

Master Planning for Resiliency and Sustainability through Net Zero Modeling

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Schofield Barracks Sustainability Plan
U.S. Army Garrison - Hawaii

Sustaining Natural Resources and Mission Readiness

REDUCTION

Category	Reduction Percentage
energy	59%
water	91%
waste	72%
stormwater runoff	47%

achieved by master plan

Installation Sustainability Component Planning:
Helping military installations achieve Net Zero goals to reduce energy and water consumption, waste, and stormwater runoff

US Army Center of Excellence
US Army Corps of Engineers



Presentation Purpose

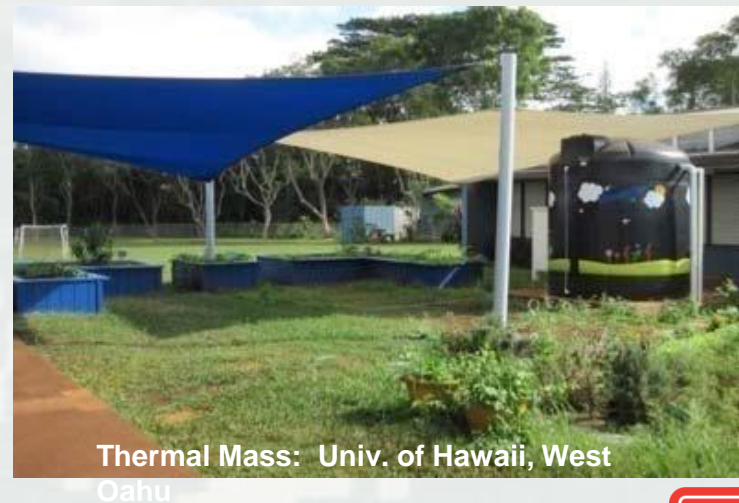
Purpose:

Demonstrate MODELING tools formulate **(Sustainability Component Plan - SCP)** for energy, water, and waste reduction and resource conservation.

Illustrate how USACE developed planning modeling process can be Leverage to formulate comprehensive, living solutions that create effective results to meet federal mandates.

CASE STUDY: KoleKole District
Sustainability Component Plan at
Schofield Barracks, USAG-HI.

Winner of the NAEP Excellence Award (2015) and APA
Sustainability Award (2015.)



Presentation Agenda

- Background
- Sustainability Component Plan using Net Zero Planner
- Path forward using integration
- Technology transfer



Master Planning DoD Policy Response

UFC 2-100-01 Installation Planning/ planning strategies



- 1) Form-Based Coding
- 2) Area Development Planning
- 3) **Sustainable Development**
- 4) **Sustainable Building Design**
- 5) Natural and Cultural Resource Preservation
- 6) Planning for Healthy Communities
- 7) Critical Infrastructure Risk Management (CIRM)
- 8) AT/FP
- 9) Facility Standardization
- 10) Spatial Data Management



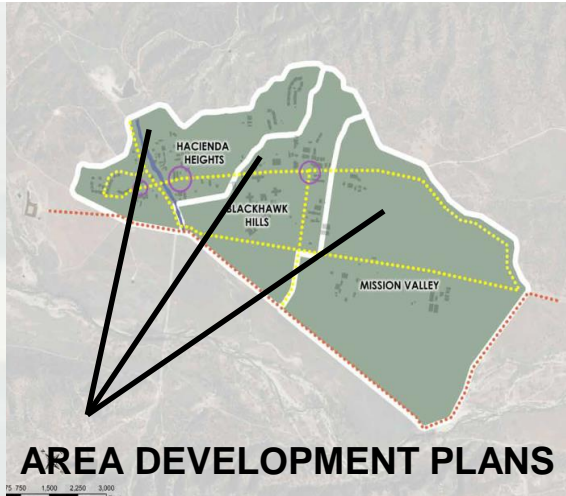
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Master Planning Methodology and Product

