

# U.S. ARMY INSTALLATION CLIMATE RESILIENCE

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**ISWG  
3 December 2020**

- Army installations already exposed to climate hazards and extreme weather events.
- Climate change is a threat multiplier that will increase over time.
- Developing resilience will help preserve mission readiness and modernize Strategic Support Areas (SSAs).



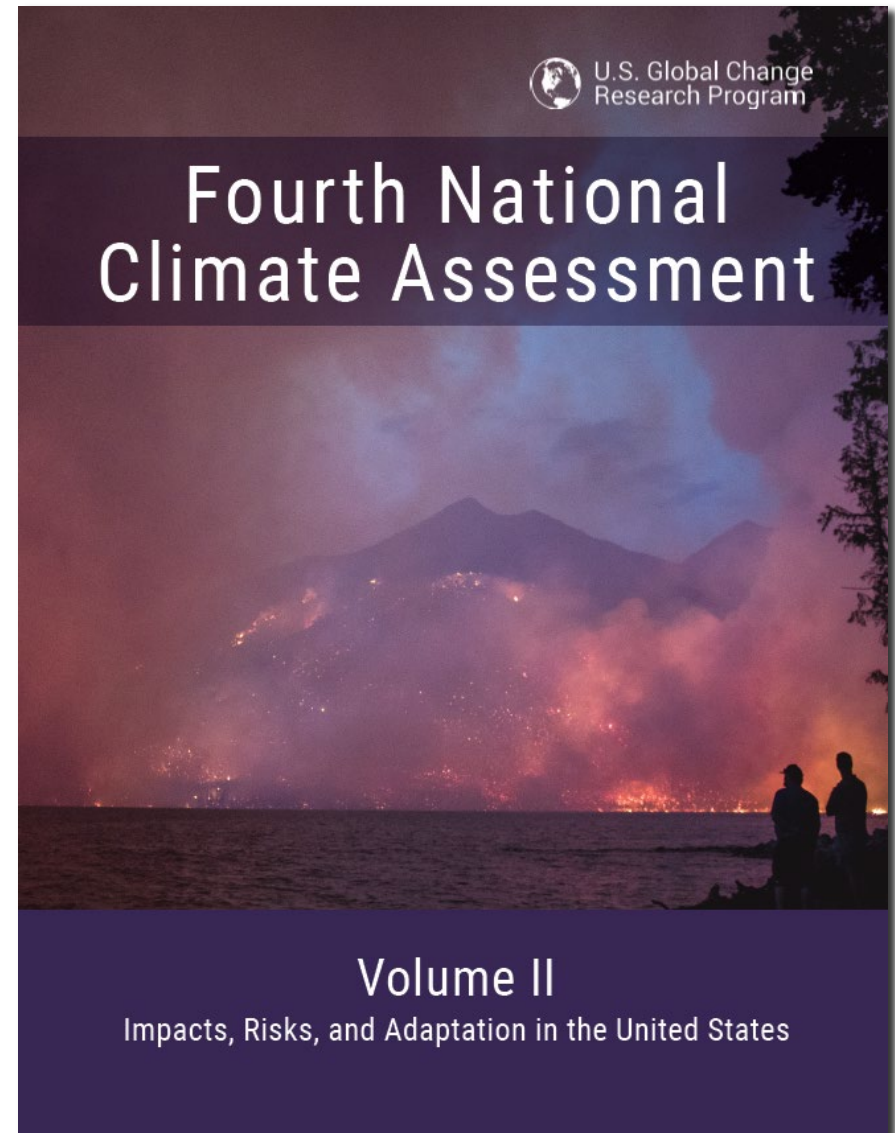
## EVALUATION OF CLIMATE CHANGE EFFECTS ON ARMY LOCATIONS

Interim Draft for Review April 2019 **FOUO: Predecisional**



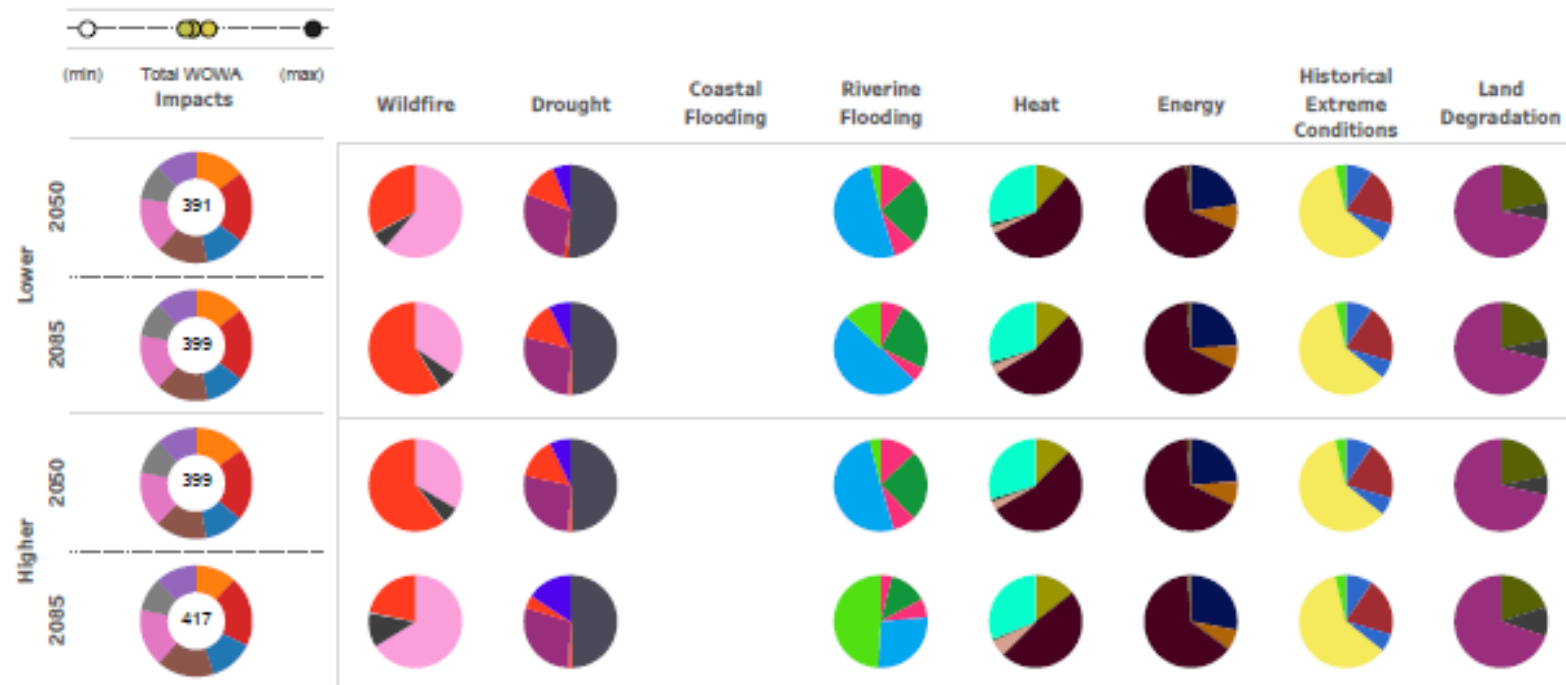
- National Defense Authorization Act (NDAA) 2018, Section 335: DoD must report to Congress current climate vulnerabilities and 20 year projections.
- Army started working with U.S. Army Corps of Engineers (USACE) to launch Army Climate Assessment Tool (ACAT).
- Seven climate-related threats projected: Coastal flooding, riverine flooding, drought, heat, wildfire, land degradation, and energy demand. Historical data on hurricanes and tornadoes also included.
- Projections to 2050 and 2085 under two emissions scenarios (RCP 4.5 and RCP 8.5).

- National Oceanic and Atmospheric Administration (NOAA).
- Federal Emergency Management Agency (FEMA).
- U.S. Geological Survey (USGS).
- Fourth National Climate Assessment (NCA4).



- Indicator exposure scores aggregated into Weighted Order Weighted Average (WOWA) scores to allow assessment of overall exposure and comparisons between installations.
