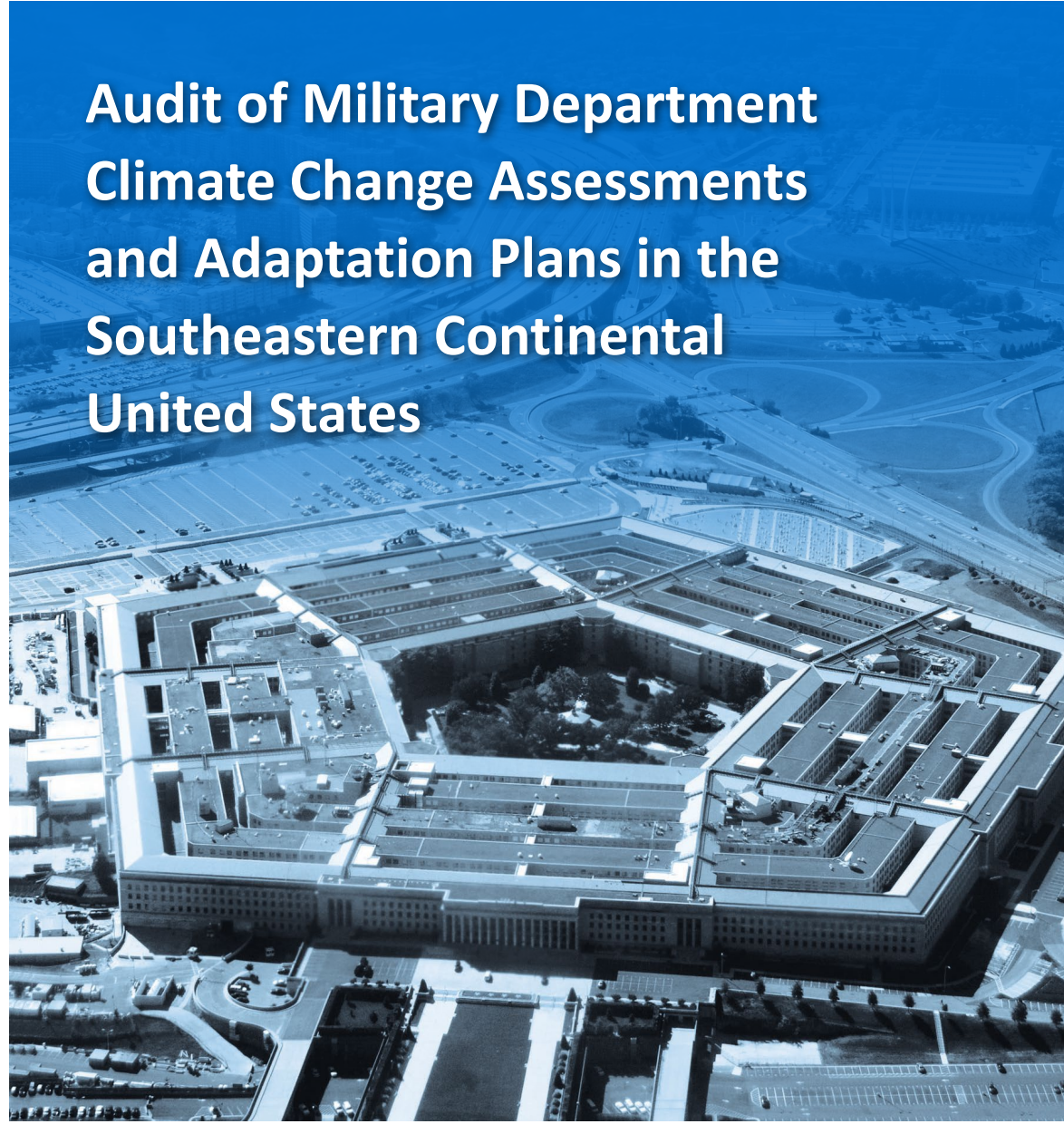




# INSPECTOR GENERAL

*U.S. Department of Defense*

MARCH 28, 2023



## Audit of Military Department Climate Change Assessments and Adaptation Plans in the Southeastern Continental United States

INTEGRITY ★ INDEPENDENCE ★ EXCELLENCE





# Results in Brief

## *Audit of Military Department Climate Change Assessments and Adaptation Plans in the Southeastern Continental United States*

March 28, 2023

### Objective

The objective of this audit was to determine whether the Military Services assessed facility resilience and planned for the adaptations needed to address climate change and extreme weather events at installations in the southeastern continental United States bordering the Gulf of Mexico and the Atlantic coast from Texas to Virginia. We focused our audit on the climate resilience assessments performed by the Military Departments.<sup>1</sup>

### Background

The DoD defines climate change as variations in average weather conditions that persist over multiple decades or longer—increases and decreases in temperature, shifts in precipitation, and changing risk of certain types of extreme weather events, such as tornados, hurricanes, and drought.

The FY 2020 NDAA required the DoD to include climate resilience elements in a major installation's Master Plan. DoD Instruction 4165.70 establishes the requirement for all military installations to develop a Master Plan, and the DoD incorporated the required elements into Unified Facilities Criteria (UFC) 2-100-01. The Master Plan outlines the efforts needed to sustain the mission for the intended lifespan of the installation's infrastructure and assets. Section 2833 of the FY 2022

<sup>1</sup> Because the U.S. Marine Corps falls under the Department of the Navy and the U.S. Space Force falls under the Department of the Air Force for policy and guidance, we will refer to the Military Departments in this report.

### Background (cont'd)

NDAA tasked each Military Department with completing climate resilience plans for at least two major military installations and providing the plans to Congress.

### Findings

Military Departments did not consistently develop the climate resilience assessments required by UFC 2-100-01 and the FY 2020 NDAA at the five installations we reviewed. Personnel at the five installations did not use a standardized approach to conduct and document their climate assessment because DoD guidance has not been updated to reflect the changes in the law. Specifically, DoD Instruction 4165.70 does not contain language requiring all installations to include climate resilience in their Master Plans. In addition, UFC 2-100-01 does not provide sufficient guidance to standardize assessments. Finally, the Military Departments did not update their guidance to identify the seven required elements from the FY 2020 NDAA or require assessments to use specific climate hazards established in UFC 2-100-01. As a result, the DoD is at an increased risk of not adequately assessing climate change impacts that affect military installations or evaluating how climate change will impact readiness.

Personnel at the three installations we visited had projects to adapt to the impact of climate change. Specifically, personnel at each of the three installations were proactive in identifying projects intended to enhance installation climate resilience before the enactment of the FY 2020 NDAA requirements. However, installation officials stated that they completed projects only because the project was associated with a mission impact, and that they believed it would be difficult to obtain funding for climate projects without an immediate mission impact.

### Recommendations

To address the findings in this report, we made eight recommendations. Among other things, we recommended that the Under Secretary of Defense for Acquisition and Sustainment update guidance to include the requirement to incorporate climate resilience plans



# Results in Brief

## *Audit of Military Department Climate Change Assessments and Adaptation Plans in the Southeastern Continental United States*

### **Recommendations (cont'd)**

in all Master Plans. We also recommended that the Deputy Assistant Secretary of Defense for Construction and the Military Departments update UFC 2-100-01 to standardize the climate assessments and that they update their department policies to reflect those changes.

### **Management Comments and Our Response**

The Deputy Assistant Secretary of Defense for Construction, responding for the Under Secretary of Defense for Acquisition and Sustainment, agreed with the recommendations, but intends to include the standardization of the climate assessments in

DoD level guidance rather than in UFC 2-100-01. The Assistant Secretary of the Army (Installations, Energy, and Environment) and the Commander of the Naval Facilities Engineering Systems Command agreed with the recommendations to update implementing guidance after the DoD level guidance is completed.

### **Management Comments Required**

The Commander of the Air Force Civil Engineer Center did not receive the draft report and therefore was unable to provide comments. We request that the Commander of the Air Force Civil Engineer Center provide comments on the final report within 30 days.

## Recommendations Table

Management	Recommendations Unresolved	Recommendations Resolved	Recommendations Closed
Under Secretary of Defense for Acquisition and Sustainment		A.1, A.2.a, A.2.b, A.2.c, A.2.d, A.2.e	
Deputy Assistant Secretary of Defense for Construction		A.3	
Commander, U.S. Army Corps of Engineers		A.3, A.4	
Commander, Naval Facilities Engineering Systems Command		A.3, A.4	
Commander, Air Force Civil Engineer Center	A.3, A.4		

Please provide Management Comments by May 1, 2023.

**Note:** The following categories are used to describe agency management’s comments to individual recommendations.

- **Unresolved** – Management has not agreed to implement the recommendation or has not proposed actions that will address the recommendation.
- **Resolved** – Management agreed to implement the recommendation or has proposed actions that will address the underlying finding that generated the recommendation.
- **Closed** – DoD OIG verified that the agreed upon corrective actions were implemented.





**INSPECTOR GENERAL  
DEPARTMENT OF DEFENSE  
4800 MARK CENTER DRIVE  
ALEXANDRIA, VIRGINIA 22350-1500**

March 28, 2023

MEMORANDUM FOR UNDER SECRETARY OF DEFENSE FOR ACQUISITION AND SUSTAINMENT  
AUDITOR GENERAL, DEPARTMENT OF THE ARMY  
AUDITOR GENERAL, DEPARTMENT OF THE NAVY  
AUDITOR GENERAL, DEPARTMENT OF THE AIR FORCE

SUBJECT: Audit of Military Department Climate Change Assessments and Adaptation Plans  
in the Southeastern Continental United States (Report No. DODIG 2023-061)

This final report provides the results of the DoD Office of Inspector General's audit. We previously provided copies of the draft report and requested written comments on the recommendations. We considered management's comments on the draft report when preparing the final report. These comments are included in the report.

This report contains Recommendations A.3 and A.4 for the Air Force Civil Engineer Center that are considered unresolved. Because of technical errors during draft report distribution, the Air Force did not respond to the draft report. Therefore, the recommendations will remain unresolved until an agreement is reached on the actions taken to address the recommendations. The Deputy Assistant Secretary of Defense for Construction responding on behalf of the Under Secretary of Defense for Acquisition and Sustainment agreed to address Recommendations A.1, and redirected Recommendations A.2.a, A.2.b, A.2.c, A.2.d, and A.2.e presented in the report; therefore, we consider the recommendations resolved and open. Once we verify that the actions are complete, the recommendations will be closed.

The Assistant Secretary of the Army Installations, Energy, and Environment and the Commander, Naval Facilities Engineering Systems agreed to address Recommendations A.3 and A.4 therefore, we consider the recommendations resolved and open. Once we verify that the actions are complete, the recommendations will be closed.

DoD Instruction 7650.03 requires that recommendations be resolved promptly. Therefore, please provide us within 30 days your response concerning specific actions in process or alternative corrective actions proposed on the recommendations. Send your response to either [followup@dodig.mil](mailto:followup@dodig.mil) if unclassified or [rfunet@dodig.smil.mil](mailto:rfunet@dodig.smil.mil) if classified SECRET.