UFC 2-100-01 Installation Planning/ planning strategies

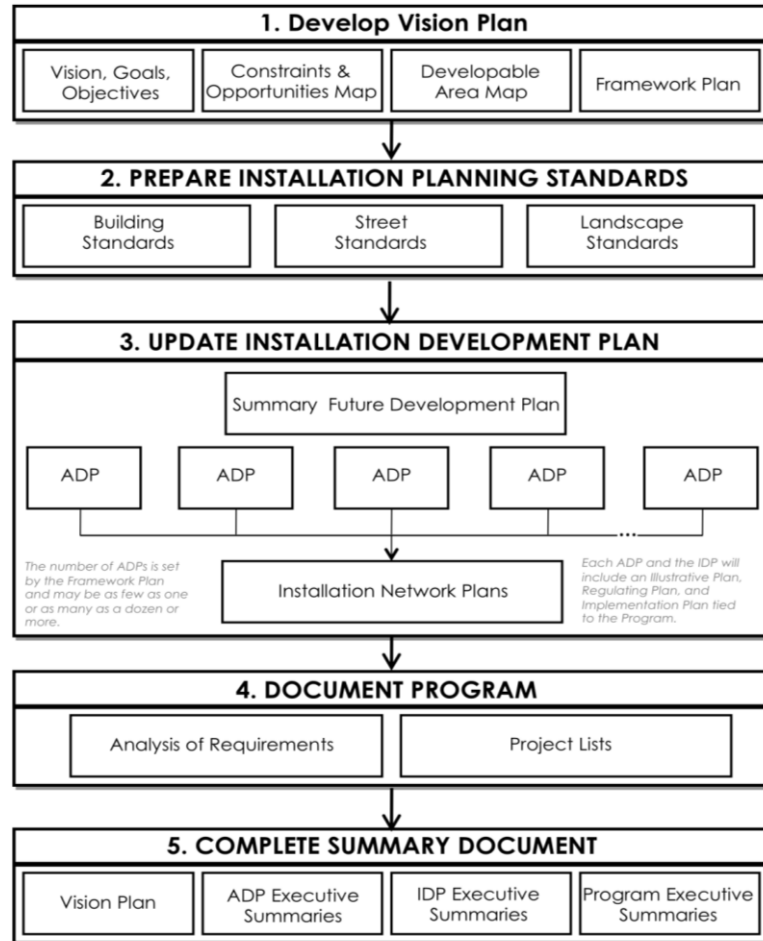
FT HUNTER LIGGETT FRAMEWORK PLAN



AREA DEVELOPMENT PLANS

- Establish the Vision
- Collect & Analyze data
- Develop Goals & Objectives
- Develop & Evaluate Alternatives
- Select & Evaluate Alternatives
- Implement Plan
- Monitor/ Amend Plan

MASTER PLANNING PROCESS



Area Development Plan – Kolekole, Schofield Barracks



Capacity Calculations
 Total New Building Area at Minimum Building Height: 5,033,050sf
 Total New Building Area at Maximum Building Height: 11,030,896sf
 Total Demolished Building Area: 3,171,349sf
 Total Demolished Housing: 3,629 units

Total New Parking Required w/ 20% Mass Transit Reduction (min): TBD
 Total New Parking Required w/ 20% Mass Transit Reduction (max): TBD

Total Existing Parking: 6,344 spaces
 New Car Park Spaces: TBD
 New On-Street Parking: TBD
 Demolished Parking: TBD

Schofield Barracks Kolekole ADP Illustrative Plan

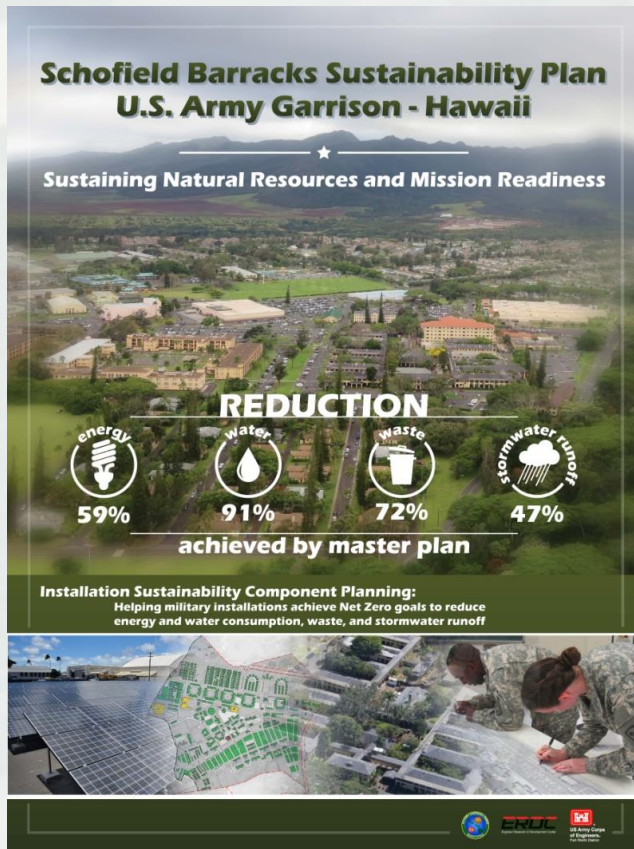
- Installation Boundary
- Topography - 1ft Contours
- New Building
- Existing Building
- Quads / Parks
- Natural Open Space
- Existing Tree
- New Tree
- Demolished Building
- Tactical Pavement / Parking / Staging