- Installations can examine individual indicator scores to assess projected local exposure conditions.

Indicator Number	Indicator Name	Description	Units
<b>Drought</b>			
101	Flash Drought Frequency	Flash Drought Frequency is the average number of times per year in which the 1-month Standardized Precipitation Evaporation Index (SPEI) drops from above -1 to below -1.5 in a 3 month window [for example, from -0.5 in March to -1.75 in May].	Frequency (Occurrence/year)
102	Drought Year Frequency	Drought Year Frequency is the average percentage of years in which the 12-month Standardized Precipitation Evaporation Index (SPEI) is < -1 (moderate or more extreme drought).	Percentage
105	Aridity	Aridity is the average aridity of the climate based on the Aridity Index. The Aridity Index is precipitation divided by potential evapotranspiration (P/PET), where PET is estimated using the Thornthwaite method. Smaller values indicate greater aridity, with the threshold between humid and arid climates occurring at an index value of 0.65.	Unitless
106	Consecutive Dry Days	Consecutive Dry Days is the mean annual maximum number of consecutive days with less than 0.01" of precipitation.	Days/year
108C	Mean Annual Runoff	Mean Annual Runoff is the average annual discharge (volume of water) from the entire watershed upstream of the downstream-most boundary of the installation for the largest river in this watershed. This is an estimate of unregulated flows, meaning the effects of water storage and flood releases are not taken into account.	Cubic feet per second (cfs)



