



DPRI Program Overview: Sustainability & Stormwater Management

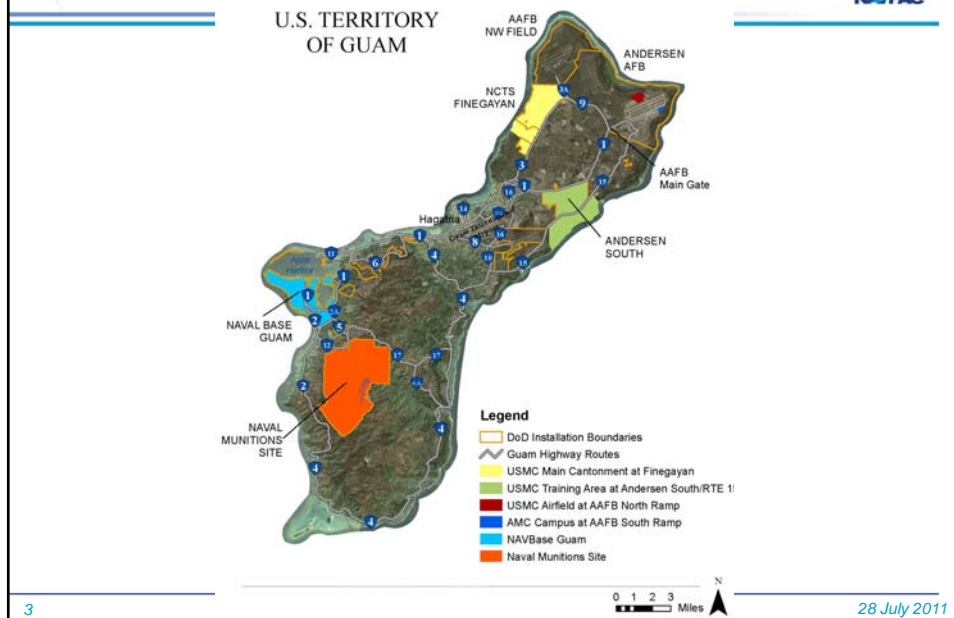
*Guam Stormwater Workshop
Steve Barker, NAVFAC PAC GPMO
28 July 2011*

Overview of DPRI Program



- **Defense Policy Review Initiative (DPRI) Program**
 - In accordance with an international agreement with GOJ, construct infrastructure to relocate 8,000 Marines & their families from Okinawa to Guam (part of the Guam Military Relocation Project).
 - In addition to the infrastructure required to support a Marine base, the DPRI construction program also includes construction of training facilities, wharf facilities, aviation support facilities, housing, improvements to existing facilities and infrastructure, including utilities and roads.
 - Major construction activities are expected to occur mostly in the northern region of Guam with waterfront facilities, training range, and utilities construction activities extending into central Guam.

Overview of DPRI Proposed Development



Sustainability and Stormwater Interrelated



- DPRI Sustainability and Stormwater Management Effort consists of:
 - The SSIM™ study used to develop the Sustainability Program
 - Mandate for LEED Silver (or Better) Rating for Buildings
 - Drainage and Flood Control Master Planning
 - Low Impact Development (LID) Implementation
 - For Construction Stormwater Management – Comprehensive Stormwater Pollution Prevention Plan (SWPPP) as part of construction NPDES Program for DPRI projects

4

28 July 2011

Sustainability Systems Integration Model (SSIM™)



■ DPRI Sustainability Program

- Developed to provide the new Marine Base on Guam with the greatest potential to achieve high performance, sustainable facilities that optimize energy savings and life cycle costs while complying with all applicable federal mandates.
- An opportunity to set the standard for base development in the 21st century.
- Program includes the following tasks:
 - Identify Unified Facilities Criteria (UFC) that adversely impacts sustainability efforts and propose alternative criteria to mitigate impacts.
 - Developed the Sustainable Systems Integration Modeling (SSIM™).
 - Integrate sustainability into the Master Plan including LID principles.
 - Integrate LEED requirements in the Master Plan.
 - Advanced Metering Initiative to measure, monitor, report and adapt