If you have any questions, please contact me at [REDACTED]. We appreciate the cooperation and assistance received during the audit.

FOR THE INSPECTOR GENERAL:

A handwritten signature in blue ink that reads "Richard B. Vasquez".

Richard B. Vasquez  
Assistant Inspector General for Audit  
Readiness and Global Operations

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# Introduction

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## Objective

The objective of this audit was to determine whether the Military Services assessed facility resilience and planned for the adaptations needed to address climate change and extreme weather events at installations in the southeastern continental United States. We announced this audit in September 2021; however, the FY 2022 National Defense Authorization Act (NDAA), signed in December 2021, changed how the Military Departments were reporting climate resilience assessments.<sup>2</sup> We focused our audit on the climate resilience assessments already being performed to determine whether the assessments were consistent across the Military Departments and met Federal and DoD criteria. See Appendix A for the scope and methodology and prior coverage related to the objective.

## Background

The DoD defines climate change as variations in average weather conditions that persist over multiple decades or longer. The variations encompass increases and decreases in temperature, shifts in precipitation, and changing risk of certain types of extreme weather events. While there is no official DoD definition of extreme weather events, the report “DoD Installation Exposure to Climate Change at Home and Abroad,” April 19, 2021, describes extreme weather conditions (climate hazards) as tornado frequency, hurricane winds greater than 50 knots, hurricane maximum precipitation, hurricane frequency, ice storms, historic drought frequency, and ice jams.<sup>3</sup> DoD Directive 4715.21, “Climate Change Adaptation and Resilience,” defines resilience and adaptation.<sup>4</sup>

- Resilience is the ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions.
- Adaptation is the adjustment in natural or human systems in anticipation of or in response to a changing environment in a way that effectively uses beneficial opportunities or reduces negative efforts.

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<sup>2</sup> Public Law 117-81, “The National Defense Authorization Act for Fiscal Year 2022,” section 2833, “Prompt completion of military installation resilience component of master plans for at-risk major military installations,” December 27, 2021.

<sup>3</sup> U.S. Army Corps of Engineers: Washington, D.C., “DoD Installation Exposure to Climate Change at Home and Abroad,” April 2021.

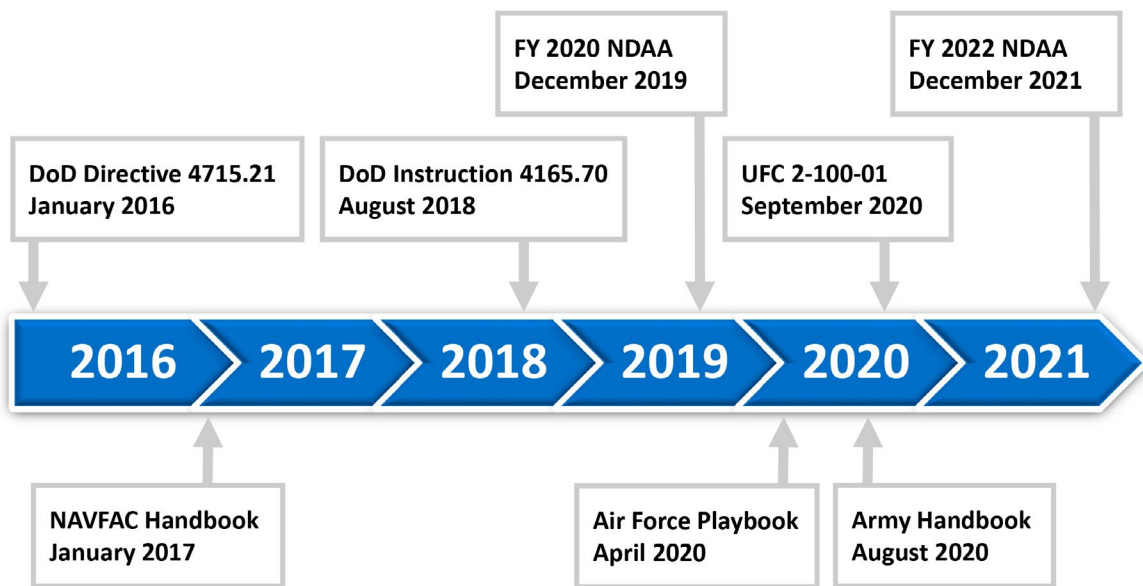
<sup>4</sup> DoD Directive 4715.21, “Climate Change Adaptation and Resilience,” effective January 14, 2016, and updated on August 31, 2018.

In 2019, the DoD reported to Congress on the effects of climate change on 79 military installations in the United States.<sup>5</sup> The report stated that 78 of these DoD installations were vulnerable to the effects of climate change and that about two-thirds of the 79 installations were vulnerable to recurring flooding. Additionally, according to the report to Congress, the effects of a changing climate are a national security issue, with potential impacts to DoD missions, operational plans, and installations.

### ***DoD Criteria and Public Laws Related to Military Installation Climate Resilience Assessments***

DoD criteria for assessing climate change resilience have evolved over the past several years, with the most recent update occurring in December 2021. With changes to these criteria, requirements for how installations are expected to assess climate hazards have also changed. Figure 1 illustrates when Federal and DoD guidance related to climate change was issued or updated.

*Figure 1. DoD Climate Resilience Guidance Timeline*



Source: The DoD OIG.

<sup>5</sup> Office of the Under Secretary of Defense for Acquisition and Sustainment, "Report on Effects of a Changing Climate to the Department of Defense," January 2019. Only one installation, the Pentagon, reported no vulnerabilities to the effects of climate change.

The DoD issued DoD Directive 4715.21, “Climate Change Adaptation and Resilience,” and the Military Departments issued or updated implementing guidance for installations to assess climate hazards and identify adaptations needed. DoD Instruction 4165.70, “Real Property Management,” establishes the requirement for all military installations to develop a Master Plan.<sup>6</sup> In addition, the FY 2020 NDAA introduced required elements that must be included in the major installation’s Master Plan.<sup>7</sup> A Master Plan is an installation document that evaluates factors affecting the present and future physical development and operation of an installation. In September 2020, the DoD updated UFC 2-100-01 to include the requirements from the FY 2020 NDAA. The September 2020 update added a requirement for installations to include an Installation Climate Resilience Plan (ICRP) that identifies and assesses the risks to the installation from the effects of extreme weather events and climate change as an annex in the Master Plan.<sup>8</sup> The ICRP

*The September 2020 (UFC) update added a requirement for installations to include an Installation Climate Resilience Plan (ICRP) that identifies and assesses the risks to the installation from the effects of extreme weather events and climate change as an annex in the Master Plan.*

outlines an installation’s planned efforts to ensure mission sustainment over the intended lifespan of infrastructure and assets. Finally, the FY 2022 NDAA tasked each Military Department with completing climate resilience plans for at least two installations and providing the plans to Congress.

### ***DoD Directive 4715.21, “Climate Change Adaptation and Resilience”***

DoD Directive 4715.21 directly ties climate change adaptation to mission readiness, stating that the DoD must be able to adapt current and future operations to address the impacts of climate change to maintain an effective and efficient U.S. military. The DoD must identify and assess the effects of climate change on the DoD mission and consider those effects when developing plans and implementing procedures. The Directive also states that the DoD must anticipate and manage any risks that develop as a result of climate change to build resilience. Furthermore, the Directive establishes the roles and responsibilities for DoD installation resilience efforts.

<sup>6</sup> DoD Instruction 4165.70 “Real Property Management,” April 6, 2005; Incorporating Change 1, August 31, 2018.

<sup>7</sup> Public Law 116-92, “The National Defense Authorization Act for Fiscal Year 2020,” section 2801, “Military installation resilience plans and projects,” December 20, 2019.

<sup>8</sup> UFC 2-100-01 requires the installations to incorporate an Installation Climate Resilience Plan into their Master Plan. For clarity in this audit report, we will use the term assessment to refer to the process of identifying and reporting climate hazards, related risks, and the adaptations required. We will use the term Installation Climate Resilience Plan only in relation to the document required by UFC 2-100-01.

***UNDER SECRETARY OF DEFENSE FOR ACQUISITION AND SUSTAINMENT***

The Under Secretary of Defense for Acquisition and Sustainment is responsible for ensuring that DoD installations and infrastructure are resilient to climate change. In addition, the Under Secretary of Defense for Acquisition and Sustainment is responsible for developing DoD climate change adaptation and resilience policy in coordination with the Under Secretary of Defense for Policy.

***ASSISTANT SECRETARY OF DEFENSE (ENVIRONMENT AND ENERGY RESILIENCE)***

The Assistant Secretary of Defense (Environment and Energy Resilience) is the DoD's primary climate change adaptation official and is required to provide oversight of programs related to climate change.

***MILITARY DEPARTMENTS***

Military Departments are responsible for integrating climate change considerations into Department policy, guidance, plans, and operations.

***DoD Military Department Climate Assessment Guidance***

Each Military Department issued guidance to help installations perform climate resilience assessments.

- “Army Climate Resilience Handbook,” August 2020 (Army Handbook). The Army Handbook states that it is a desktop reference to guide climate-informed decisions for master planning, natural resource planning, and installation resilience in both the near term and the far term.
- Naval Facilities Engineering [Systems] Command (NAVFAC), “Climate Change Installation Adaptation and Resilience Planning Handbook,” January 2017 (Navy Handbook).<sup>9</sup> The Navy Handbook states that it is a desktop reference to be used as a companion tool throughout the planning process, especially during the analysis phase of the Navy Master Plan process.
- “Air Force Civil Engineer Severe Weather/Climate Hazard Screening and Risk Assessment Playbook,” April 2020 (Air Force Playbook). The Air Force Playbook states that it provides a framework for screening and assessing extreme weather and climate hazards and their associated current and future risks at Air Force installations.

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<sup>9</sup> On November 3, 2020, NAVFAC changed its name from the Naval Facilities Engineering Command to the Naval Facilities Engineering Systems Command to reflect its mission.

### ***DoD Instruction 4165.70, “Real Property Management”***

DoD Instruction 4165.70 assigns responsibility for managing real property. The Instruction establishes policy that requires all installations to develop a Master Plan. According to DoD Instruction 4165.70, the Master Plans:

- are developed by the DoD Component that has management responsibility for the installation,
- must be based on a strategic assessment of the operational mission and expected use of the installation,
- must cover at least a 10-year period, and
- must be updated every 5 years or more often if necessary.

### ***The FY 2020 National Defense Authorization Act***

The FY 2020 NDAA, signed on December 20, 2019, requires installation Master Plans to include a discussion of the following seven climate elements.