- Impacts**
- Wildfire
  - Drought
  - Coastal Flooding
  - Riverine Flooding
  - Heat
  - Energy
  - Historical Extreme Conditions
  - Land Degradation

- Indicator**
- 601\_Fuel\_Abundance
  - 604\_Fire\_Season\_Length
  - 602\_Ignition\_Rate
  - 101\_Flash\_Drought\_Freq
  - 108C\_Mean\_Annual\_Runoff
  - 106\_Consec\_Dry\_Days
  - 105\_Aridity
  - 102\_Drought\_Year\_Freq
  - 201\_Coastal\_Flood\_Extent
  - 202\_Coastal\_Erosion
  - 302C\_Flood\_Mag\_Factor
  - 303\_Max\_1-Day\_Precip
  - 304\_Max\_5-Day\_Precip
  - 305\_Extreme\_Precip\_Days
  - 301\_Flood\_Extent
  - 401\_Days\_>95F
  - 402\_5-Day\_Max\_Temperature
  - 403\_High\_Heat\_Days
  - 404\_Frost\_Days
  - 405\_High\_Heat\_Index\_Days
  - 502\_Cooling\_Degree\_Days
  - 503\_5-Day\_Min\_Temperature
  - 501\_Heating\_Degree\_Days
  - 804\_Hist\_Drought\_Freq
  - 805\_Wildland\_Urban\_Interface
  - 802\_Hurricane\_Freq
  - 801\_Tornado\_Freq
  - 806\_Hurricane\_Wind > 50knots
  - 807\_Hurricane\_Max\_Precip
  - 808\_Ice\_Jam\_Occurrence
  - 701\_Soil\_Loss
  - 702\_FF\_Hazard\_Potential

Threshold	ORness
100%	0.70

Dataset: Army Climate Exposure Tool  
Climate Data Source: CMIP5 GCM - LOCA dataset

National Standard Settings?  
Yes





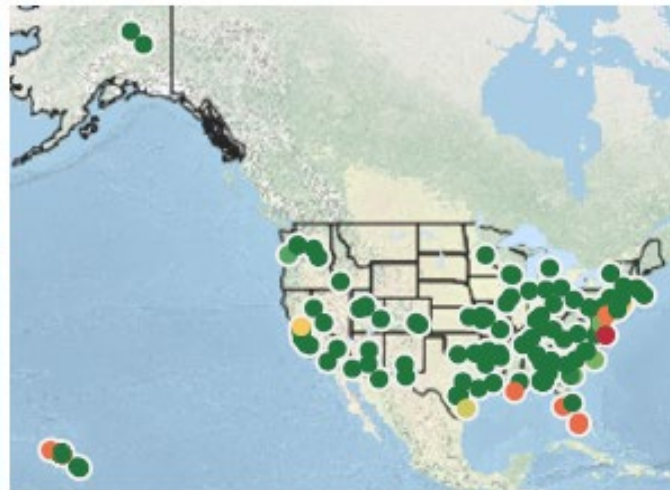
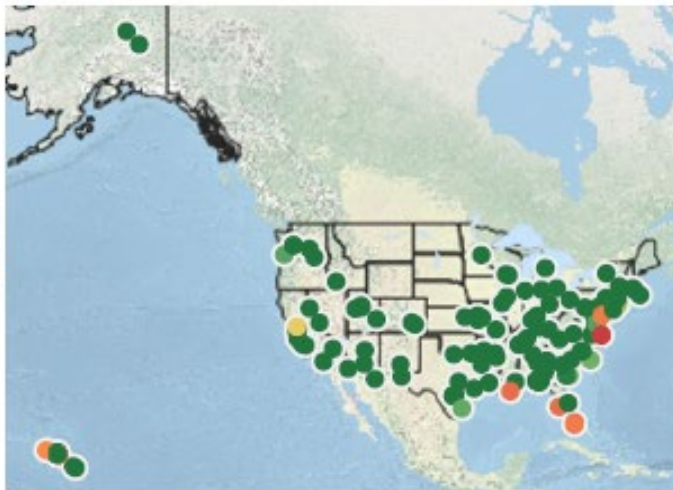
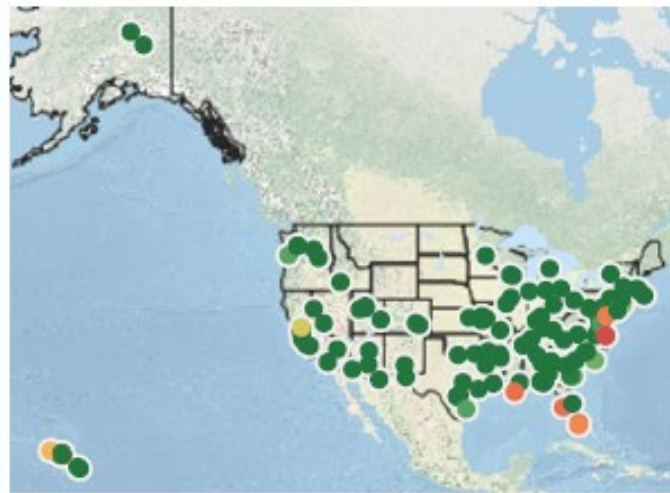
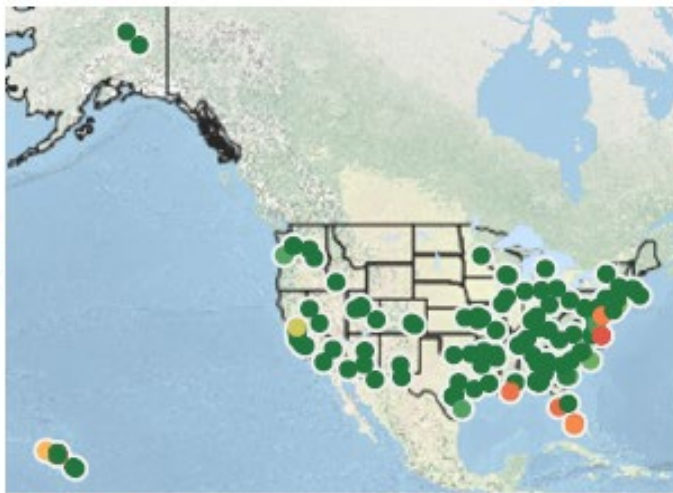
## Exposure by Impact & Scenario (Coastal Flooding)

