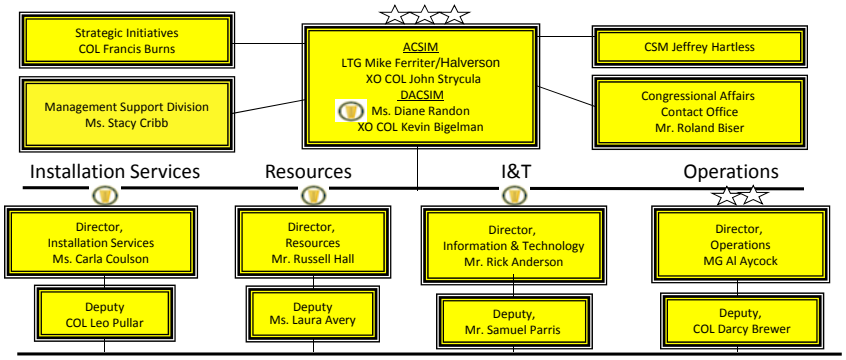
# Low Impact Development

## Office of the Assistant Chief of Staff for Installation Management

Bill Sproul, Construction Division, OACSIM



## Office of the Assistant Chief of Staff for Installation Management

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On Board Strength
Civilians 390 +/-
Military 55 +/-

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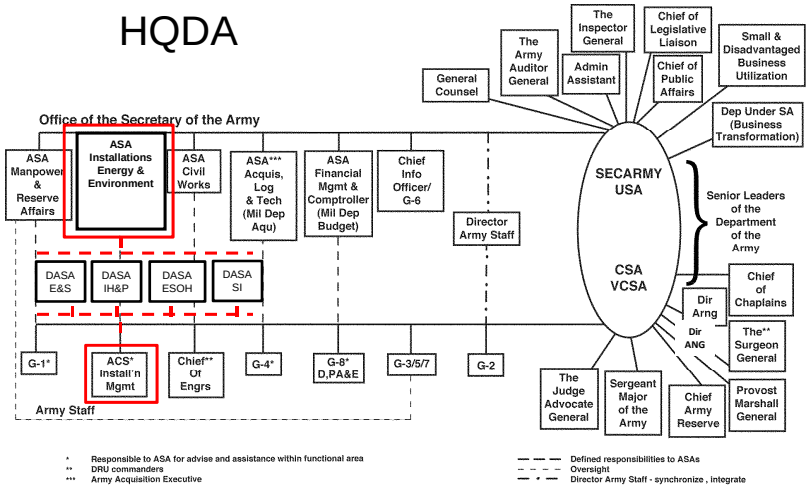
HQDA




Source: 2009-2010 of How the Army Runs



# Module 1 – Policy, Guidance and Integration of LID

# Learning Objective 1.1

## LID Policy and Guidance

# LID Policy

- Federal Legislation - Title 42, USC, Chapter 52, Section 17094, Section 438 Energy Independence and Security Act, December 2007
- OSD Policy - Memorandum, Deputy Under Secretary of Defense (Installations and Environment), 19 Jan 10, subject: DoD Implementation of Storm Water Requirements under Section 438 of the Energy Independence and Security Act (EISA)
- Army Policy - ASA(IE&E), Dec 16, 2013 Policy Memorandum titled Sustainable Design and Development Policy Update (replaces the Oct 27, 2010 memo)

# EISA Section 438

- Energy Independence and Security Act

  *"Storm water runoff requirements for federal development projects. The sponsor of any development or redevelopment project involving a Federal facility with a footprint that* ***exceeds 5,000 square feet*** *shall use site planning, design, construction, and maintenance strategies for the property to* ***maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property with regard to the temperature, rate, volume, and duration of flow.****"*