1. Risks and threats to military installation resilience that exist at the time of the development of the plan and that are projected for the future, including from extreme weather events, mean sea-level fluctuation, wildfires, flooding, and other changes in environmental conditions.
2. Assets or infrastructure located on the military installation vulnerable to the risks and threats described in the first element.
3. Lessons learned from the impacts of extreme weather events, including changes made to the military installation to address such impacts, since the prior Master Plan was developed.
4. Ongoing or planned infrastructure projects or other measures, as of the time of the development of the plan, to mitigate the impacts of the risks and threats described in the first element.
5. Community infrastructure and resources located outside the installation (such as medical facilities, transportation systems, and energy infrastructure) that are necessary to maintain mission capability or the resilience of the military installation, and vulnerable to the risks and threats described in the first element.
6. Agreements in effect or planned, as of the time of the development of the plan, with public or private entities for the purpose of maintaining or enhancing military installation resilience or resilience of the community infrastructure and resources described in the fifth element.

7. Projections from recognized governmental and scientific entities such as the U.S. Census Bureau, the National Academies of Sciences, the U.S. Geological Survey, and the U.S. Global Change Research Office (or any similar successor entities) with respect to future risks and threats (including the risks and threats described in the first bullet above) to the resilience of any project considered in the Master Plan during the 50-year lifespan of the installation.

### ***DoD Unified Facilities Criteria 2-100-01***

The DoD updated UFC 2-100-01 on September 30, 2020, to incorporate the requirements from the FY 2020 NDAA. UFC 2-100-01 sets the standards for the development of military installation Master Plans. The processes, products, tools, and strategies in UFC 2-100-01 apply to the preparation of Master Plans for all Army, Navy, Air Force, and Marine Corps permanent installations and Reserve Component locations in the United States. In September 2020, a DoD working group consisting of representatives from the Office of the Deputy Assistant Secretary of Defense for Construction, the U.S. Army Corps of Engineers (USACE), NAVFAC, and the Office of the Air Force Deputy Chief of Staff for Engineering and Force Protection updated UFC 2-100-01. The update included the FY 2020 NDAA requirements and required installation planners to consider extreme weather and climate change during installation master planning, as applicable to the installation. Table 1 shows the list of extreme weather and climate hazards installations should assess at a minimum, based on UFC 2-100-01. However, UFC 2-100-01 does not provide definitions of the hazards.

*Table 1. UFC 2-100-01 Extreme Weather and Climate Hazards*

UFC 2-100-01 Extreme Weather and Climate Hazards		
Storm surge flooding	Wildland fires/Wildfires	Subsidence
Non-storm surge (riverine or surface) flooding	Permafrost	Sea level change
Hurricanes/Typhoons	Desertification	Precipitation change
High winds	Volcanic	Annual average temperature increases
Tornados	Seismic	Extreme heat/cold
Drought	Tsunamis	

Note: UFC 2-100-01 establishes these climate hazards but does not define them.

Source: UFC 2-100-01.



The September 2020 update to UFC 2-100-01 also added the requirement for each DoD installation to document the extreme weather events applicable to that installation in an ICRP. An ICRP is required to be included in the Master Plan, and it should document the methodology used by the installation to recognize climate hazards and describe measures to minimize or mitigate the risks of these hazards in the future. The ICRP is required to describe extreme weather and other changing environmental factors that could affect the installation and includes information such as:

- existing and projected risks and threats to military installation resilience,
- assets or infrastructure at risk to climate or weather hazard-related risks, and
- ongoing or planned infrastructure projects to mitigate the impacts of the risks and threats.

### ***The FY 2022 National Defense Authorization Act***

The FY 2022 NDAA, signed on December 27, 2021, requires that each Secretary of a Military Department identify at least two major military installations that the Secretary considers at risk from extreme weather events. The FY 2022 NDAA further requires that Military Departments complete an ICRP for each of the identified installations within a year of the enactment of the FY 2022 NDAA. Finally, the FY 2022 NDAA requires the Secretaries of the Military Departments to brief the results of the ICRP to the Committees on Armed Services of the Senate and the House of Representatives within 60 days of completion. Table 2 contains the list of installations the Military Departments identified during the audit in response to the FY 2022 NDAA requirements.<sup>10</sup>

*Table 2. Installations Selected by the Military Departments for Review in Response to the FY 2022 NDAA Requirements*

Military Department	Installation	Location
Army	Kwajalein Atoll	Marshall Islands
Army	Fort Carson	Colorado
Navy	Naval Base San Diego	California
Navy	Marine Corps Recruit Depot Parris Island <sup>1</sup>	South Carolina
Air Force	Joint Base Langley-Eustis	Virginia
Air Force	Vandenberg Space Force Base <sup>2</sup>	California

<sup>1</sup> The Marine Corps falls under the Department of the Navy.

<sup>2</sup> The Space Force falls under the Department of the Air Force.

Source: The DoD OIG.

<sup>10</sup> Assistant Secretary of the Army (Installations, Energy, and Environment) stated in management comments to the draft report that they did not conduct an ICRP for the Kwajalein Atoll in the Marshall Islands.

To address the FY 2022 NDAA requirement, each Military Department is developing a process to obtain the information needed to perform climate resilience assessments. Specifically, the Military Departments are gathering the data required from each installation to compile the ICRP for each selected installation.

### ***Southeastern Continental United States Installations We Selected for Review***

According to “DoD Installation Exposure to Climate Change at Home and Abroad,” the main risks facing installations in the southeastern continental United States were coastal flooding and extreme weather events, specifically hurricanes. For the purpose of this audit, we defined our audit scope as the installations located in states in the southeastern continental United States bordering the Gulf of Mexico and Atlantic coast from Texas to Virginia. We nonstatistically selected six installations for review in the southeastern continental United States based on the installations’ proximity to the coastline and risks of exposure to winds from hurricanes and sea level rise.<sup>11</sup> We were not able to review an assessment for Fort Bragg because the installation Master Plan was not due for an update, and therefore, the installation had not performed a climate resilience assessment. Table 3 identifies the installations we selected for review.

*Table 3. Installations We Selected for Review*

Military Department	Installation	Conducted Site Visit	Reviewed Climate Resilience Assessment
Army	Military Ocean Terminal Sunny Point, North Carolina	X	X
Army	Fort Bragg, North Carolina		*
Navy	Naval Air Station Key West, Florida		X
Navy	Marine Corps Recruit Depot Parris Island, South Carolina	X	X
Air Force	Joint Base Langley-Eustis, Virginia	X	X
Air Force	MacDill Air Force Base, Florida		X

\* We selected Fort Bragg, but we could not perform a review because the installation had not performed a climate resilience assessment.

Source: The DoD OIG.

<sup>11</sup> While “DoD Installation Exposure to Climate Change at Home and Abroad” uses the terms coastal flooding and extreme weather events, these are not climate hazards identified in the UFC. For this report, we will use the climate hazards identified in the UFC.

## **What We Reviewed**

For this audit, we divided the methodology into two approaches. First, we compared the installation climate assessments that were already being performed to determine whether the installations within a Military Department were consistent in how they performed their assessments. We selected two installations from each Military Department that were either part of the FY 2022 NDAA response or were identified by the DoD as one of the 79 installations vulnerable to the effects of climate change. We requested climate assessments for the five installations that we selected to determine whether the Military Departments consistently assessed facility resilience and planned for adaptations needed to address climate change and extreme weather events. Specifically, we obtained documentation to compare how each location developed the climate assessments to identify the existence of consistent processes and a standardized approach. We then selected installations for site visits to determine what climate projects have been performed at the installations. We visited Marine Corps Recruit Depot (MCRD) Parris Island and Joint Base Langley-Eustis (JBLE) because the Military Departments chose these installations to be included in the response to the FY 2022 NDAA requirements. We visited Military Ocean Terminal Sunny Point (MOTSU) because it was the only U.S. Army installation within our scope that had performed a climate assessment. At these three locations, we physically observed the steps installation personnel took and projects they identified to adapt to climate change and enhance installation climate resilience.

## **Review of Internal Controls**

DoD Instruction 5010.40 requires DoD organizations to implement a comprehensive system of internal controls that provides reasonable assurance that programs are operating as intended and to evaluate the effectiveness of the controls.<sup>12</sup> We identified internal control weaknesses related to DoD installation climate resilience assessments. Specifically, we identified internal control weaknesses related to UFC 2-100-01 not defining climate hazards and not requiring the use of DoD-validated sources of information when performing climate assessments. We will provide a copy of the report to the senior officials responsible for internal controls in Office of the Assistant Secretary of Defense (Energy, Installations, and Environment) and the Departments of the Army, Navy, and Air Force.

<sup>12</sup> DoD Instruction 5010.40, "Managers' Internal Control Program Procedures," May 30, 2013 (Incorporating Change 1, June 30, 2020).

## Finding A

### The DoD Needs to Standardize Military Installation Climate Resilience Assessment and Reporting

Military Departments did not consistently develop the climate resilience assessments required in UFC 2-100-01 and the FY 2020 NDAA at the five installations we reviewed in the southeastern continental United States. Personnel at five installations did not use a standardized approach to conduct and document their assessment of the impacts of climate change and extreme weather on the installation.

Installation personnel did not use a standardized approach because DoD guidance has not been updated to reflect the changes in the law. DoD Instruction 4165.70 does not contain language requiring all installations to include climate resilience in their Master Plans. In addition, while UFC 2-100-01 was updated, it does not:

- adequately define the climate hazards the installations should assess,
- include a list of DoD-approved data sources or require the installation personnel to justify why they used self-identified data sources, or
- require the assessments to follow a standard format.

Finally, Military Departments did not update their guidance to identify the seven required elements from the FY 2020 NDAA or require assessments to use specific climate hazards established in UFC 2-100-01.

As a result, the DoD is at an increased risk of not adequately assessing climate change impacts that affect military installations or evaluating how climate change will impact readiness. Without standardized assessment and reporting, DoD personnel will not be able to compare climate projects across the Military Departments to prioritize resources needed to mitigate the most pressing effects of climate change. The lack of standardized reporting could also limit the application of best practices across the DoD if the information is not presented uniformly.

If installation personnel do not identify or assess all climate hazards that affect their installation, installation planners will not be able to determine how to adapt the installation to be more resilient to ensure future readiness. Furthermore, without the ability to determine what climate hazards affect the installation, installation personnel cannot identify construction projects to improve installation resilience.

## **Military Departments Did Not Consistently Assess Climate Hazards**

The Military Departments did not consistently develop the climate resilience assessments required in UFC 2-100-01 and the FY 2020 NDAA for the installations we reviewed in the southeastern continental United States. For the climate resilience assessment reviewed, Military Departments were not consistent in the climate hazards assessed, used a variety of sources of information to conduct the assessments, and did not follow a consistent format for reporting the assessments.