2050

2085

Lower

Higher

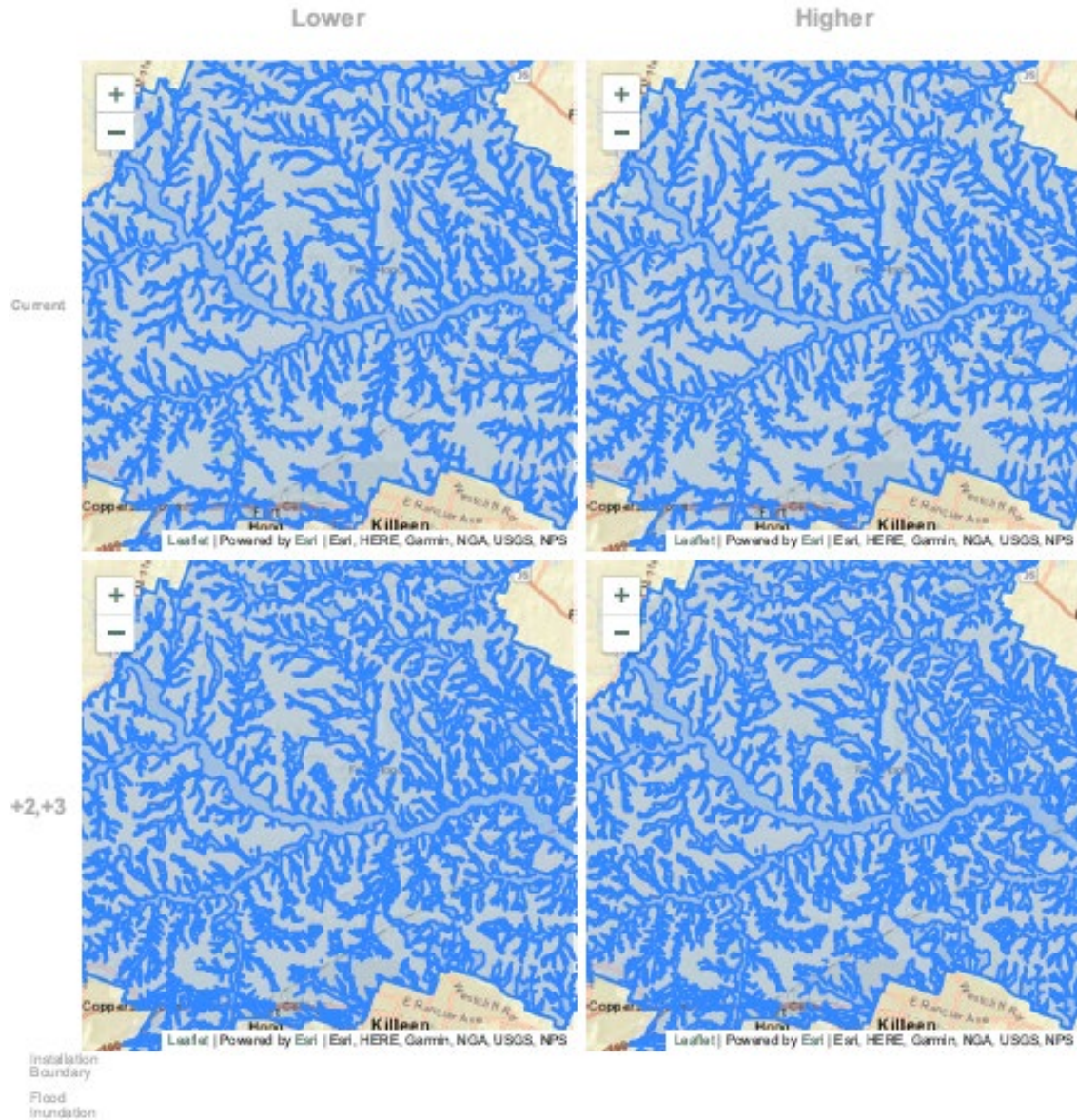


**Left Click an Installation to Highlight in Other Maps**

Dataset: Army Climate Exposure Tool

Climate Data Source: CMIP5 GCM - LOCA dataset

Threshold	ORness	National Standard Settings?
100%	0.70	Yes

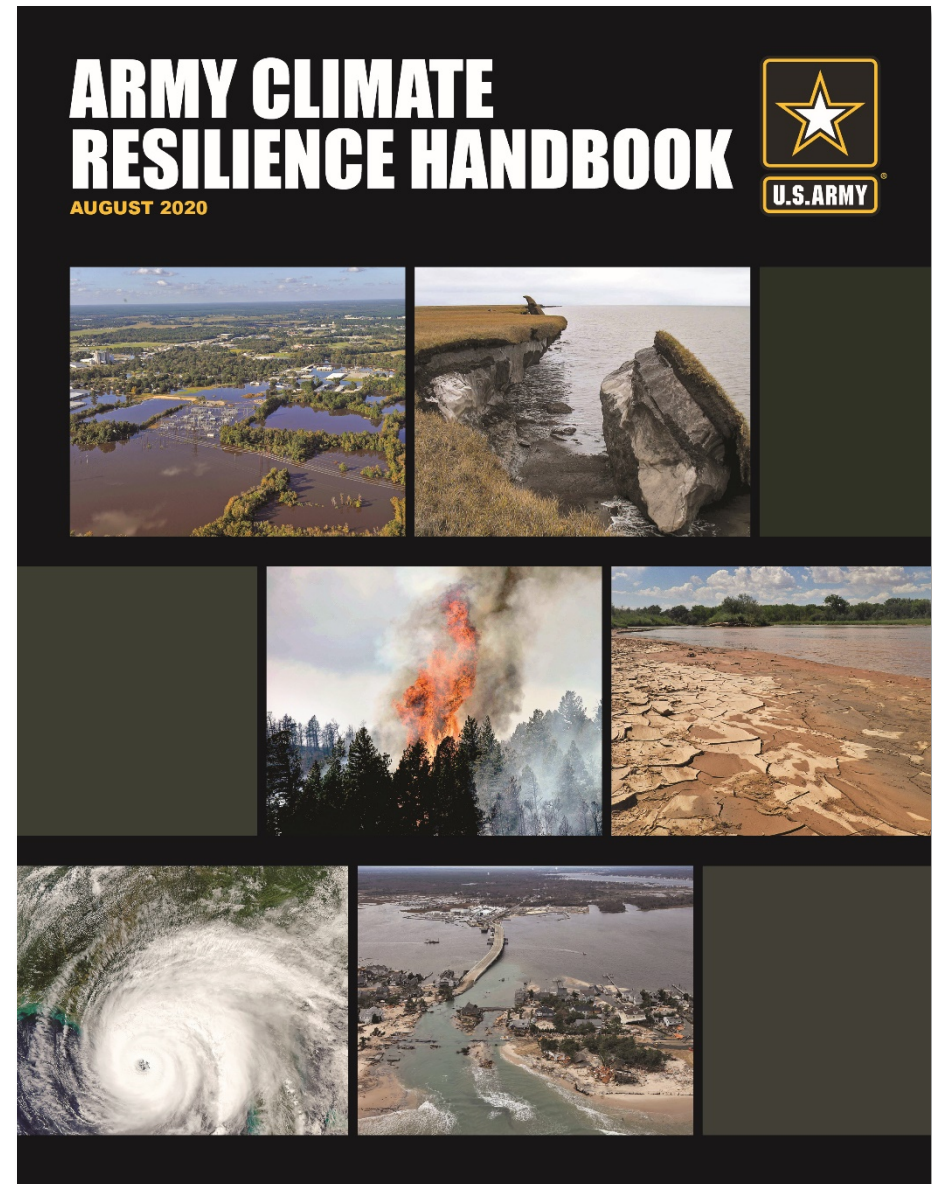




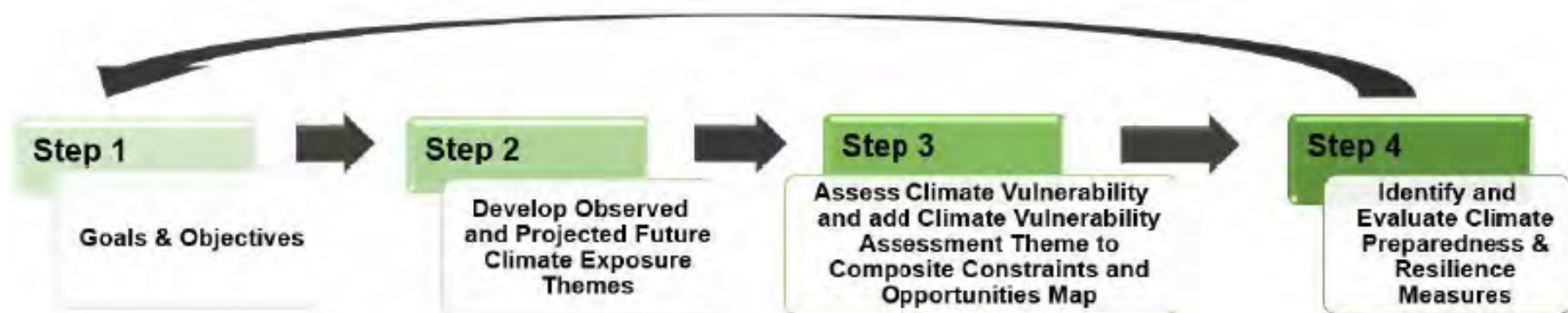
- HQ-level Analysis: Headquarters Department of the Army (HQDA) will use tool to assess and rank exposure of sites across the Army. 148 sites across 116 US installations have been analyzed to date. Data on overseas installations is in progress and will be added to tool in the coming months.
- Installation-level Analysis: Garrison commanders will incorporate tool results into real property master plans, Integrated Natural Resource Management Plans, Installation Energy and Water Plans, emergency management plans, continuity of operations plans, and standard operating procedures.

- Pilot launches at Fort Bragg and Fort Hood. Launched for 116 installations with ASA memo on 28 July 2020.
- Memo & Quick Guide:  
[https://www.asaie.army.mil/Public/ES/doc/Army\\_Climate\\_Assessment\\_Tool\\_Memo\\_ASAIEE.pdf](https://www.asaie.army.mil/Public/ES/doc/Army_Climate_Assessment_Tool_Memo_ASAIEE.pdf)
- ACAT (CAC-enabled):  
[https://corpsmapr.usace.army.mil/cm\\_apex/f?p=116](https://corpsmapr.usace.army.mil/cm_apex/f?p=116)

- Army Climate Resilience Handbook published in August 2020.
- Worked closely with USACE.
- Companion to ACAT.
- Walks through use of ACAT during master planning processes.