- A Barracks: 60 Bldgs. 9,650sf / flr total (2-4 flr)
- B Battalion Motorpool Complex
- C TEMF: 28,600sf / flr (1-2 flr)
- D TEMF: 28,600sf / flr (1-2 flr)
- E TEMF: 47,800sf / flr (1-2 flr)
- F TEMF: 21,300sf / flr (1-2 flr)
- G Flex-Use: 25,000sf / flr (2-4 flr)
- H Flex-Use: 24,400sf / flr (2-4 flr)
- I Flex-Use: 24,400sf / flr (2-4 flr)
- J Flex-Use: 17,250sf / flr (2-4 flr)
- K Flex-Use: 17,250sf / flr (2-4 flr)
- L Flex-Use: 49,400sf / flr (2-4 flr)
- M Flex-Use: 24,400sf / flr (2-4 flr)
- N Flex-Use: 24,400sf / flr (2-4 flr)
- O Flex-Use: 24,400sf / flr (2-4 flr)
- P Flex-Use: 24,400sf / flr (2-4 flr)
- Q TEMF: 2 Bldgs. 33,200sf / flr total (1-2 flr)
- R Organizational Storage: 4 Bldgs. 9,000sf / flr total (1-2 flr)
- S Admin: 2 Bldgs. 11,200sf / flr total (2-4 flr)
- T COF: 2 Bldgs. 80,000sf / flr (1-2)
- U Gym: 42,600sf / flr (2-3)
- V DFAC: 16,800sf / flr (2-3)
- W Flex-Use: 24,700sf / flr (2-4 flr)
- X Flex-Use: 24,700sf / flr (2-4 flr)
- Y Boulevard
- Z Roundabout
- AA Boulevard
- BB Bldg. 1492 Expansion: 5,000sf / flr (2-4 flr)
- CC Flex-Use: 41,000sf / flr (2-4 flr)
- DD Gym: 36,000sf / flr (2-3 flr)
- EE Flex-Use: 55,400sf / flr (2-4 flr)
- FF Flex-Use: 53,700sf / flr (2-4 flr)
- GG Flex-Use: 31,200sf / flr (2-4 flr)
- HH Park / PT Space
- II Town Square



Sustainability Component Plans (SCPs) – Schofield Barracks

Technology: Plans focus on meeting mission changes and development goals while cutting energy, water, and waste footprint.



2015 Sites – 28 Sites

Presidio of Monterey (POM)
Parks Reserve Forces Training Area (PRFTA)
Fort Hood - 1st CAV
Presidio of Monterey (POM)
NASA JSC - Main
Fort Hood - HAAF, Kuoma, & Pershing/Patton Park
Fort Hood - 1st Cav Data
USAG-HI - Wheeler & HMR
NASA JSC - WSTF
Fort Hood - NFH, Phantom East, & Phantom Warrior
USAG-HI - Field Station Kunia (FSK)
USAG-HI: Fort Shafter
USAG-HI - East and South Range, FSK
NASA JSC - EF/SC
Fort Hood - Clear Creek/Darnall, Com. Ridge, QP, & WFH

2016 Sites – 21 Sites

NSA
MCAS Iwakuni - 6 districts
Fort Bliss – 2 districts
WSMR - 7 districts
Greeley
Lakenheath – USAF
ESTCP JBPHH
ESTCP Fort Hood



