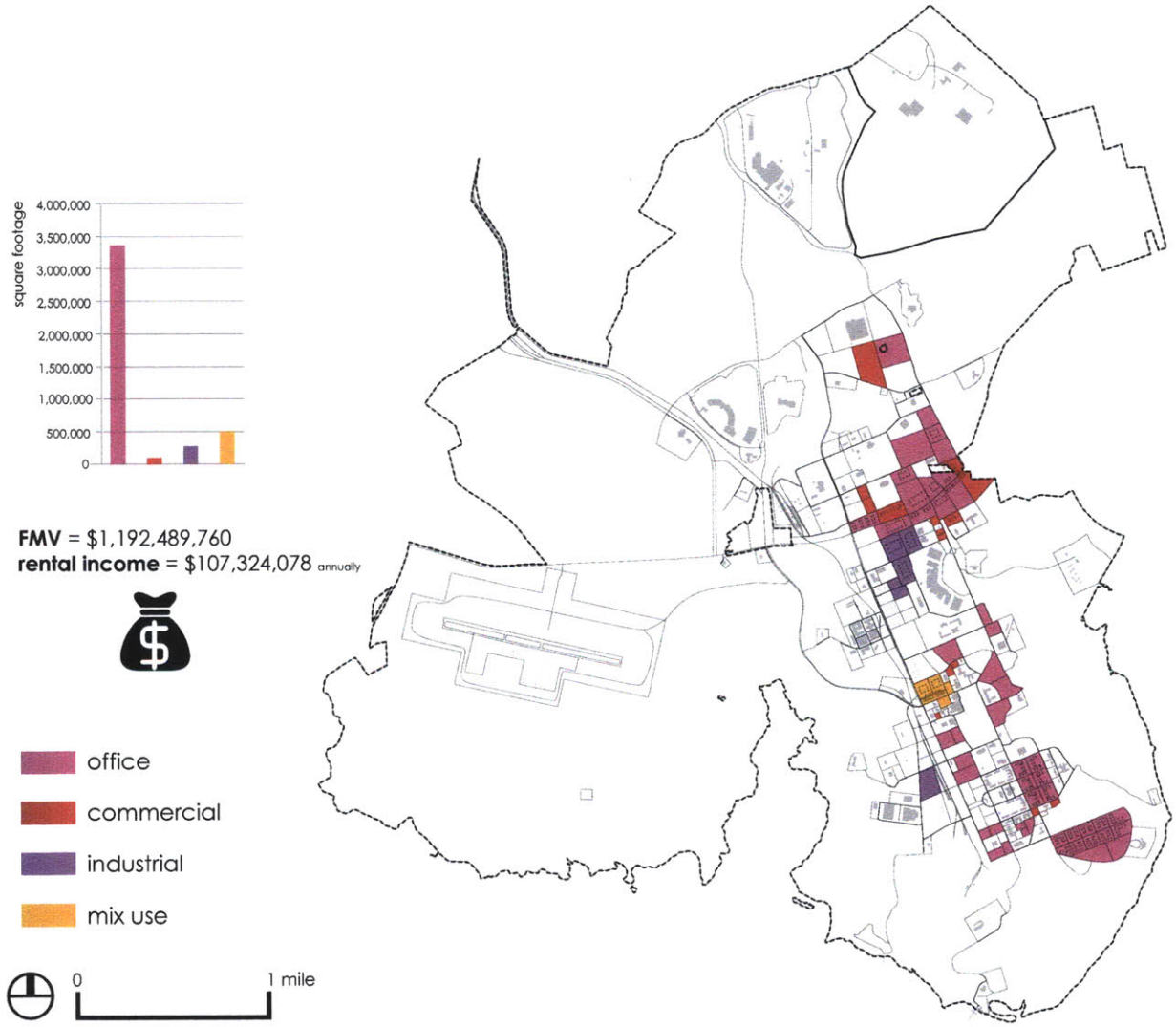

Figure 75. EUL Zoning. There is potential for significant revenue generation based on a moderate development proposal. (Source: Fort Belvoir DPW and Jones Lang LaSalle)