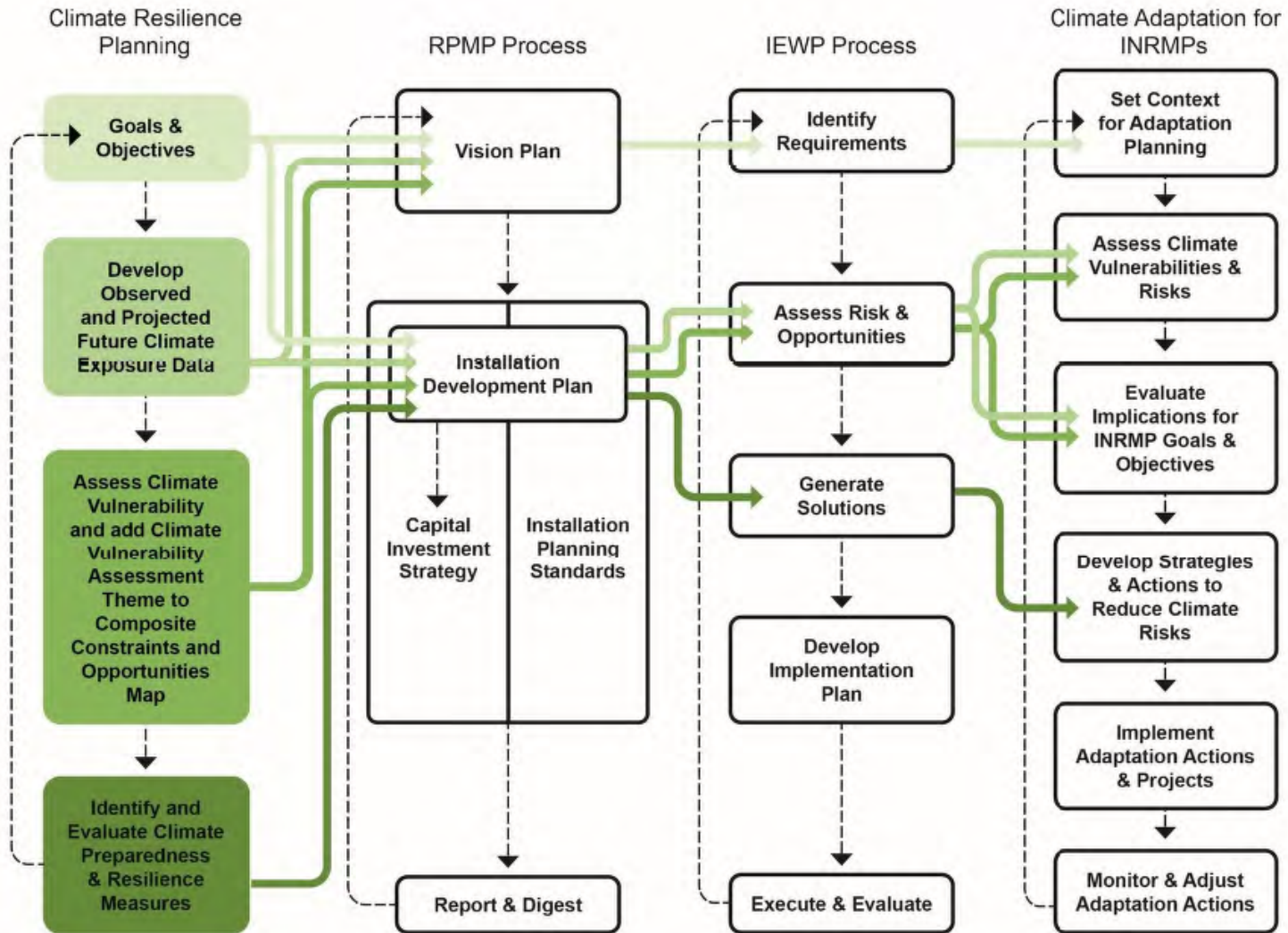


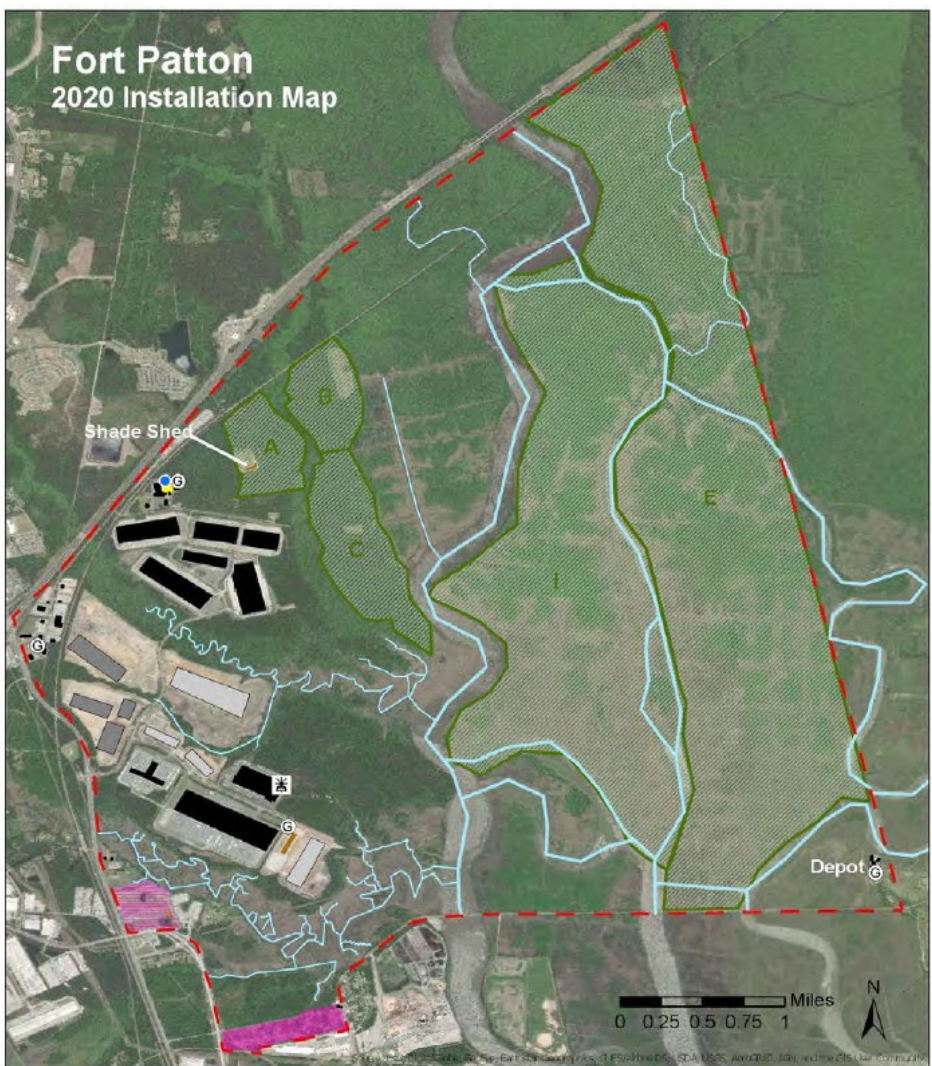
## INSTALLATION CLIMATE RESILIENCE PROCESS