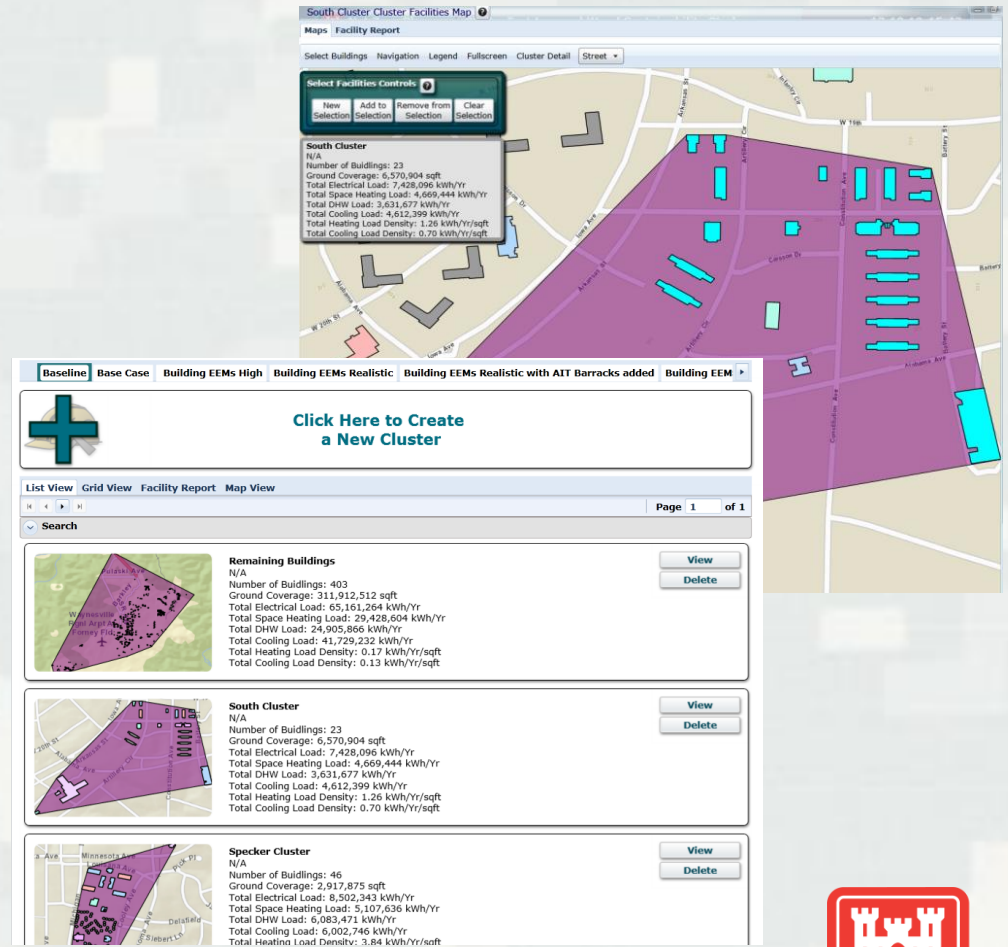
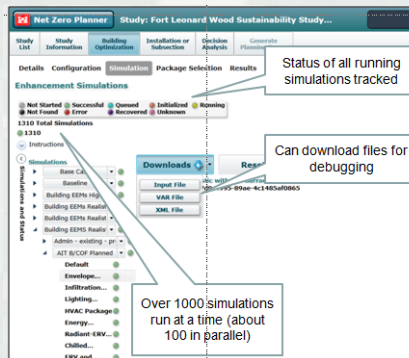
Net Zero Planner

Web based tool that assists in energy, water, and waste (EW2) planning

Technology: Online system that creates studies and performs analysis on existing and future facilities with considerations for climate region and empirical energy/water/waste data & analysis of an installation.

Technical Objectives:

- System exercises the strategies of the latest energy and water technologies and analyzes potential for centralized vs. de-centralized facility management clustering.



Base, Better, and Best Case Scenarios Energy



The Base Case represents the total energy that would be consumed by the installation if current building practices and efficiency levels were maintained.



The Better Case represents the total energy that would be consumed if all new facilities on the installation were built to ASHRAE 90.1 (standard for energy efficiency in new construction), and all existing facilities underwent retrofit to ASHRAE 100 (standard for energy efficiency in existing buildings).

The Best Case represents the total energy that would be consumed if all facilities on the installation were built or renovated to meet the targets of Architecture 2030 and the PassivHaus Standard, relying on natural, passive strategies for the majority of their lighting and HVAC needs.



Base, Better, and Best Case Scenarios Energy



Modeling provides holistic considerations of alternatives



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Base, Better, and Best Case Scenarios Water



The Base Case represents the total water consumption of the installation based on current usage patterns.