Figure 76. Urban. Parcels are identified for development and reutilization. This ensures a reserve for future potential growth. (Source: Fort Belvoir DPW)

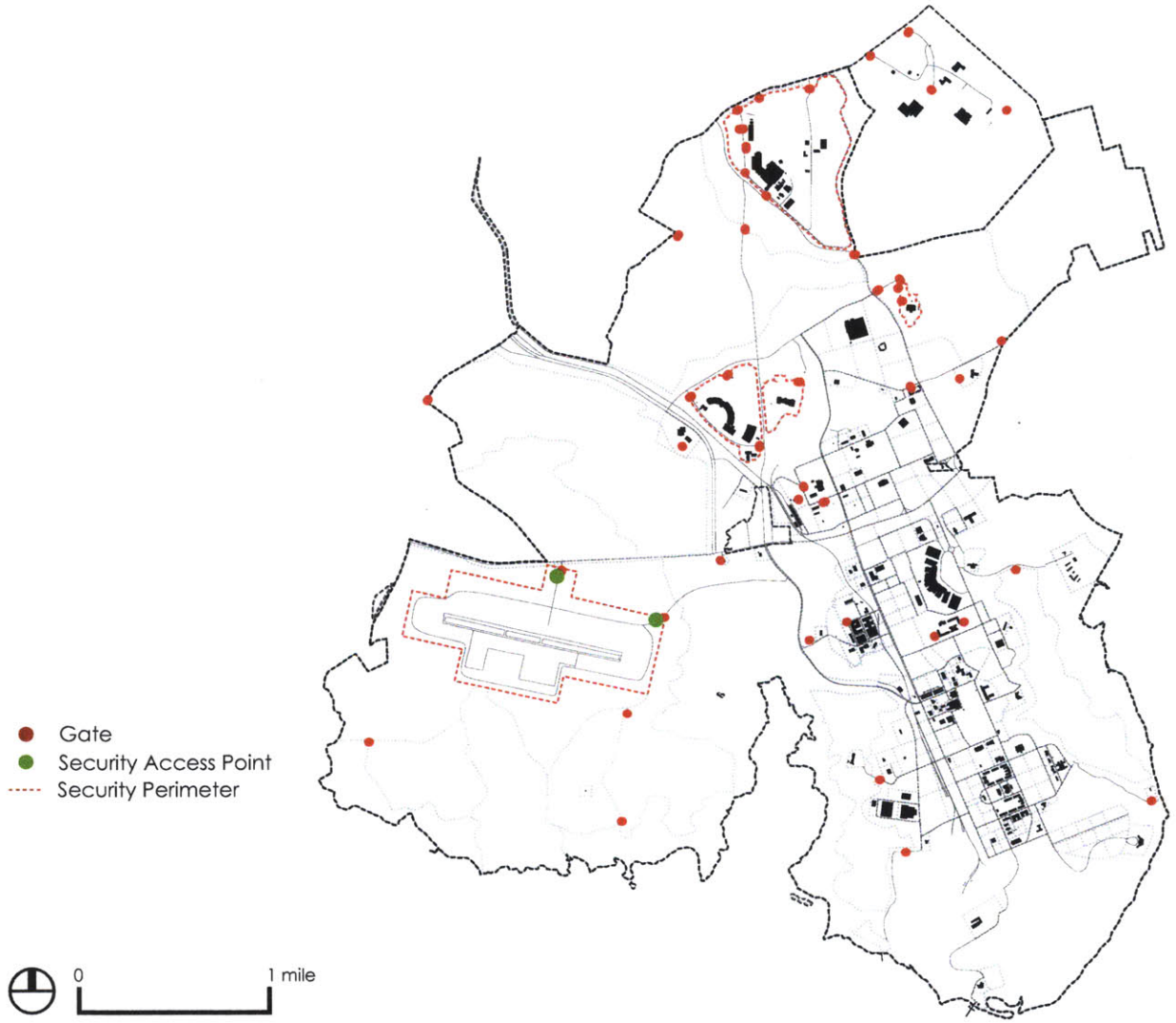

Figure 77. Access. Airfield and secured perimeters have controlled security access. Buildings have localized security access and gates restrict access when needed.
(Source: Fort Belvoir DPW)