5

28 July 2011

Sustainability Systems Integration Model (SSIM™)



Goals and Objectives

- Reduce total ownership costs of Facilities
- Improve Energy Efficiency and Water Conservation
- Provide safe, healthy and productive built environments
- Promote Sustainable Environmental Stewardship

Guiding Principles

- Employ Integrated Design Principles
- Optimize Energy Performance
- Protect and Preserve Water
- Enhance Indoor Environmental Quality
- Reduce Environmental Impact of Materials

6

28 July 2011

Sustainability Policies & Guidelines



- **Federal DoD Policies**
 - Energy Policy Act (EPAAct) of 2005
 - Guiding Principles MOU (2006)
 - Energy Independence and Security Act (EISA) of 2007
 - Executive Order 13423 (January 24, 2007)
 - Engineering & Construction Bulletins
 - Executive Order 13514 (October 5, 2009)
- **Local Water and Energy Policies**
 - Joint Region Marianas (JMR) Energy Instruction 4100.1
 - NAVBASE Guam Energy instruction 4100.1
 - NAVBASE Guam Water Conservation Instruction 11330.1

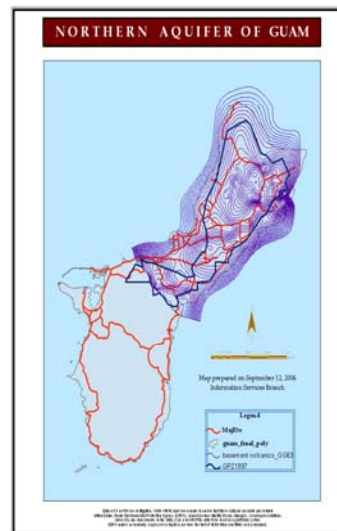
7

28 July 2011

Potential Water Strategies



- **Interior Water Demand Reduction:** Low flow fixtures
- **Interior Water Reuse:** Collect and reuse condensate water and reuse gray water
- **Exterior Water Demand Reduction:** Low demand landscaping and no Landscape Irrigation
- **Exterior Water Reuse:** Rooftop rainwater harvesting
- **Low Impact Development (LID) and Stormwater:**
 - Porous Pavement
 - Rainwater Gardens & Bio-retention Areas
 - Dry bio-swales
 - Stormwater Detention/Retention
 - Groundwater Recharge



8

28 July 2011

Potential Energy Strategies



Improved passive building performance

- High performance façade solutions, including the use of high performance glazing systems and solar shading
- Building envelope / air tightness

Efficient Plant and Controls

- High efficiency HVAC systems
- High efficiency lighting solutions

Exterior Lighting

- Induction lighting
- Solar lighting for parking lots

Renewable Energy

- Photo Voltaic (PV), roof integrated
- Passive solar hot water heating
- Other considerations: geothermal, sea water air conditioning (SWAC), and wind

Hot Water Reduction Measures

- Low Flow Fixtures

Appliances

- Energy Star® - Rated refrigerators, dishwashers, and washers

9

28 July 2011

Green Building/Potential LEED Strategies



Goal - All qualified buildings receive a minimum LEED SILVER certification as federally mandated (EPA Act 2005)

Sustainable Site:

- Smart Growth
- Maintain predevelopment hydrology to maximum extent technically feasible
- Rainfall managed onsite through:
 - Bio-retention
 - Permeable Pavement

Water Efficiency:

- Use low flow rated plumbing fixture use 20 to 30% less potable water
- Water efficient landscaping and no outdoor irrigation

Energy and Atmosphere:

- Building design to achieve 30% below current energy consumption on Guam
- Generate renewable energy electricity (50% by 2020)
- 30% of HWD provided by solar (EISA 2007)