# OSD LID Policy

- EISA Section 438 requirements apply to projects that construct facilities with a footprint greater than 5,000 gross square feet, **or expand the footprint of existing facilities by more than 5,000 gross square feet**.
- The overall design objective for each project is to maintain predevelopment hydrology and prevent any net increase in storm water runoff. **DoD defines "predevelopment hydrology" as the pre-project hydrologic conditions** of temperature, rate, volume, and duration of storm water flow from the project site.
- Project site design options shall be evaluated to achieve the design objective to the maximum extent technically feasible.
- Prior to finalizing the design for a redevelopment project, DoD Components shall also consider whether natural hydrological conditions of the property can be restored, to the extent practical.
- Estimated design and construction costs for implementing EISA Section 438 shall be documented in the project cost estimate as a separate line item.
- The OSD LID Policy has been incorporated into **UFC 3-210-10 Low Impact Development**

# Army SDD Policy Update

- **Applicability**. This policy applies to all construction activities on Army installations (including government owned/contractor operated installations and tenant activities) regardless of funding source, **with the exception of DoD Medical [DoDM] funding and privatization initiatives.** This policy also applies to all Army funded construction activities regardless of location; at Joint Installations, the supporting Component guides all construction policy and guidance. For overseas construction activities on permanent basing and in support of contingency operations, this policy will apply to the greatest extent practical **considering mission objectives and Host Nation agreements.**
- **Effective Date**. The following policy will begin immediately for Sustainment, Restoration, and Modernization (SRM) projects, and with incorporation to the extent practicable for new construction/major renovations in FY2014 and full compliance in FY2015.
- **Storm Water Management**.
  - Site development for all projects of 5,000 ft2 or greater shall retain the pre-development site hydrology in accordance with EISA 2007 Section 438, UFC 3-210-10 (reference 1.l), and reference 1.m. These projects must be planned, designed, and constructed to manage any increase in storm water runoff (i.e., the difference between pre- and post-project runoff) within the limit of disturbance. Projects will maximize the use of existing site topography including soils, flora, slope, and hydrology to minimize site disturbance including clearing and soil grubbing activities. Documentation of the project's compliance with EISA 438 will be maintained in the project file and will be reported via the chain of command for annual SSPP reporting. Storm water management guidance and tools are available in reference 1.m. and at: http://www.usace.army.mil/Missions/Sustainability/HydrologyandLowImpactDevelopment.aspx.



# Army LID Implementation

- Army LID Implementing Guidance (Army Stormwater Management Using Low Impact Development) - *(Draft, Staffing for MG Aycock signature)*
- Army LID Technical User Guide - *(Introduction, policy and guidance; LID BMPS for Army installations; Implementing LID on Army installations; Hydrologic modeling and simulation; Design and construction considerations for common structural LID BMPs)*
- Army LID Planning Tool - *(Planning estimates for pre and post runoff volumes; Planning estimates for LID BMPs)*
- Army LID Cost Tool - *(Draft, Staffing cost tool through USACE)*
- Army LID Websites:

http://www.usace.army.mil/Missions/Sustainability/HydrologyandLowImpactDevelopment.aspx

https://mrsi.usace.army.mil/sustain/SitePages/CX/Hydrology%20LID.aspx

# UFC 3-210-10

- **UFC 3-210-10 Low Impact Development (15 Nov 2010)**
- Criteria and design standards for all DoD Construction in US
- Per EISA Section 438, DoD and Army Policy.
- A paradigm shift in design approach for stormwater management.
- The DoD has chosen to use the 95th percentile design storm event for determining the LID design volume.
- Any state and local requirements for stormwater management shall be met in addition to UFC requirements.