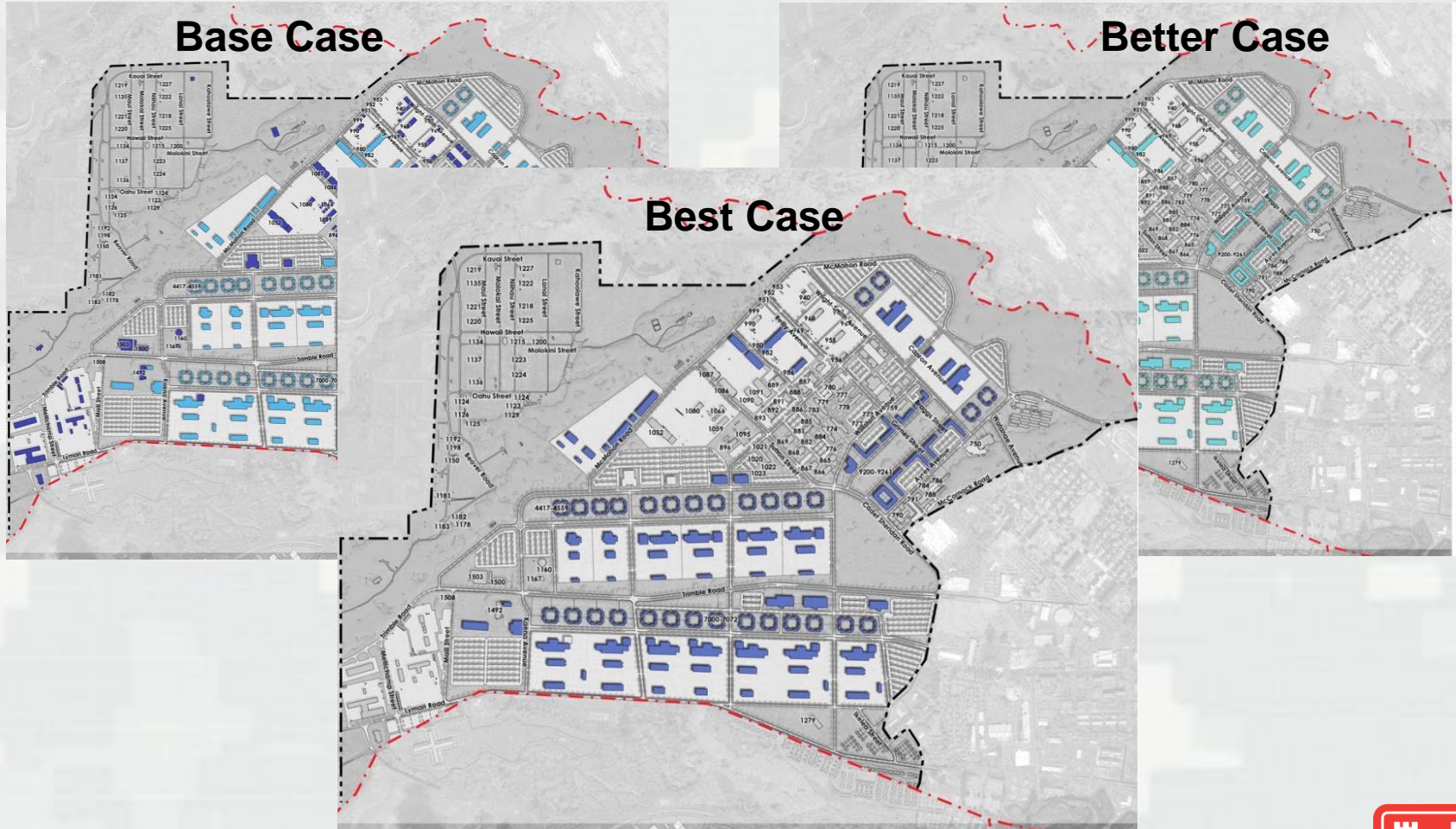
The Better Case represents the total water consumption of the installation if the reduction and recovery strategies are applied.



The Best Case represents the total water consumption of the installation if all of the strategies and policies are adopted. Water reuse in the form of greywater capture in addition to the reduction and recovery strategies, and comprehensive policies on water conservation make this case feasible.