10

28 July 2011

Comprehensive Drainage & LID Study



- LID Integration – *Comprehensive Drainage and Low Impact Development Implementation (LID) Study* provided basis for LID strategies for the SSIM™ water model :

(Note – A separate Drainage and Flood Control Master Plan is currently in progress)

- For the Finegayan Main Cantonment, the goals for sustainably management of the water resources under a LID implementation strategy are to convey, treat, and store stormwater flows; protect public health, safety and existing infrastructure; and to treat and infiltrate stormwater to recharge and protect the underlying aquifer.
- LID Study established in accordance with Federal Leadership in High Performance and Sustainable Building MOU to allow full flexibility in the integration of stormwater elements into the urban and landscape design.

11

28 July 2011

LID DoD Guidance & Standards



- **USEPA Guidance on Implementing 438, Dec 09**
 - Retain on-site 95th percentile storm event
 - 2.2 inches for Guam (< 1 year storm)
- **Unified Facilities Criteria (UFC):**
 - LID (3-210-10, 3-210-10N)
 - Civil Engineering (3-200-10N)
 - Drainage In Areas other than Airfields (3-230-17FA)
 - Sustainable Development (4-030-01)
- **UFC requires following “local standard”**
 - 2006 CNMI and Guam Stormwater Management Manual (governs) - retain difference between pre- & post-development peak flows for 25-year storm event
 - 1980 USACE Guam Storm Drainage Manual (reference/resource)

12

28 July 2011

Finegayan LID Study



Comprehensive Drainage and Low Impact Development (LID) Implementation Study, dated April 2010

- Focused on LID-scale storms and development of IMP treatment to address water quality
- Addresses many stormwater management concerns
- Modeled a variety of rainfall events
- Developed notional drainage routing and detention basin siting based on notional grading and the Sept 2009 Development Plan

LID Study Guidance Principles Used:

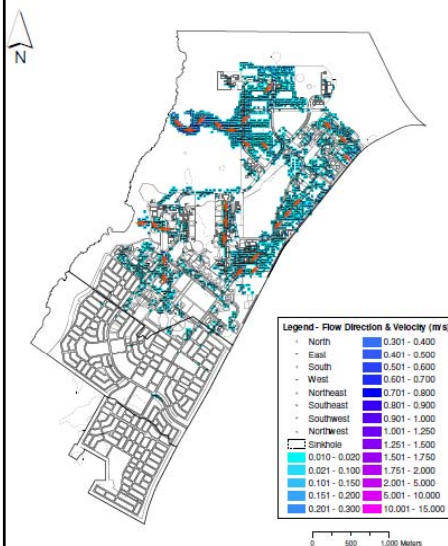
- Maintain, to maximum extent technically feasible, the predevelopment hydrology regarding the temperature, rate, volume, and duration of flow.
- Integrating water management measures into the development form and landscape to ensure efficient use of landscape spaces while maximizing the visual amenity.
- Protecting groundwater quality by pre-treating stormwater flows, as appropriate, utilizing vegetation for water quality enhancement.
- Maximizing water harvesting for non-potable uses.

Followed by the "Drainage and Flood Control Master Plan" currently in progress

13

28 July 2011

Sample Model Output – 95th Percentile Storm Runoff



- Model of Post-Development Stormwater Runoff from 95th Percentile Rainfall Event (2.2")
- 2.2" Storm is the LID Design Criteria
- Illustrates the degree of runoff that will be captured by onsite BMPs

14

28 July 2011

LEED Stormwater Credits



- All Base Buildings to Achieve at least LEED Silver Rating
- Two Stormwater Credits to Consider:

CREDIT 6.1 STORMWATER DESIGN—QUANTITY CONTROL

1 POINT

Intent: To limit the disruption of natural hydrology by reducing impervious cover, increasing onsite infiltration, reducing or eliminating pollution from stormwater runoff, and eliminating contaminants.

Requirement: Post-development stormwater must not exceed predevelopment peak discharge rate and quantity for 1- and 2-year, 24-hour design storms (for sites with 50% or less existing impervious cover).