***"Sites with available land and good vegetative cover and soil conditions may see a net reduction in site civil construction costs."***



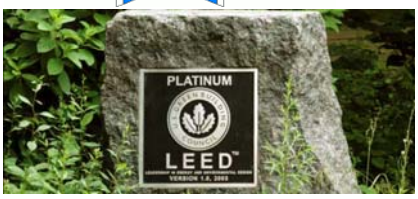
# ASHRAE Standard 189.1

- **Standard 189.1 provides a "total building sustainability package"** for those who strive to design, build and operate green buildings. From site location to energy use to recycling, this standard sets the foundation for green buildings by addressing site sustainability, water use efficiency, energy efficiency, indoor environmental quality, and the building's impact on the atmosphere, materials and resources. **ASHRAE Standards are required for LEED certification.**

- **Site hardscape requirements and invasive plant guidance is provided in Standard 189.1:**
  - To mitigate the urban heat island effect: 50% of site hardscapes must be shaded within 10 years of occupancy, have high solar reflectivity (e.g. white concrete), or be permeable pavement.
  - Invasive plants shall not be planted, and any existing invasive plants will be removed from site and disposed of in a land fill.

# UFC 1-200-01 and UFC 1-200-02

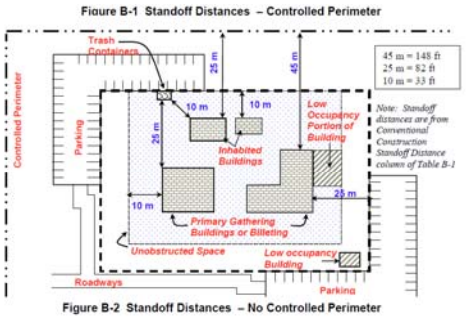
- **UFC 1-200-01 General Building Requirements (1 Sept 2013)**
- **UFC 1-200-02 High Performance and Sustainable Building Requirements (1 March 2013)**
- Applies to all new construction and renovation
- UFC 1-200-02 Goals
  - Life-cycle costs
  - Integrated design
  - Sustainable resources and environmental stewardship
  - Energy and water conservation
- In compliance with Federal Guiding Principles and achieve LEED Silver
  - Energy/water nexus

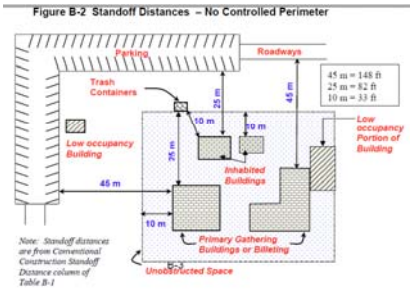





# UFC 4-010-01 and UFC 4-010-02

- **UFC 4-010-01 DoD Minimum Antiterrorism Standards for Buildings (1 Oct 2013)**
- **UFC 4-010-02 DoD Minimum Antiterrorism Standoff Distance for Buildings (9 Feb 2012)**
- Standards significantly impact LID implementation due to required setback distances.

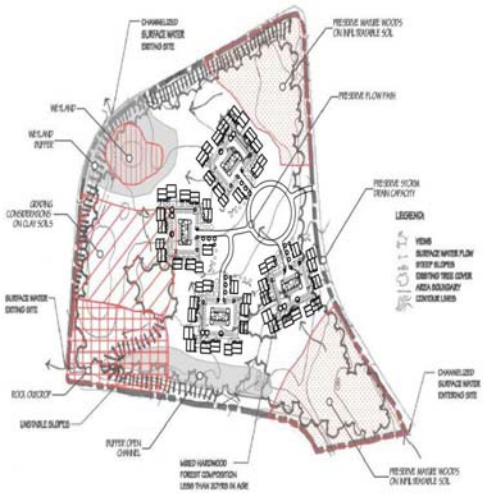


# UFC 2-100-01

- **UFC 2-100-01 Installation Master Planning (15 May 2012)**
- Integrate concepts of Low Impact Development into Master Planning practices

*"When developing plans defined in this UFC, minimize impervious surfaces and insure there is additional site area available to offset the increase in impervious areas associated with siting new facilities and structures."*





# Learning Objective 1.2

## Integrating LID

- Integrating LID techniques with existing policy and guidance

# Water Quality Concerns Driving LID

Annual Loadings to the Chesapeake Bay:

- 291 million pounds of nitrogen
- 13.8 million pounds of phosphorus
- 6.6 billion pounds of sediment

**Source: Chesapeake Bay Program, 2008 data*

Photograph from Low Impact Development Center

Satellite image by NASA

Photograph by Jane Thomas, IAN Image library

# Clean Water Act

- Restoration and maintenance of chemical, physical and biological integrity of Nation's waters.
- The EPA had changed its focus under the Clean Water Act to emphasize eliminating nonpoint source pollution through the National Pollutant Discharge Elimination System program (NPDES).
- As the NPDES program is often implemented by States, stormwater management must meet State and Local requirements (i.e., stormwater construction permits) as well as Section 438 of EISA.

# Executive Order 13423

E.O. 13423 requires Federal agencies to ensure new construction and major renovations comply with the 2006 Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding (MOU). It also requires that 15% of the existing Federal capital asset building inventory of each agency incorporate the sustainable practices in the Guiding Principles by the end of fiscal year 2015.

*Outdoor Water. Use water efficient landscape and irrigation strategies, including water reuse and recycling, to reduce outdoor potable water consumption by a minimum of 50 percent over that consumed by conventional means (plant species and plant densities).* ***Employ design and construction strategies that reduce storm water runoff and polluted site water runoff.***

# Executive Order 13514

E.O. 13514 expands the water efficiency and management requirements of E.O. 13423 and the Energy Independence and Security Act (EISA) of 2007. E.O. 13514 does not supersede either regulation, but does require Federal agencies to improve water efficiency and management by:

- Reducing potable water consumption intensity 2% annually through FY 2020, or 26% by the end of FY 2020, relative to a FY 2007 baseline.
- Reducing agency industrial, landscaping, and agricultural volumetric water consumption 2% annually, or 20% by the end of FY 2020, relative to a FY 2010 baseline.
- Identifying, promoting, and implementing water reuse strategies consistent with state law that reduce potable water consumption.

# Integrating LID w/Policy & Guidance

- Use of LID best management practices (BMPs) is the way the Army manages stormwater.
- Implementation of LID BMPs meets the intent of Federal legislation found in Section 438, Energy Independence and Security Act, DoD and Army Policy.
- Executive Order 13423 stipulates that all Federal land holding agencies are to be environmental leaders on Federal lands.
- The military has a stated conservation goal to promote compatible multiple uses of resources, and has been articulated by the National Defense Center for Environmental Excellence (NDCEE) and may be met by LID technologies.
- LID Approach meshes with the stormwater requirements of the CWA NPDES Phase II, which sets standards for stormwater management.
- MCA projects are to incorporate sustainability features, LID, renewal energy opportunities, and features to obtain LEED-NC/MR Silver rating.
- Maintenance and Repair (OMA-funded) projects are also required to incorporate sustainable and energy efficient features where possible. LEED NC/MR Silver rating is required for major renovation projects (PA > $7.5M). Other projects are to meet current policy requirements in the portion of the facility or system that is being renovated/repaired.



# Learning Objective 1.3

## Challenges to Implementing LID Policy

- Physical
- Technical
- Institutional

# Physical Challenges

- Site infeasibility
- Conflicts with landscaping requirements
- High groundwater table
- Expansive soils
- Shallow bedrock
- Karst topography
- Contaminated soils
- Site is too small for volume

# Technical Challenges

- Basic unawareness of principles and practices
- Inconsistent definitions and nomenclature
  - LID is big, LID is small
  - LID goes by many names
- Unknown risks
- Safety concerns
- Maintenance and durability
- Unknown life cycle costs

# Institutional Challenges

- UFC 1-200-01, General Building Requirements
- UFC 4-010-01, DoD minimum Antiterrorism Standards for Buildings
- Local ordinances discourage or can prohibit LID practices (e.g., water harvesting)
- Competing agency regulations (Water rights)
- American with Disabilities Act
- Lack of understanding the limitations of conventional stormwater management