Reduction, Reuse, and Recovery Scenarios Water



Base, Better, and Best Case Scenarios Waste



Composting: Fort Lewis, WA



Sorted Recycling: Fort Hood, TX

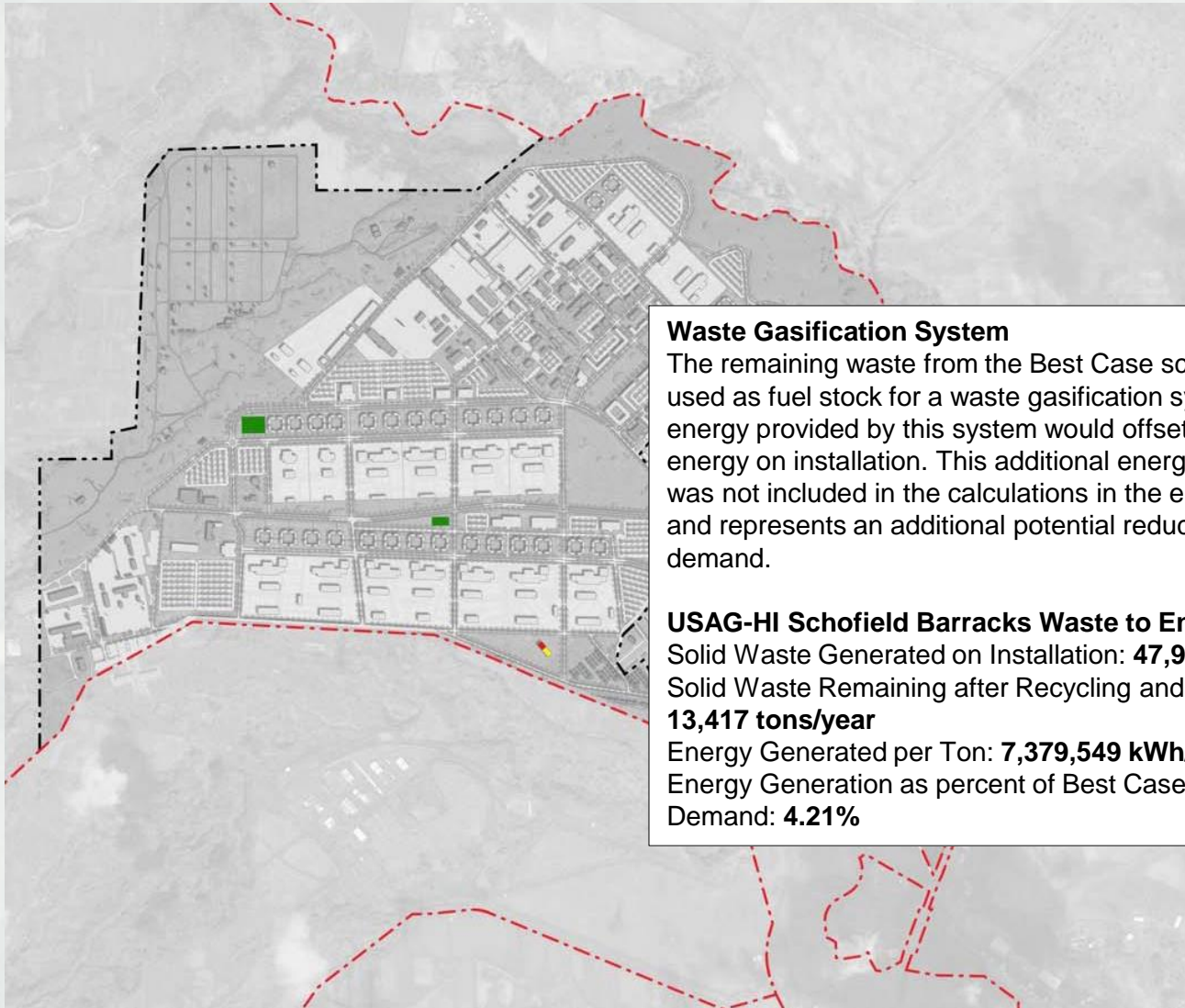
The Base Case represents the amount of solid waste that would be generated from operation of the installation if none of the outlined strategies were applied.

The Better Case represents the total solid waste generated for the installation with an aggressive recycling program.

The Best Case represents the solid waste generation of the installation if all strategies and policies were adopted. The remaining waste could then be converted to energy through waste gasification.