### ***Military Departments Did Not Consistently Use Standardized Hazard Assessments Identified in Criteria***

The Military Departments did not consistently use standardized hazard assessments. UFC 2-100-01 identifies 17 climate hazards the installations must assess, such as storm surge flooding, non-storm surge (riverine or surface) flooding, hurricanes/typhoons, high winds, sea level change, and precipitation change. In addition, UFC 2-100-01 requires installation personnel to assess the level of risk their installation is vulnerable to for the 17 climate hazards. Personnel at JBLE and MacDill Air Force Base assessed all 17 climate hazards that affected their installations and the severity of the impact of the climate hazards to the installation. However, some of the climate hazards included in the MOTSU and Naval Air Station (NAS) Key West climate assessments differed from those found in UFC 2-100-01. For example, MOTSU personnel assessed five climate hazards, but only four hazards assessed were included in UFC 2-100-01. Personnel at NAS Key West assessed three climate hazards, but only two hazards assessed were included in UFC 2-100-01. For the hazards assessed that were not included in UFC 2-100-01, it was unclear how the hazards assessed by the installations corresponded to the climate hazards included in UFC 2-100-01. For example, MOTSU personnel assessed “recurring flooding,” and NAS Key West included “coastal flooding.” We could not determine how these two climate hazards related to the “storm surge flooding” and “non-storm surge flooding (riverine or surface)” categories in UFC 2-100-01.

UFC 2-100-01 does not require installations to address all 17 climate hazards. Instead, the guidance states that the installations are required to “assess the risks related to extreme weather events and climate change phenomena applicable to a specific location.” UFC 2-100-01 does not require the installation personnel to

*Only two of the five installations reviewed covered all 17 climate hazards outlined in UFC 2-100-01, with the remaining three installations including only some of the climate hazards in their assessments and no discussion of the climate hazards that were not included.*

report on their determination as to which climate hazards were applicable. Only two of the five installations reviewed covered all 17 climate hazards outlined in UFC 2-100-01, with the remaining three installations including only

some of the climate hazards in their assessments and no discussion of the climate hazards that were not included. For example, MCRD Parris Island personnel assessed only 3 of the 17 UFC 2-100-01 climate hazards in their assessment, and the assessment did not contain any discussion of why the other 14 climate hazards did not apply. MCRD Parris Island personnel stated that there was no guidance on what climate hazards applied, and they used professional judgement to determine what climate hazards to assess. While the installation officials at the sites we visited were aware of the hazards that would affect the installation, not all hazards were included in the installation's climate assessment. Therefore, based on the information provided in the climate assessment, we were unable to determine whether the installation determined that the 14 omitted climate hazards were not applicable or the installation did not assess those hazards. See Table 5 in Appendix B for the list of 17 climate hazards identified in UFC 2-100-01 and the climate hazards the installations addressed in their assessments that we reviewed.

### ***Military Departments Were Using Different Sources of Information for Installation Hazard Assessments***

The Military Departments used different sources of information to perform the climate hazard assessments at the installations we reviewed. At the five installations we reviewed, installation personnel used 35 different sources of climate data to assess the risks facing the installation, sometimes using different data sources for the same climate hazard within a Military Department. For example, the Air Force used different sources of information when addressing hurricanes in its climate resilience assessments. Specifically, personnel at JBLE used sources such as the Integrated Natural Resources Management Plan and the Union of Concerned Scientists Report of 2016,

*At the five installations we reviewed, installation personnel used 35 different sources of climate data to assess the risks facing the installation, sometimes using different data sources for the same climate hazard within a Military Department.*

while MacDill Air Force Base personnel used sources such as the Installation Complex Encroachment Management Action Plan and National Oceanic and Atmospheric Administration data. Personnel that performed climate resilience assessments stated that they were not always aware of the different sources available for use in performing their assessments and relied on their personal knowledge of databases to identify sources for their assessments. See Table 6 in Appendix B for the lists of installations reviewed and the sources of information used to perform the assessment.

In addition, Army, Navy, Air Force, and Marine Corps installation personnel stated that when they performed the climate resilience assessments, they determined that the use of multiple sources of information was necessary. Personnel at MCRD Parris Island and JBLE stated that the climate hazard-related data contained in national databases were not in alignment with their regional and state data or were incomplete and obsolete. For example, personnel at MCRD Parris Island stated that the buoy used by the National Oceanic and Atmospheric Administration to measure tidal surge was located too far away from their installation to be accurate. Therefore, installation personnel installed a local tidal buoy to determine the level of tidal surge that affected their installation. The local tidal buoy showed that the tidal surge during the day was on average 0.22-foot higher than reported in the DoD Regional Sea Level Database. Finally, at JBLE, personnel stated that they used a National Aeronautics and Space Administration Flood Tool that predicted flooding based on predicted sea level rise because the Federal Emergency Management Agency flood zone information was more than 30 years old and not consistent with the current climate conditions.

Without accurate, reliable future climate data, the Military Departments will not be able to predict the future impacts of climate change on their installations. The five installations identified and used multiple data sources to determine the impacts of the climate hazards that would affect their installations.

However, not all five installations included their rationale for the selection of the sources used in the climate assessments. For example, both MOTSU

*However, not all five installations included their rationale for the selection of the sources used in the climate assessments.*

and NAS Key West personnel used data from sources that were not included in the list of sources provided in UFC 2-100-01 or Military Department guidance. Neither MOTSU nor NAS Key West personnel included a discussion on why they selected these data sources in their climate assessments. Alternatively, personnel at MCRD Parris Island included a detailed discussion in their climate assessment

report explaining why the DoD Regional Sea Level Database was inaccurate for their location and what steps they took to ensure their climate hazard assessments were based on accurate data.

### ***Military Departments Were Not Consistent in Assessing and Reporting Hazards***

In an effort to address the FY 2020 NDAA requirements, the personnel at the installations we reviewed conducted climate resilience assessments; however, installation personnel did not assess climate hazards using the same methods across the Departments. In addition, installation personnel independently developed their assessment format and layout, leading to differences in what information installation personnel presented.

#### ***MOTSU Installation Assessment and Report***

The MOTSU assessment contained 289 pages of detailed information and addressed all seven elements outlined in UFC 2-100-01. The assessment included a flood hazard map, 100-year water level analysis, and historical flood hazard events. The MOTSU assessment also included maps and analysis of MOTSU's topography, the projected effect of sea level rise, and the history of climate change events that led to significant flooding at MOTSU. MOTSU used a consequence rating scale to assess risk with low, medium, high, and very high-risk levels to document the various climate hazards at the installation.<sup>13</sup> In addition, the assessment included flood scenarios due to sea level rise and the potential effects on the main areas on the installation. It included resilience objectives to address imminent, short-term, and long-term flood and land degradation hazards that affect MOTSU. Finally, the assessment identified projects designed to address the existing stormwater drainage and conveyance system to mitigate the effects of future climate hazards.

#### ***MCRD Parris Island Assessment and Report***

The MCRD Parris Island assessment contained 110 pages of detailed information and addressed all seven climate assessment elements outlined in UFC 2-100-01. The MCRD Parris Island assessment included maps and analysis of MCRD topography mapping the projected impact of sea level rise and the average high tide. The MCRD Parris Island assessment did not use a rating scale to assess risk; instead, it followed a four-stage approach to assessing the climate hazards, developing adaptations for these hazards, calculating the benefits and costs of the adaptations, and identifying alternative actions the installation could take to address the hazards. The MCRD Parris Island assessment applied this staged approach to seven different projects related to permanent inundation and storm surge flooding.

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<sup>13</sup> A consequence rating scale considers both asset and mission impact arising from exposure to the hazards.



### ***NAS Key West Installation Assessment and Report***

NAS Key West climate assessment contained 14 pages of general information and did not contain a comprehensive climate resilience study. The assessment addressed all seven elements outlined in UFC 2-100-01; however, the plan provided a limited amount of information for each element. For example, one UFC 2-100-01 element requires climate assessments to evaluate previous weather events and apply lessons learned when developing resilience and adaptation measures. The NAS Key West assessment established only that the personnel should review hurricane preparedness plans before each hurricane season, and that future construction designs would include climate change considerations. The section did not evaluate the impact of prior hurricane events nor did it identify the necessary changes to the installation to mitigate the impacts from occurring again. The NAS Key West assessment used the Navy's Weighted Order-Weighted Average score index to assess risk and included a graph of the hazards to the installation from the Defense Climate Assessment Tool, but did not include detailed discussion of the specific hazards.<sup>14</sup> Finally, the NAS Key West assessment highlighted that there had not been a comprehensive resilience study undertaken at the installation to address climate change as a whole.

### ***JBLE and MacDill Air Force Base Installation Assessments***

JBLE and MacDill Air Force Base personnel did not complete an ICRP, and only completed an assessment of the climate hazards that could affect the installations. JBLE and MacDill Air Force Base personnel used Excel spreadsheets developed by the Air Force to assess the climate hazards affecting each installation and identified the risks associated with those hazards. Both the JBLE and MacDill Air Force Base spreadsheets use a four-level risk scale rating of extremely high, high, medium, and low based on the probability and the severity of each hazard. However, the Air Force personnel at both installations did not analyze the steps needed to adapt to those hazards. In response to the FY 2020 NDAA, the Air Force established a three-phased approach to assess the hazards and determine the impacts to the installations, rate the risks associated with each hazard, and establish adaptation efforts to address each hazard. Because of the phased approach, all Air Force installations had completed their hazard assessments; however, none of the Air Force installations had progressed past identifying what climate hazards applied to the installation when the FY 2022 NDAA was signed. Air Force officials stated that they plan to complete the climate assessments for the two installations selected to meet the FY 2022 NDAA requirements, and will apply the lessons learned from congressional reviews to all Air Force installations.

<sup>14</sup> The Weighted Order-Weighted Average score is an index used to standardize environmental impacts to all Navy installations globally.

## DoD Instruction 4165.70 Has Not Been Updated to Include New Requirements

DoD guidance has not been updated to reflect the changes in the law.

DoD Instruction 4165.70 does not contain language requiring all installations to include climate resilience in their Master Plans. The Instruction was last

*DoD Instruction 4165.70 establishes the requirement for all military installations to perform Master Plans but does not include the requirement to include climate resilience plans in the Master Plans.*

updated in 2018, before the requirements were established in the FY 2020 NDAA. DoD Instruction 4165.70 establishes the requirement for all military installations to perform Master Plans but does not include the requirement to include

climate resilience plans in the Master Plans. Therefore, the Under Secretary of Defense for Acquisition and Sustainment should update DoD Instruction 4165.70 to include the requirement to incorporate climate resilience plans in all installation Master Plans.

## UFC 2-100-01 Does Not Include Standard Requirements in All Areas Needed for Consistent Reporting

UFC 2-100-01 does not adequately define the climate hazards the installations should assess. In addition, UFC 2-100-01 does not include a list of DoD-approved sources or require installation personnel to justify why they used self-identified sources of data in their ICRPs. Finally, UFC 2-100-01 does not standardize report formats for climate resilience assessments to follow.

### ***UFC 2-100-01 Does Not Define Climate Hazards***

UFC 2-100-01 does not adequately define the climate hazards the installations should assess. Even though UFC 2-100-01 provides a list of 17 climate hazards, it does not provide a standard definition for each of the 17 climate hazards.