- Handbook:  
[https://www.asaie.army.mil/Public/ES/doc/Army\\_Climate\\_Resilience\\_Handbook\\_Change\\_1.pdf](https://www.asaie.army.mil/Public/ES/doc/Army_Climate_Resilience_Handbook_Change_1.pdf)







- |                             |                     |                                    |
|-----------------------------|---------------------|------------------------------------|
| Installation Boundary       | Base Housing        | Creek                              |
| Permanent Building          | Future Base Housing | <b>Current Resilience Measures</b> |
| Temporary Building          | Fuel_Storage        | Generator                          |
| Building Under Construction | Training_Area       | Solar Panels                       |
| Building Removed            | Main River          | Water Storage                      |
|                             |                     | Shade Shed                         |

NOTICE: This map is of a fictional installation.



- Secretary of the Army signed Army Directive (AD) 2020-08 on 11 September 2020.
- Issues policy guidance for installation commanders to incorporate climate resilience into all planning processes.
- Implements DoDD 4715.21.



SECRETARY OF THE ARMY  
WASHINGTON

11 SEP 2020

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Army Directive 2020-08 (U.S. Army Installation Policy To Address Threats Caused by Changing Climate and Extreme Weather)

1. References.

- a. Department of Defense, Unified Facilities Criteria 2-100-01 (Installation Master Planning), 15 May 2012, incorporating Change 2, 25 October 2019
- b. Army Regulation (AR) 200-1 (Environmental Enhancement and Protection), 13 December 2007
- c. AR 210-20 (Real Property Master Planning for Army Installations), 16 May 2005
- d. AR 420-1 (Army Facilities Management), 12 February 2008
- e. U.S. Army Science Board, FY 2013 Summer Study, Final Report (Planning for Climate Change: Actions for the Army to Better Adapt to the Effects of Climate Change in 2030), November 2013

2. Purpose. Army infrastructure is vulnerable to the effects of changing climate and extreme weather (see reference 1e). This directive establishes requirements for Army installations in the Strategic Support Area to protect critical assets and ensure mission resilience against threats caused by changing climate and extreme weather.

3. Applicability. This directive applies to the Regular Army, Army National Guard/Army National Guard of the United States, and U.S. Army Reserve.

4. Policy.

- a. Effective immediately, commanders of Army installations will assess, plan for, and adapt to the projected impacts of changing climate and extreme weather by adding the results of climate change prediction analysis tools into all facility and infrastructure-related plans, policies, and procedures. This practice will enhance the installation master planning process and Army facility standard designs beyond the current Unified Facilities Criteria minimum requirements.



- Purpose: Directive establishes requirements for Army installations in the Strategic Support Area to protect critical assets and ensure mission resilience against threats caused by changing climate and extreme weather.
- Policy: Commanders of Army installations will assess, plan for, and adapt to the projected impacts of changing climate and extreme weather by adding the results of climate change prediction analysis tools into all facility and infrastructure-related plans, policies, and procedures.
- Full AD: [https://www.asaie.army.mil/Public/ES/doc/AD\\_2020-08\\_USArmy\\_Installation\\_Policy\\_To\\_Address\\_Threats\\_Caused\\_by\\_Changing\\_Climate\\_and\\_Extreme\\_Weather.pdf](https://www.asaie.army.mil/Public/ES/doc/AD_2020-08_USArmy_Installation_Policy_To_Address_Threats_Caused_by_Changing_Climate_and_Extreme_Weather.pdf)



- Addition of overseas installations to ACAT in coordination with DoD Climate Assessment Tool.
- ACAT and handbook trainings at landholding commands, select installations, and in web videos.
- Office of the Deputy Chief of Staff (DCS), G-9 will issue implementation guidance for AD 2020-08.
- Long-term operations & maintenance funding of ACAT in Army POM.

- Army.mil Article on Army Directive 2020-08:  
[https://www.army.mil/article/238014/new\\_directive\\_to\\_prepare\\_army\\_installations\\_against\\_extreme\\_weather\\_climate\\_change](https://www.army.mil/article/238014/new_directive_to_prepare_army_installations_against_extreme_weather_climate_change)
- *ARMY Magazine* Article on ACAT:  
<https://www.ausa.org/articles/climate-change-hits-home-assessment-tool-helps-gauge-way-forward>