Waste Recovery Plan



Waste Gasification System

The remaining waste from the Best Case scenario can be used as fuel stock for a waste gasification system. The energy provided by this system would offset the need for energy on installation. This additional energy generation was not included in the calculations in the energy chapter, and represents an additional potential reduction in energy demand.

USAG-HI Schofield Barracks Waste to Energy Potential

Solid Waste Generated on Installation: **47,919 tons/year**

Solid Waste Remaining after Recycling and Composting:

13,417 tons/year

Energy Generated per Ton: **7,379,549 kWh/year**





Energy Generation as percent of Best Case Energy

Demand: **4.21%**



Sustainability Component Plans (SCPs)

Meet federal planning mandates for maintaining energy, water, waste, and storm water usage optimization through data collection and analysis.

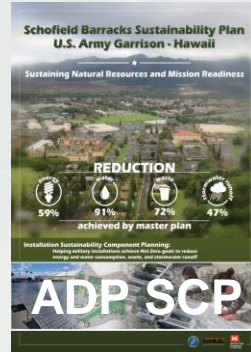
	 ENERGY	 WATER	 WASTE	 STORMWATER				
Baseline Use Rate Use Intensities based on current consumption patterns	SB: 17.4 kWh/sf/year		SB: 91.25 gal/sf/year		SB: 3.92 lbs/sf/year		SB: 34.91 gal/sf/year	
	Conroy: 22.4	Kolekole: 13.9	Conroy: 91.25	Kolekole: 91.25	Conroy: 3.92	Kolekole: 3.92	Conroy: 25.4	Kolekole: 41.4
Base Case Total Demand Total Demand for Installation in the Base Case	SB: 424 Million kWh/year		SB: 2.14 Billion gal/year		SB: 96 Million lbs/year		SB: 853 Million gal/year	
	Conroy: 221,944,852	Kolekole: 202,172,932	Conroy: 905,881,455	Kolekole: 1,323,782,000	Conroy: 38,915,675	Kolekole: 56,922,626	Conroy: 252,461,179	Kolekole: 600,503,751
Better Case Total Demand Reduced demand based on application of selected strategies	SB: 301 Million kWh/year		SB: 961 Million gal/year		SB: 58 Million lbs/year		SB: 517 Million gal/year	
	Conroy: 168,266,339	Kolekole: 132,957,445	Conroy: 317,687,200	Kolekole: 642,814,371	Conroy: 23,349,405	Kolekole: 34,153,576	Conroy: 57,126,676	Kolekole: 460,228,592
Best Case Total Demand Reduced Demand based on application of all strategies	SB: 175 Million kWh/year		SB: 192 Million gal/year		SB: 27 Million lbs/year		SB: 449 Million gallons/year	
	Conroy: 79,428,214	Kolekole: 95,713,680	Conroy: 78,525,695	Kolekole: 113,297,556	Conroy: 10,896,388	Kolekole: 15,938,335	Conroy: 12,903,420	Kolekole: 435,661,072
Total Reduction Reduction in Use From Base Case to Best Case	SB: 59%		SB: 91%		SB: 72%		SB: 47%	
	Conroy: 62.2%	Kolekole: 52.6%	Conroy: 91.3%	Kolekole: 91.4%	Conroy: 72%	Kolekole: 72%	Conroy: 94.9%	Kolekole: 27.5%

Note: Calculations in this report are based on the capacity potential of Schofield Barracks (SB), United States Army Garrison, Hawaii.