During our audit, we determined that installations were not consistently using the climate hazards identified in the UFC and instead the installations were assessing climate hazards they defined. For example, the MOTSU assessment identified five climate hazards that applied to MOTSU. Of the five hazards, four hazards aligned with the hazards listed in UFC 2-100-01, specifically drought, desertification, wildfires, and permafrost. The fifth hazard in the MOTSU assessment is “recurrent flooding,” which the assessment defined as coastal and riverine flooding. However, UFC 2-100-01 establishes the terms “storm surge flooding” and “non-storm surge flooding” and does not thoroughly

define each term. Because the UFC does not define “storm surge flooding” and “non-storm surge flooding,” it is not clear whether MOTSU’s “recurrent flooding” addresses any climate hazard in UFC 2-100-01. Without defining the terms and providing explanations of what should be included in the climate hazards, different installations could assess the same conditions in different climate hazards and could make comparisons across installations difficult. For example, without definitions of UFC 2-100-01 climate hazards “storm surge flooding,” “non-storm surge flooding,” and “sea level change,” installations could include tidal flooding into any of these climate hazards. Therefore, senior Military Department officials may have difficulty comparing climate hazards, prioritizing projects to address these issues, and identifying best practices to address the hazards across the Military Departments.

In addition, UFC 2-100-01 requires climate assessments to address only hazards applicable to the installation but does not direct installations to provide a justification of why the other climate hazards do not apply. At MOTSU, NAS Key West, and MCRD Parris Island, installation personnel did not explain in their assessments why climate hazards listed in UFC 2-100-01 were not applicable. MOTSU personnel only included assessments of the climate hazards deemed applicable to their installation and did not include any rationale for the omission of the other hazards outlined in UFC 2-100-01. The MCRD Parris Island personnel addressed three climate hazards that applied to the installation, but did not address the remaining 14 hazards, and therefore potentially omitted applicable hazards, such as high

winds, hurricanes, or extreme heat or cold. For example, according to a Military Health System report, MCRD Parris Island recorded 530 heat-related illness events from 2017 through 2021; however, MCRD Parris Island personnel did not include any

*If installations do not consider all the climate hazards that may affect the installation, it will be difficult to establish an adequate adaptation plan and prioritize areas and installations that are more susceptible.*

discussion of extreme heat in their assessment. If installations do not consider all the climate hazards that may affect the installation, it will be difficult to establish an adequate adaptation plan and prioritize areas and installations that are more susceptible. Therefore, after DoD Instruction 4165.70 is updated, the Assistant Secretary of Defense (Energy, Installations, and Environment), in coordination with USACE, NAVFAC, and the Air Force Civil Engineer Center (AFCEC), should update UFC 2-100-01 to include definitions of the climate hazards to ensure that climate impacts are being reported consistently across the DoD. In addition, the Assistant Secretary of Defense (Energy, Installations, and Environment), in coordination

with USACE, NAVFAC, and AFCEC, should update UFC 2-100-01 to require the installations to address in their climate resilience assessments the rationale for the climate hazards that were determined not applicable to the installation.

### ***UFC 2-100-01 Does Not Identify Approved Data Sources or Require Justifications for Other Sources***

UFC 2-100-01 provides examples of sources of information for assessing climate hazard risk, and the Military Department guidance provides additional potential sources of information, but neither set of guidance requires the use of these sources. In the ICRP section of UFC 2-100-01, the guidance identifies the DoD Climate Vulnerability Assessment Tool and the DoD Regional Sea Level Database as possible sources of information to use for assessing installation climate hazards. UFC 2-100-01 includes additional sources of information in other sections of the guidance, such as in portions dealing with off-installation data collection and environmental conditions. However, UFC 2-100-01 does not require the use of these sources of information and allows the use of other tools, models, or databases. In addition to listing sources within UFC 2-100-01, guidance from the Military Departments listed additional sources of information for assessing installation climate hazards. For example, the Navy Handbook identifies the DoD Regional Sea Level Database from UFC 2-100-01, but it does not identify the DoD Climate Vulnerability Assessment Tool. In addition, the Navy Handbook identifies 17 additional sources of information to use that UFC 2-100-01 did not mention. See Table 7 in Appendix B for a comparison of sources of information listed in DoD climate resilience guidance to sources of information listed in Military Department guidance.

During our site visits, installation personnel stated that they were not aware of all of these potential sources for data, and often used locally identified sources of data for their climate assessments. UFC 2-100-01 does state that installation personnel may use other tools, models, or databases if available; however, the

*During our site visits, installation personnel stated that they were not aware of all of these potential sources for data, and often used locally identified sources of data for their climate assessments.*

UFC does not require installation personnel to provide information on why they chose the additional sources of data and the accuracy of the information used in their assessments. The importance of reliable sources of data and information that military

installations can use to develop their climate assessments is imperative for installations to create adaptation and resilience plans that will help the DoD optimize resource allocation and minimize future vulnerabilities to mission

readiness. Therefore, after DoD Instruction 4165.70 is updated, the Assistant Secretary of Defense (Energy, Installations, and Environment), in coordination with USACE, NAVFAC, and AFCEC, should update UFC 2-100-01 to include a list of DoD-approved standard sources of information. In addition, UFC 2-100-01 should include requirements for the installation to assess the accuracy of the information contained in any data source that is not included in the approved list and provide a summary of that assessment in the ICRP.

### ***UFC 2-100-01 Does Not Establish a Standardized Assessment Process and Reporting Format***

UFC 2-100-01 does not establish a standard process for installations to follow in performing the climate assessments or a consistent report format to document their findings. The ICRP section in UFC 2-100-01 outlines the seven elements established from the FY 2020 NDAA, but it does not provide any additional guidance as to how the assessment should be performed and what the ICRP should contain.

We identified many differences in how the installations we reviewed performed their assessments. For example, the MOTSU assessment identified projects needed to address near-, medium-, and long-term climate change while the NAS Key West assessment did not identify any mitigation projects for the base beyond some environmental projects, such as wetland protection and shoreline preservation. In addition, the structure and presentation of information differed in each of the plans reviewed, making a comparison between the different assessments difficult.

*We identified many differences in how the installations we reviewed performed their assessments.*

The UFC also did not define the criteria for determining the level of risk to an installation, and there was no standardized risk scale to compare climate hazards between the Military Departments. MOTSU used a consequence rating scale that categorized risk into low, medium, high, and very high-risk levels by comparing the hazard’s potential impact with the installation’s ability to adapt to the hazard. Both Air Force installations also used a four-level scale—low, medium, high, and extremely high-risk levels—to categorize risks and based the determination on a comparison of potential impact with frequency of occurrence. NAS Key West used Weighted Order-Weighted Average numbered index to assess risk. MCRD Parris Island’s assessment did not use a risk rating scale; instead, MCRD Parris Island personnel assessed current and future climate hazards and developed project options to reduce, mitigate, or eliminate risks from climate change.

For the ICRPs to be a beneficial tool to determine risks and compare climate impacts across the DoD and develop a DoD-wide assessment of the impacts of climate change to the installations, UFC 2-100-01 needs to include requirements for a standard reporting format and risk rating criteria for all installations. A standard reporting format would allow users to quickly locate similar information at different installations across the Military Departments, and standard risk rating criteria would allow the DoD to prioritize climate adaptation plans according to their importance. To allocate resources in the more susceptible areas, the DoD needs to be able to assess risk and compare the information provided by the installations and make informed decisions to address the issues. If the DoD received information that is different or not comparable, it would be difficult to determine the best use of DoD resources. Therefore, after DoD Instruction 4165.70 is updated, the Assistant Secretary of Defense (Energy, Installations, and Environment), in coordination with USACE, NAVFAC, and AFCEC should update UFC 2-100-01 to include a standard ICRP report format and establish standardized risk rating criteria and definitions.

## **Military Departments Did Not Update Guidance to Match UFC 2-100-01 Requirements**

Military Department guidance did not always align with UFC 2-100-01 requirements. Specifically, Military Department guidance did not require military installation personnel to assess all 17 climate hazards outlined in UFC 2-100-01 or include processes for installations to assess all seven FY 2020 NDAA elements.

### ***Military Department Guidance Did Not Require Use of UFC-Defined Hazards***

Military Department guidance did not always align with UFC 2-100-01 requirements and did not require military installation personnel to assess the 17 climate hazards outlined in UFC 2-100-01. Guidance from all three Military Departments was issued before the update of UFC 2-100-01. The Army Handbook was issued in August 2020, and the Navy Handbook was issued in January 2017, so neither included the language for the 17 climate hazards introduced in the September 2020 update of UFC 2-100-01. While the Air Force did not update

*Because the Military Departments did not update the handbooks to reflect the climate hazards, the Army Handbook contains only 6 of the 17 hazards, and the Navy Handbook has only 9 of the 17 hazards.*

the Air Force Playbook since the issuance of UFC 2-100-01, it did provide a spreadsheet listing the 17 climate hazards for installations to use in assessing climate impacts. Because the Military Departments did not update the handbooks to

reflect the climate hazards, the Army Handbook contains only 6 of the 17 hazards, and the Navy Handbook has only 9 of the 17 hazards. The Air Force Playbook identifies the 17 climate hazards contained in the UFC and allows the installations to identify additional hazards that could affect the installation. Because Military Department guidance does not fully align with UFC 2-100-01, installation personnel may not be able to determine which climate hazards they should evaluate and whether they have assessed all climate hazards that affect their installations. A lack of standardization in the climate hazards the installations assess would limit the DoD's ability to compare and prioritize needs across the Department, and could result in a greater risk from the climate hazards that impact the DoD's missions. Therefore, after DoD Instruction 4165.70 and UFC 2-100-01 are updated, the Commanders of USACE and NAVFAC should update their respective handbooks to include the requirement for each installation to assess the climate hazards outlined in the updated UFC 2-100-01.

### ***Military Department Guidance Did Not Address All NDAA Elements Included in the UFC***

Military Departments did not update their guidance to include processes for installations to assess all seven elements required by the FY 2020 NDAA and incorporated as requirements in UFC 2-100-01. All three Military Department issued their guides before the update of UFC 2-100-01, and thus the guides did not contain the updated requirements. Officials from all three Military Departments stated that they intend to issue updated guidance based on the FY 2022 NDAA requirements. Table 4 outlines the FY 2020 NDAA elements that are included in the Military Department guidance.

*Table 4. FY 2020 NDAA Elements That Are Within the Military Department Guidance*

FY 2020 NDAA Elements	Army Handbook	Navy Handbook	Air Force Playbook
Identify existing and projected risks and threats to military installation resilience			X
Identify installation assets or infrastructure at risk to climate hazard-related risks and threats	X	X	X
Evaluate previous extreme weather events and application of lessons learned	X	X	
Identify infrastructure projects to mitigate the impacts of the risks and threats	X		X
Identify community infrastructure and resources located outside the installation			X
Identify agreements with public or private entities for maintaining or enhancing military installation resilience			X

Table 4. FY 2020 NDAA Elements That Are Within the Military Department Guidance (cont'd)

FY 2020 NDAA Elements	Army Handbook	Navy Handbook	Air Force Playbook
Identify projections for future risks and threats to the resilience of any project	X	X	
<b>Number of Elements Addressed</b>	<b>4</b>	<b>3</b>	<b>5</b>

Source: The DoD OIG.