Parameter	Goal	Result
reduction in housing square footage	75%	91%
reduction in square footage	20%	47%/24%
increase in EUL	15%	100%*
increase in training area(s)	10%	10.4%
reserve in buildable acreage	10%	16.7%

* substantial increase shown due to no prior EUL facilities or buildings

Figure 78. Parameters Tested. The design proposal successfully achieved established metrics.

The Plan

Figure 79. Site Plan. Rendered site plan of the design proposal. (Source: Fort Belvoir DPW)

Figure 80. Aerial Perspective. Rendered aerial view of the design proposal.
(Source: Fort Belvoir Community Hospital)

7. Conclusion

A successful design solution produced a version of the future of Army installations based on established parameters. A framework was established utilizing four urban design theories to effectively shrink Fort Belvoir, VA. Detailed research, analysis, and recommended changes informed the design. The framework and design process utilized provides transferability to all Army installations in the Continental United States. Masters Planners can apply these tools to generate successful solutions to shrink Army installations. It allows flexibility and ingenuity to develop results that are site specific. The configuration of the framework also serves to determine if an installation is a prime candidate for closure. Parameters and metrics allow Master Planners to determine if the goal of shrinkage is achieved.

Successful demonstration of this framework provides a tool for the field of Urban Planning to shrinking cities in the United States. The combination of theories prompt urban planners and urban designers to rethink singular constructs used in designs. The agglomeration of techniques illustrates how to utilize different strategies to solve complex problems. It further demonstrates that a multi-disciplinary approach to urban planning and urban design is necessary to effectively solve challenges faced by the field.

Recommendations

Army installations are going to shrink and the need for innovative and creative solutions to address the problem is imperative. Current Army planning practices do not account for this fundamental change from growth to loss. This thesis demonstrates a design proposal to effectively shrink installations and generate revenue for the Army. A future BRAC round will be utilized to start the process of shrinking Army installations. The Army needs to ensure that their planning approaches are not a singular construct. There are numerous conventional approaches to Urban Design and Master Planners should identify which approach best aligns with site-specific problems.

It is suggested the Army develop a design competition to generate innovative solutions. Design competitions provide a wide array of design solutions that would not be possible with current planning capacity. They result in high quality designs based on the design problem posed. Design competitions provide options for Army leadership to face the instrumental task of effectively and efficiently shrinking installations. The Department of Housing and Urban Development has organized many design competitions most notable 'Rebuild by Design' to generate solutions to complex problems. The competition should start with a request for qualifications and through this process a defined number of teams will advance. Selected teams will then conduct research and analysis of Army installations. The synthesis of the research and analysis results in teams identifying key design opportunities at one or several installations. Teams will then select a specific installations and develop schedmatic design solutions. Winning design solutions move toward design development and those teams oversee the implementation of shrinking the specific Army installation. This happens in synergy with the potential BRAC round 2017.

More research and analysis is needed to make sound decisions on the future of Army installations. A framework was provided that created design elements that have transferability across all CONUS installations. This design aims to challenge frames of reference concerning installations. It simplified the complexities of planning to look solely at the physical and natural systems. Thorough analysis was conducted, but numerous gaps in research exist. The future of Army installation will use a multi-disciplinary approach to provide decision makers with the requisite information to determine how the Army will shrink installation footprints.

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133 Mapping Data

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