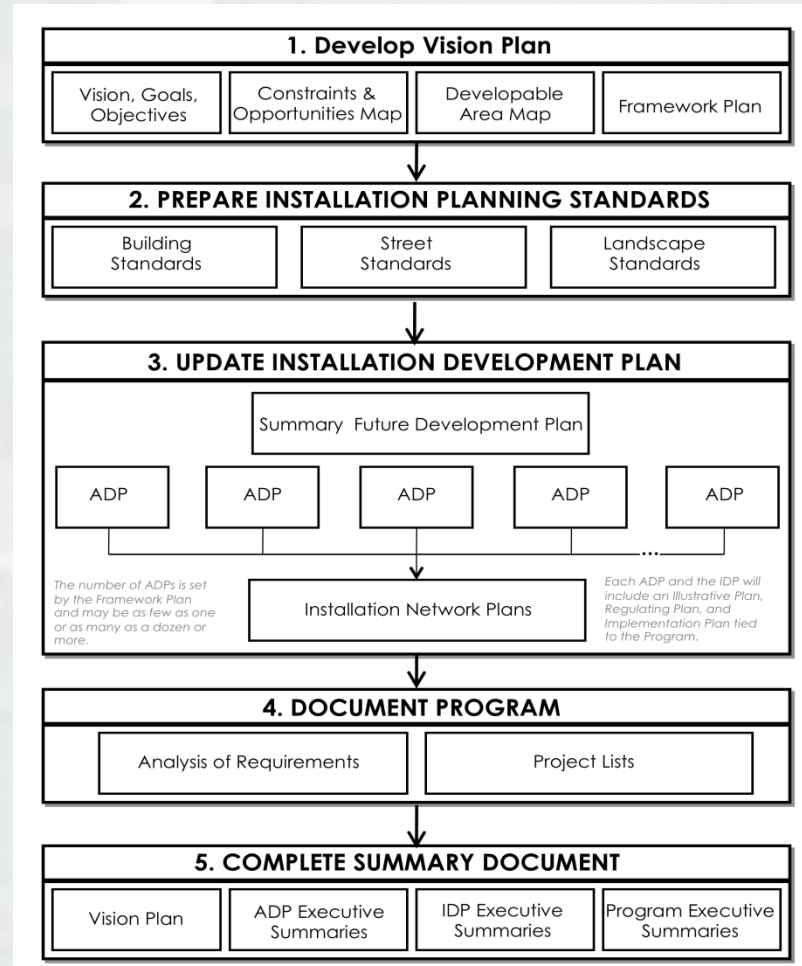
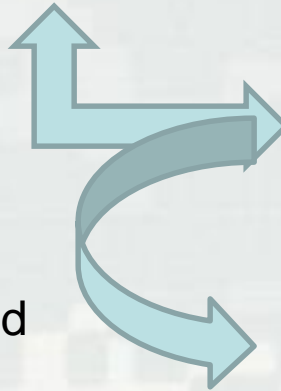
Integration into the Plan

Meet federal planning mandates for maintaining energy, water, waste, and storm water usage optimization through data collection and analysis.



SCP'S are integrated into ADPs and IDPs

Identified projects integrated into investment program



Master Planning and Modeling: Next Steps

Integration of modeling and sustainability plan into geospatial visualizations for real-time analysis

PLANNING PROTOTYPE

Performer: USACE SWD, CERL

Demonstration Sites: Fort Hood, JBPHH

Technology: Demonstrate integration of a Master Planning system (**CAMPS**) with an Energy Planning System (**NZP**) to provide improved Installation Scale-energy planning.

Technical Objectives:

- Integration of Master Planning tool and Energy Planning tool (NZP)
- Rapid identification and quantification of energy facility and installation energy efficiency measures.
- Improved planner and installation tenant understanding of energy measures
- Reduced planning cycle time.



CAMPS/NZP will help installation planners and residents to identify and communicate energy efficiency opportunities (red facilities exceed EUI targets for plan).

Awarded 2016 GREENGOV Presidential Award for Green Innovation

Cited for Revolutionizing sustainability planning and ..- Perfectly suited to meet sustainability goals.



DoD Installation Energy Master Planning Next Steps

Energy planning integrated with master Plan

DOD MEMORANDUM FOR INSTALLATION ENERGY MASTER PLANNING

Concept: Comprehensive Planning based on Master Plan

SCP: Complies with DOD Directive

Net Zero Modeling quick analytical tool

MILESTONES: All installations have completed Installation Master Plans by 2019

INSTALLATION WATER PLANNING:

Concept: leverage Installation Energy Master Planning work for Water



CAMPS/NZP will help installation planners and residents to identify and communicate energy efficiency opportunities (red facilities exceed EU targets for plan).



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Knowledge Transfer

Capability to increase competencies and transferability across USACE

Enterprise Collaboration & Training (CERL & SWF) – Baltimore and Seattle training scheduled for FY16

Distance Learning (Packaged On-line Courses)

Master Planning formal training Course 258 MP Energy & Sustainability 26-29 Apr Taos NM

Course 163 MP Energy & Resiliency (modeling) 28-29 June Champaign IL

Net Zero Planner Cross Training



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Master Planning for Resiliency and Sustainability through Net Zero Modeling

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