As Table 4 shows, of the seven reporting elements, the Army Handbook did not include three, the Navy Handbook did not include four, and the Air Force Playbook did not include two. The seven elements, which came from the FY 2020 NDAA, directly identify what Congress wants installations to include in the ICRPs. These elements provide a clear view to Congress as to what climate hazards would affect the installations and what steps, if any, the installations have taken to adapt to the climate hazards and make the installation more resilient. Therefore, after DoD Instruction 4165.70 and UFC 2-100-01 are updated, the Commanders of USACE, NAVFAC, and AFCEC should update their respective guidance to include the requirement for each installation to assess all elements required by the FY 2020 NDAA and outlined in UFC 2-100-01.

## The DoD May Not Prioritize Climate Resilience Construction Projects Based on Installations Most Affected by Climate Change

Because the Military Departments have not consistently developed the climate resilience assessments needed to meet the requirements in UFC 2-100-01 and the FY 2020 NDAA at the five installations we reviewed, the DoD may not prioritize climate resilience construction projects based on installations that are most affected by climate change.

Without standardized assessment and reporting, DoD personnel will not be able to compare climate projects across the Military Departments to prioritize resources needed to mitigate the most pressing effects of climate change.

*Without standardized assessment and reporting, DoD personnel will not be able to compare climate projects across the Military Departments to prioritize resources needed to mitigate the most pressing effects of climate change.*

In addition, without standardized risk assessment criteria, the Military Departments and individual installations will develop independent methods to assess risk that could limit the DoD's ability to determine which installations were at the highest immediate



risk. The lack of standardized reporting could also limit the application of best practices across the DoD. Furthermore, without a standard report format, users would have to read the entire ICRP to determine what risks each installation faced and the mitigation identified for these risks. If the reports were standardized, planners would easily discern and quickly determine whether other installations faced similar risks and whether mitigation plans could be adapted to their location. In addition, nonstandard terms used in reporting climate resilience assessments may result in inconsistent reporting to the Committees on Armed Services of the Senate and the House of Representatives as required in the FY 2022 NDAA.

## **Management Comments on the Finding and Our Response**

### ***Deputy Assistant Secretary of Defense for Construction, Performing the Duties of the Principal Deputy Assistant Secretary of Defense for Energy, Installations, and Environment Comments***

The Deputy Assistant Secretary of Defense for Construction, responding for the Under Secretary of Defense for Acquisition and Sustainment, stated that the section titled “The DoD May Not Prioritize Climate Resilience Construction Projects Based on Installations Most Affected by Climate Change” is misleading or inaccurate. The Deputy Assistant Secretary stated that the heading implies that Congress directed DoD to prioritize military construction projects based on installations most affected by climate change. The Deputy Assistant Secretary stated that there was no such direction from Congress, and the DoD is not working any policy direction to do so, as military construction projects are prioritized by impact on mission regardless of whether they are affected by climate change. The Deputy Assistant Secretary stated that prioritizing resources and projects remains with the Secretaries of the Military Departments. The Deputy Assistant Secretary requested that we restate the heading to address the applicability of a standard assessment process and reporting capability and remove or modify the first sentence in the second paragraph on page 22.

### ***Our Response***

We acknowledge the Deputy Assistant Secretary of Defense for Construction’s concern with wording in the section “The DoD May Not Prioritize Climate Resilience Construction Projects Based on Installations Most Affected by Climate Change.” Our intent with the section was to broadly include all of the DoD. We did not intend to imply the Office of the Secretary of Defense determined the prioritization of military construction projects or that Congress required them

to do so. We used “DoD” to encompass the Military Departments’ prioritization of construction projects, and determined the report section does not need to be updated.

### ***Assistant Secretary of the Army (Installations, Energy, and Environment) Comments***

The Assistant Secretary of the Army (Installations, Energy, and Environment) stated the Army does not cite the MOTSU ICRP as a completed ICRP consistent with the congressional requirement, because the report was analyzed and written before the publication of the ICRP guidance evaluated in this audit. The Assistant Secretary identified two almost completed ICRPs and a third ICRP in progress that meet ICRP standards used for this DoD OIG report. The Assistant Secretary stated that the Army conducted two pilot ICRPs during 2022, on Fort Carson and Anniston Army Depot, and developed a template and process for use for all other Army ICRPs. The Assistant Secretary stated none of these ICRPs were reviewed during the audit. The Assistant Secretary stated that the Army did not conduct an ICRP on Kwajalein in 2022 because of data limitations and the ICRP pilot deadline.

The Assistant Secretary stated that the language throughout the report referring to assessing all climate hazards should include the term “as applicable” to align with the UFC 2-100-01 requirement for installations to assess only those hazards that are applicable to the installation instead of “at a minimum.” The Assistant Secretary indicated that in many cases, many of these hazards are not applicable to installations. This discrepancy could result in a significant amount of evaluation and analysis related to hazards that are not applicable to installation function and mission.

The Assistant Secretary stated that what constitutes a climate hazard must be reviewed and updated in UFC 2-100-01, as several of the extreme weather and climate hazards identified in the report from section 2-2.17.1 of UFC 2-100-01, such as seismic and volcanic hazards, are not climate hazards. The Assistant Secretary stated that although these hazards should be incorporated into the planning process, these hazards are not applicable to an ICRP and should be removed from the UFC 2-100-01 language. The Assistant Secretary suggested that the hazards align to existing DoD tools outlining climate hazards, such as DCAT, to ensure consistency with attention paid to the indicators that are included in the larger hazard categories. For instance, DCAT defines hazards as Coastal Flooding, Drought, Energy Demand, Extreme Temperature, Historical Extreme Conditions, Land Degradation, Riverine Flooding, and Wildfire. The Assistant Secretary stated that many of the hazards currently identified in the UFC 2-100-01 fall under these eight more generalized hazard categories.

## *Our Response*

In response to the Assistant Secretary's comments regarding the climate assessment at MOTSU, we acknowledge in the report that this assessment was performed before the issuance of the FY 2020 NDAA guidance. We did not refer to the MOTSU report as an ICRP and rather used the wording "climate assessment" to avoid implying that the MOTSU report was considered an official ICRP. The MOTSU climate assessment was the only assessment completed by the Army in the southeastern continental United States.

In response to the Assistant Secretary's comments on the locations selected in response to the FY2022 NDAA requirement, the information presented in the report represents the sites identified by the Army during the audit. We did not include Fort Carson in our review because it is outside the southeastern continental United States. We were not informed of the Army's inclusion of the Anniston Army Depot until we received the Assistant Secretary's comments to the draft report. We added a footnote to Table 2 to address the Assistant Secretary's comments that the Army replaced Kwajalein with the Anniston Army Depot.

We acknowledge the Assistant Secretary's concern with a significant amount of evaluation and analysis related to hazards that are not applicable to installation function and mission. However, we disagree that "as applicable" should be included because it does not allow for the installations to document that they have actually assessed and made the determination that the hazard is not applicable. As stated on page 17 of this report, MCRD Parris Island recorded 530 heat-related illness events from 2017 through 2021; however, MCRD Parris Island personnel did not include any discussion of extreme heat in their assessment. We could not determine whether extreme heat was omitted or categorized as "not applicable." If MCRD Parris Island personnel had included a statement of why extreme heat was not applicable, we would have been able to determine the accuracy of the assessment. Therefore, when assessing climate hazards that are not applicable to the installation, the Military Services should provide a justification of why the hazard is "not applicable" at an installation.

We acknowledge the Assistant Secretary's concern about the climate hazards identified in the report. As currently written, the 17 climate hazards referred to in this report are included in the current version of UFC 2-100-01, dated September 30, 2020. However, because UFC 2-100-01 is a collaborative document between representatives from the Office of the Assistant Secretary of Defense (Energy, Installations, and Environment) and the Military Departments, it is incumbent on Assistant Secretary of Defense (Energy, Installations, and Environment) and the Military Departments to agree on which climate hazards should be listed and consistently assessed across all installations in their ICRPs.

### ***Marine Corps Technical Comments on the Report***

Although not required to comment, officials from the Marine Corps provided unsigned technical comments on the report. We acknowledge the comments provided and considered them in this final report.

## **Recommendations, Management Comments, and Our Response**

### ***Redirected and Revised Recommendations***

As a result of management comments from the Deputy Assistant Secretary of Defense for Construction, responding for the Under Secretary of Defense for Acquisition and Sustainment, we redirected draft Recommendations A.2.a through A.2.e to the Under Secretary of Defense for Acquisition and Sustainment. We then revised and redirected Recommendation A.3, for the Deputy Assistant Secretary of Defense for Construction, and the Commanders of the U.S. Army Corps of Engineers, Naval Facilities Engineering Systems Command, and Air Force Civil Engineer Center to update implementing guidance in UFC 2-100-01, "Installation Master Planning," September 30, 2020, and their respective Military Department handbooks to incorporate the Under Secretary of Defense for Acquisition and Sustainment policy update in Recommendations A.1 and A.2.a through A.2.e.

### ***Recommendation A.1***

**We recommend that the Under Secretary of Defense for Acquisition and Sustainment update DoD Instruction 4165.70, "Real Property Management," April 6, 2005, to include the requirement to incorporate climate resilience plans in all installation Master Plans.**

### ***Deputy Assistant Secretary of Defense for Construction Comments***

The Deputy Assistant Secretary of Defense for Construction, responding for the Under Secretary of Defense for Acquisition and Sustainment, agreed with the recommendation. The Deputy Assistant Secretary agreed that policy updates are needed, but stated that officials have not yet determined whether these changes should reside in DoD Instruction 4165.70, "Real Property Management," April 6, 2005, or whether climate-related policies should be consolidated in a separate DoD Instruction.

### ***Our Response***

The Deputy Assistant Secretary of Defense for Construction addressed the specifics of the recommendation. Therefore, the recommendation is resolved but will remain open. Regardless of whether the Deputy Assistant Secretary decides that a new policy or an update to an existing policy is required, the policy should include a requirement for all installations to complete an ICRP. We will close the recommendation once we verify that the DoD has issued or updated a policy that incorporates all requirements to address our recommendation.

### ***Naval Facilities Engineering Systems Command Comments***

Although not required to comment, the Commander of the Naval Facilities Engineering Systems Command partially agreed, stating that 10 U.S.C. § 2864 only requires development of ICRPs and Master Plans for “major military installations,” rather than all installations. The Commander stated that the most recent DoD Base Structure Report defines a major military installation as a “large site.” The Commander stated that there is no clear guidance in the law for those installations that are not considered “major military installations.” Therefore, the Commander requested that we explicitly state in our recommendation to extend the applicability of 10 U.S.C. § 2864 to all installations, if that is our intent.