There are good opportunities to achieve this credit as LID BMPs will be designed to capture most of the post-development 1-yr Storm.

CREDIT 6.2 STORMWATER DESIGN—QUALITY CONTROL

1 POINT

Intent: To limit disruption and pollution of natural water flows by managing stormwater runoff.

Requirement: Reduce impervious cover, promote infiltration and capture, and treat stormwater runoff from 90% of average annual rainfall using BMPs. The BMPs must remove 80% of the average load of annual total suspended solids load after development based on existing monitoring reports.

There are good opportunities to achieve this credit as LID BMP Treatment Trains will be designed to target >95% removal of TSS for the 95th Percentile Storm.

15

28 July 2011

Construction Stormwater Management – DPRI Comprehensive Construction SWPPP



The Comprehensive SWPPP, dated September 2010, was developed by NAVFAC PAC GPMO to address USEPA's concerns related to stormwater management during development and construction related to the Military buildup on Guam.

This Comprehensive Construction Stormwater Pollution Prevention Plan (Comprehensive SWPPP) is a Construction Stormwater Management Plan for the DPRI Program.

This Comprehensive SWPPP provides a DPRI program-wide approach and consistency on stormwater management during construction.

This Comprehensive SWPPP is referenced in the DPRI construction specifications under Division 1 - General Requirements, Section 01 57 19.00 20, Temporary Environmental Controls.

16

28 July 2011

DPRI Comprehensive Construction SWPPP



Construction Contractors are also required to prepare their own Site-Specific SWPPP in accordance with the USEPA Construction General Permit (CGP) and the Comprehensive SWPPP.

Requirement for the Site-Specific SWPPP is provided in the USEPA CGP. A template is available on USEPA's website at

<http://cfpub.epa.gov/npdes/stormwater/swppp.cfm#template>

The Site-Specific SWPPP must be prepared prior to filing of the Notice of Intent (NOI) to seek NPDES permit coverage under the CGP. After obtaining Navy-approval, a courtesy copy of the Site-Specific SWPPP must be uploaded onto the Guam EPA e-permits website.

17

28 July 2011

DPRI Comprehensive Construction SWPPP



- For each project, construction contractors and the Navy will file the NOI electronically with USEPA at least 7 days prior to start of construction activities. The Contractor must have a Navy-approved Site-Specific SWPPP prior to filing of the NOI.
- The Site-Specific SWPPP must be routinely updated and reflect changes in the BMPs such as sediment, erosion, and pollution prevention control measures, as the project progresses.
- The Site-Specific SWPPP must be kept on-site and made available to the Navy, USEPA and regulatory agencies.

18

28 July 2011

DPRI Comprehensive Construction SWPPP



Contractor Stormwater Management Requirements

Phase 1 - Pre-Construction

Attend pre-construction meeting to discuss stormwater compliance
Prepare Site-Specific SWPPP for Navy review
Provide SWPPP training to workers and subcontractors
The Contractor must have a Navy-approved Site-Specific SWPPP prior to filing of the NOI
File the NOI electronically with USEPA at least 7 days prior to start of construction activities
Provide a courtesy copy of the Navy-Approved Site-Specific SWPPP to GEPA via E-permitting website

Phase 2 - Construction

- Perform routine BMP maintenance (very important)
- Conduct weekly SWPPP/BMP inspections and within 24 hours of a storm event
- Discuss BMP issues at weekly QC meetings
- Update SWPPP/BMP maps & plans
- Provide SWPPP training
- Provide non-compliance notices & reporting to the Navy

Phase 3 - Post-Construction

- Maintain BMPs until final stabilization
- Upon completion of construction & acceptable site stabilization (final site acceptance by the Navy), file Notice of Termination (NOT) with USEPA

19

28 July 2011

Questions?

Steve Barker, NAVFAC PAC GPMO
PW Team Leader

Stephen.Barker@navy.mil

20

28 July 2011