### ***Our Response***

We agree with the comments from the Commander of the Naval Facilities Engineering System Command that Public Law 116-92, “The National Defense Authorization Act for Fiscal Year 2020,” section 2801, “Military installation resilience plans and projects,” December 20, 2019, updated 10 U.S.C. § 2864 which only requires development of ICRPs and Master Plans for major military installations. However, the current DoD Instruction 4165.70, “Real Property Management,” establishes the requirement for all military installations to develop a Master Plan. The Under Secretary of Defense for Acquisition and Sustainment agreed with recommendation A.1 to update policy to include the requirement for ICRPs in all installation Master Plans.

## ***Recommendation A.2***

**We recommend that the Under Secretary of Defense for Acquisition and Sustainment update DoD Instruction 4165.70, “Real Property Management,” April 6, 2005 to:**

- a. Define the climate hazards so that climate impacts are being reported consistently across the DoD and require the military installations to address the rationale for the climate hazards that were determined not applicable to the installation.**
- b. List DoD-approved sources of information.**
- c. Require military installations to assess the accuracy of the information contained in any data source that is not included in the approved list and provide a summary of that assessment in the Installation Climate Resilience Plan.**
- d. Standardize the Installation Climate Resilience Plan report format.**
- e. Establish standardized risk rating categories and define those risk rating categories.**

### ***Deputy Assistant Secretary of Defense for Construction Comments***

The Deputy Assistant Secretary of Defense for Construction, responding for the Under Secretary of Defense for Acquisition and Sustainment, partially agreed with the recommendation. The Deputy Assistant Secretary agreed that these elements are not currently present in UFC 2-100-01; however, the Deputy Assistant Secretary disagreed the elements should reside in UFC 2-100-01. The Deputy Assistant Secretary stated that the UFCs are technical criteria documents, and the elements in Recommendations A.2.a through A.2.e are policy-related and should be included in a DoD Instruction. The Deputy Assistant Secretary stated that the DoD will include these elements in the DoD Instruction planned for Recommendation A.1.

### ***Our Response***

The Deputy Assistant Secretary of Defense for Construction addressed the specifics of the recommendation. Therefore, the recommendation is resolved but will remain open. We agree with the planned steps by the Deputy Assistant Secretary to include Recommendations A.2.a through A.2.e in the policy decision planned for Recommendation A.1. We will close the recommendation once we verify that recommendations A.2.a through A.2.e are incorporated into DoD policy.

### ***Assistant Secretary of the Army (Installations, Energy, and Environment) and Naval Facilities Engineering Systems Command Comments***

The Assistant Secretary of the Army (Installations, Energy, and Environment) and the Commander of the Naval Facilities Engineering Systems Command provided comments in response to Recommendation A.2. The Assistant Secretary agreed, and the Commander partially agreed with the need to update their current policies. However, based on redirecting of Recommendation A.2 to the Under Secretary of Defense for Acquisition and Sustainment, the Assistant Secretary's and the Commander's comments are addressed in revised Recommendation A.3.

### ***Recommendation A.3***

**We recommend that the Deputy Assistant Secretary of Defense for Construction in coordination with the Commanders of the U.S. Army Corps of Engineers, Naval Facilities Engineering Systems Command, and Air Force Civil Engineer Center update Unified Facilities Criteria 2-100-01, "Installation Master Planning," September 30, 2020, and then the Military Departments update their respective handbooks to include the policy updates for Recommendations A.2.a through A.2.e and the requirement for each installation to assess the climate hazards outlined in the updated Unified Facilities Criteria 2-100-01, "Installation Master Planning," September 30, 2020.**

### ***Management Comments Required***

Due to a DoD OIG technical error when sending the encrypted draft report link to the Auditor General, U.S. Air Force general group inbox, the Commander of the Air Force Civil Engineer Center did not receive the draft report. During discussions with U.S. Air Force Auditor General personnel, we agreed that the best way forward would be for the Commander, Air Force Civil Engineering Center to provide comments to the final report. Therefore, as the Commander did not comment on the recommendation in the draft report we consider the recommendation unresolved. We request that the Commander of the Air Force Civil Engineer Center provide comments on the final report within 30 days. We will evaluate the response to determine whether the recommendations resolve or close the recommendation.

### ***Deputy Assistant Secretary of Defense for Construction Comments***

The Deputy Assistant Secretary of Defense for Construction, responding for the Under Secretary of Defense for Acquisition and Sustainment partially agreed. The Deputy Assistant Secretary stated that, consistent with Recommendations A.1.

and A.2., the policy direction should be addressed in an appropriate DoD Instruction, after which the Commander of the U.S. Army Corps of Engineers and the Commander of the Naval Facilities Engineering Systems Command should update their respective handbooks to incorporate the guidance in the new or revised DoD Instruction.

### ***Our Response***

Because UFC 2-100-01 provides implementing guidance on how installations should prepare the installation Master Plans, this guidance needs to be updated to include the climate requirements developed by the Under Secretary of Defense for Acquisition and Sustainment to ensure the climate requirements are included in the Master Plans. We agree with Deputy Assistant Secretary's suggestion for the Military Departments to wait until the implementation of Recommendations A.1 and A.2. Additionally, we suggest that the Under Secretary of Defense for Acquisition and Sustainment and all of the Military Departments coordinate when developing the Military Departments' respective guidance to ensure consistency across the DoD.

### ***Assistant Secretary of the Army (Installations, Energy, and Environment) Comments***

The Assistant Secretary of the Army (Installations, Energy, and Environment) stated that the Army partially agreed with Recommendation A.3 and concurred with Recommendation A.2; however as Recommendation A.2 was redirected to the Under Secretary of Defense for Acquisition and Sustainment, no further action is required by the Assistant Secretary for Recommendation A.2. The Assistant Secretary stated that the Army Handbook is not the appropriate document for ICRP guidance, but agreed that ICRP guidance should be clearly documented. The Assistant Secretary stated that the Army has made significant progress toward achieving the recommendation already; however, this progress is not represented in this report. The Assistant Secretary stated the Army has developed additional guidance and a standard ICRP report template. Additionally, the Assistant Secretary stated that if the recommendation is for the DoD to standardize a report format, this needs to occur very soon to avoid redundant efforts across the Services.

### ***Our Response***

The comments from the Assistant Secretary of the Army (Installations, Energy, and Environment) addressed the specifics of the recommendation. Therefore, the recommendation is resolved but will remain open. We acknowledge the Army's efforts to incorporate the climate resilience plan in all Army installation Master



Plans, including the standard ICRP template. We received the Army memorandum, “Guidance for Installation Climate Resilience Plans,” signed November 14, 2022, and verified that it incorporates the ICRP elements established within UFC 2-100-01. However, after the Under Secretary of Defense for Acquisition and Sustainment finalizes the policy from Recommendations A.1 and A.2, the Army should review their policies and update accordingly. We will close the recommendation once we verify that the revision of UFC 2-100-01 and the update to the Army guidance address the recommendation.

### ***Naval Facilities Engineering Systems Command Comments***

The Commander of the Naval Facilities Engineering Systems Command partially agreed with Recommendation A.3 and Recommendation A.2. However, Recommendation A.2 was redirected to the Under Secretary of Defense for Acquisition and Sustainment; therefore, no further action is required by the Commander for Recommendation A.2. The Commander stated that the appropriate climate scenario development requires that the Military Departments make extensive science assumptions regarding applicable climate hazards and their anticipated geographic impact area, strength and intensity, duration, frequency, timeframe, and their physical effects on man-made structures and natural resources. The Commander stated that this expertise requires a centralized DoD-led working group that is informed by the appropriate subject matter experts across industry and government. The Commander stated that revisions to UFC 2-100-01 are contingent on the completion of Recommendation A.1 and should be conducted by the Military Departments’ “Planning Design Working Group” chaired by the U.S. Air Force with participation from the respective Military Departments. The Commander stated the Navy plans to revise the NAVFAC Resilience Guide and NAVFAC Climate Change Planning Handbook after the Under Secretary of Defense for Acquisition and Sustainment updates guidance in Recommendations A.1 and A.2.

### ***Our Response***

The comments from the Commander of the Naval Facilities Engineering System Command addressed the specifics of the recommendation. Therefore, the recommendation is resolved but will remain open. We agree with the Commander that the Services will need expertise to conduct ICRPs. We believe that it is the responsibility of the Under Secretary of Defense for Acquisition and Sustainment, in coordination with the Military Departments, to determine the expertise needed and the procedures required of the Military Departments to develop ICRPs and implement the requirements in UFC 2-100-01, “Installation Master

Planning,” September 30, 2020. We will close the recommendation once we verify the revision of UFC 2-100-01 and the update to the Navy Handbook address the recommendation.

### ***Recommendation A.4***

**We recommend that, after the update to DoD Instruction 4165.70 and Unified Facilities Criteria 2-100-01, the Commander of the U.S. Army Corps of Engineers, the Commander of the Naval Facilities Engineering Systems Command, and the Commander of the Air Force Civil Engineer Center update their respective guidance to include the requirement for each installation to assess all elements required by Public Law 116-92, “The National Defense Authorization Act for Fiscal Year 2020,” section 2801, “Military installation resilience plans and projects,” December 20, 2019, and outlined in the updated Unified Facilities Criteria 2-100-01, “Installation Master Planning,” September 30, 2020.**

### ***Management Comments Required***

Due to a DoD OIG technical error when sending the encrypted draft report link to the Auditor General, U.S. Air Force general group inbox, the Commander of the Air Force Civil Engineer Center did not receive the draft report. During discussions with U.S. Air Force Auditor General personnel, we agreed that the best way forward would be for the Commander, Air Force Civil Engineering Center to provide comments to the final report. Therefore, as the Commander did not comment on the recommendation in the draft report we consider the recommendation unresolved. We request that the Commander of the Air Force Civil Engineer Center provide comments on the final report within 30 days. We will evaluate the response to determine whether the recommendations are unresolved, resolved but open, or closed.

### ***Deputy Assistant Secretary of Defense for Construction Comments***

Although not required to comment, the Deputy Assistant Secretary of Defense for Construction, responding for the Under Secretary of Defense for Acquisition and Sustainment partially agreed. The Deputy Assistant Secretary stated that, consistent with Recommendations A.1. and A.2., the policy direction should be addressed in an appropriate DoD Instruction, after which the Commander of the U.S. Army Corps of Engineers, the Commander of the Naval Facilities Engineering Systems Command, and the Commander of the Air Force Civil Engineer Center should update their respective guidance to incorporate the changes in the new or revised DoD Instruction.

### ***Our Response***

We agree with the Deputy Assistant Secretary's suggestion for the Military Departments to wait until the implementation of Recommendations A.1 and A.2.

### ***Assistant Secretary of the Army (Installations, Energy, and Environment) Comments***

The Assistant Secretary of the Army (Installations, Energy, and Environment) stated that the Army agrees with the recommendation and has already developed a memorandum that addresses the seven elements established within UFC 2-100-01.

### ***Our Response***

The Assistant Secretary of the Army (Installations, Energy, and Environment) addressed the specifics of the recommendation. Therefore, the recommendation is resolved but will remain open. We received the Army memorandum, "Guidance for Installation Climate Resilience Plans," dated November 14, 2022, and verified that it incorporates the ICRP elements established within UFC 2-100-01. However, after the Under Secretary of Defense for Acquisition and Sustainment finalizes the policy from Recommendations A.1 and A.2, the Army should review its policies and update accordingly. We will close the recommendation once we verify that the Assistant Secretary's actions to update their respective guidance to address the recommendation are complete.

### ***Naval Facilities Engineering Systems Command Comments***

The Commander of the Naval Facilities Engineering Systems Command partially agreed with our recommendation. The Commander stated that contingent upon completion of Recommendations A.1 through A.3, the Commander of the Naval Facilities Engineering Systems Command and the Commander of the Naval Installations Command will update their respective guidance. However, the Naval Facilities Engineering Systems Command recommends that Military Departments create guidance on master planning, including ICRPs.

### ***Our Response***

The comments from the Commander of the Naval Facilities Engineering Systems Command addressed the specifics of the recommendation. Therefore, the recommendation is resolved but will remain open. We believe the Military Departments should determine how best to incorporate the changes to their applicable guidance. We will close the recommendation once we verify that the Commander of the Naval Facilities Engineering Systems Command's actions to update their respective guidance to address the recommendation are complete.

## Finding B

### Military Installation Planning and Efforts to Adapt to Climate Change

Personnel at the three installations we visited have projects to adapt to the impact of climate change.<sup>15</sup> Specifically, personnel at each of the three installations identified the following projects that were designed to enhance installation climate resilience.

- MOTSU had completed and ongoing projects to improve stormwater management, wind mitigation, floodwater management, and shoreline degradation. MOTSU personnel identified four areas of concern for future impacts and identified related projects intended to enhance the installation's resilience to climate change in these areas.
- MCRD Parris Island completed six projects related to stormwater management and flooding. MCRD Parris Island personnel identified seven other projects intended to enhance the installation's resilience to climate change.
- JBLE had six completed or ongoing projects related to shoreline degradation, flooding, and infrastructure hardening. In addition, JBLE personnel identified six additional projects intended to enhance the installation's resilience to climate change.<sup>16</sup>

Personnel at the three DoD installations we visited were proactive in identifying adaptation efforts needed to enhance installation resilience before the FY 2020 NDAA requirements were passed. However, installation officials stated they completed projects only because the project was associated with a mission impact, and that they believed it would be difficult to obtain funding for climate projects without immediate mission impact.

### Military Installation Efforts to Adapt to Climate Change

Personnel at both MOTSU and MCRD Parris Island completed their installation climate assessments. Although JBLE did not complete an installation climate assessment, installation personnel identified risks and planned projects for the adaptation needed to address climate change and extreme weather events.

<sup>15</sup> Although we selected five installations for review, we visited only the three installations that the Military Departments selected to respond to the FY 2022 NDAA (MCRD Parris Island and JBLE) or had a completed climate assessment (MOTSU).

<sup>16</sup> As a joint base, JBLE includes Langley Air Force Base and Fort Eustis. However, the installations are 17 miles apart, so the projects listed include both installations.

## ***MOTSU Completed a Climate Assessment and Began Climate Resilience Efforts***

MOTSU personnel worked with a contractor to develop an assessment for their installation that addressed the installation's climate resilience and established projects for near-term and long-term climate resilience and adaptation related to the flood hazards on the installation.<sup>17</sup> MOTSU personnel had completed and ongoing projects to improve the climate resilience on the installation.

- MOTSU personnel cleared debris and sediment from the culverts throughout the installation to eliminate flooding and improve stormwater drainage. According to MOTSU personnel, the culvert systems throughout MOTSU had not been replaced in more than 50 years, and with the increase in frequency and impact of storms, the undersized culverts were easily clogged by debris and sediment that led to flooding on the installation. Figure 2 is an example of a culvert that was cleared of debris and sediment, and had rock installed to prevent erosion.
- MOTSU personnel were replacing wooden light and telephone poles on the installation with stronger concrete poles as funding was available. According to MOTSU personnel, the replacement of these poles will improve the resilience against wind damage from severe storms and potential lightning strikes that could lead to wildfires on MOTSU. Figure 3 is an example of the ongoing project to replace the wooden poles with concrete poles at MOTSU.
- MOTSU personnel are installing rock to mitigate land degradation and shoreline erosion at various places



Figure 2. Updated Culvert with Installed Rock at MOTSU  
Source: The DoD OIG.



Figure 3. Concrete (left) and Wooden (right) Poles at MOTSU  
Source: The DoD OIG.

<sup>17</sup> The MOTSU assessment was signed on December 16, 2021.

around the installation. MOTSU personnel identified and prioritized drainage areas near infrastructure that is flood prone and along the shoreline of the Cape Fear River for this work, and plan to install rock in additional areas as funding is available. According to MOTSU personnel, shoreline erosion and enhancement is the most important climate change project for MOTSU, and without protecting the shoreline, coastal flooding will eventually flood the inland infrastructures and potentially hinder the mission of MOTSU. Figure 4 is an example of rock installed along the Cape Fear River to mitigate land degradation and shoreline erosion.



Figure 4. Rock Installed Along the Cape Fear River  
Source: The DoD OIG.

In addition, MOTSU personnel and the contractor identified climate projects planned for execution from FY 2021 through FY 2031 that consisted of the highest priority areas to address near-term flood risks. Installation personnel designed the projects to:

- address flooding problems with the existing stormwater drainage system by replacing and relocating pipes, repairing damaged pipes, cleaning and removing debris and sediment from pipes, and upgrading the pipe inlet and outlet locations; and
- stabilize shoreline to prevent shoreline and wetland erosion at the Waterfront Operations District by improving the drainage infrastructures and installing wave attenuators to lessen erosion.

Finally, MOTSU personnel identified five shoreline restoration projects that are intended to address the coastal erosion and storm damage to the infrastructure along the shore of the Cape Fear River. MOTSU personnel plan to incorporate these projects into the installation's updated Master Plan to address the near- and mid-term climate change impacts.

## ***MCRD Parris Island Completed a Climate Assessment and Began Resilience Efforts***

MCRD Parris Island personnel improved climate change resilience through projects that included climate resilience measures but were not designed for the sole purpose of addressing climate change. The following climate change adaptations were included as a part of projects necessary to meet current mission requirements.

- As part of the military construction project to build a new entrance gate, MCRD Parris Island personnel included the requirement to raise the elevation of the installation's main gate to address flooding and sea level rise.
- During the military construction project to improve the backstop at the Starlite firing range, MCRD personnel also included requirements to raise the elevation of the shooting and target areas to address flooding that would hinder Marine recruit training.
- During military construction on the installation power plant, MCRD Parris Island personnel included requirements to raise the elevation of the new plant to new flood elevation standards to improve resilience to sea level rise. In addition, MCRD personnel built power plant equipment above ground to add resilience to flooding. Figure 5 is an example of the new power plant equipment that has been elevated to mitigate flood damage.



Figure 5. Elevated Power Plant Equipment  
Source: The DoD OIG.

In addition to the completed work, MCRD Parris Island and contractor personnel identified seven alternative courses of action to improve climate resilience at the installation. However, installation personnel had not scheduled the seven climate alternatives because the projects were not the installation's highest mission critical needs. These seven projects could provide infrastructure resilience improvements across the installation.

- Upgrade the stormwater system to address the current nuisance flooding and delay permanent inundation and tidal flooding for some parts of the installation.
- Increase the elevation of battalion training facilities to move infrastructure to a higher elevation and protect the facilities from future sea level rise and flooding. This course of action would require updates to the road network to keep the elevated facilities accessible.
- Update the road network to elevate and replace roads to ensure access to key facilities across the installation and delay permanent flooding due to sea level rise.
- Install tidal exclusion barriers in conjunction with the road network updates to create berms and barriers to prevent flooding associated with sea level rise.
- Relocate training facilities from low-lying training ground areas and plant vegetation to prevent soil erosion across all parts of the installation from flooding and sea level rise. This project would be in conjunction with the stormwater system upgrades, the road network updates, and the tidal exclusion barriers to prevent future flooding.
- Relocate training facilities from portions of the low-lying training ground areas and plant vegetation to prevent soil erosion.
- Use portions of the six options in the bullets above to protect the MCRD Parris Island Main Campus and the northern portion of the training facilities from flooding and sea level rise.

### ***JBLE Had Not Completed its ICRP but Started Resilience Efforts***

According to AFCEC personnel, they are developing guidance for Air Force installations to prepare their ICRPs to meet the FY 2022 NDAA reporting requirements. JBLE assessed the climate hazards that will affect the installation, but had not completed its ICRP. JBLE personnel completed the following projects to improve the installation's climate resilience.

- Installed a living shoreline that protects and stabilizes the coastline from erosion and defends against storm surge.



- Installed a groundwater pumping station that displaces 7.4 million gallons of water per hour to alleviate flooding. According to the Commander of the 33rd Civil Engineer Squadron, the installation needed to be resilient against various weather phenomena that can rapidly create high water, such as hurricanes and tidal extremes. The Commander stated that consistent resilience against short notice flooding would also help counter the longer-term threat of sea-level rise.
- Incorporated an increase in elevation for all new construction projects to improve climate resilience. The implementation of elevated construction consists of building facilities 10 feet above the mean sea level to address sea level rise and consolidating or demolishing flood prone facilities when constructing new facilities.
- Upgraded a railroad bridge used to move equipment and train personnel on the proper loading of military equipment on cargo trains. Figure 6 shows an existing bridge that JBLE needs to replace and an existing bridge that JBLE upgraded.



Furthermore, JBLE personnel stated that they have identified the following future initiatives to enhance the installation resilience.

- Include facility elevation increases when building and renovating airplane hangars. This would move critical facilities 10 feet above the mean sea level and would help minimize flooding and the effects of sea level rise.
- Install floodgates and seawalls around the installation to improve the installation's stormwater management. This initiative would encircle the installation to prevent flooding and minimize the impacts of sea level rise.
- Plant trees to reduce stormwater runoff and promote soil stability.

- Renovate the stormwater drainage system, including repairing underground piping, improving surface drainage, and elevating stormwater outfalls to reduce flooding.
- Create more living shorelines to reduce erosion to coastline areas.

## Conclusion

The military installations we visited were self-identifying projects to mitigate the effects of climate change. However, installation officials at each location stated that they were able to fund these projects only because the projects had mission impact. Officials at each installation stated that they thought it would be difficult to obtain funding for projects designed to mitigate potential future climate impacts without an immediate impact to mission capabilities. If DoD personnel do not prioritize funding for climate change projects or determine how to prioritize climate-related projects, future funding costs could increase and there may be a risk of installations not being resilient to climate change. If DoD personnel implement the recommendations in Finding A, DoD personnel could compare climate projects across the Military Departments to prioritize resources and address the projects that are most needed to adapt to the effects of climate change.

## Appendix A

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### Scope and Methodology

We conducted this performance audit from September 2021 through December 2022 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

### ***Criteria and Guidance Reviewed***

We reviewed the following criteria to gain an understanding of the requirements governing the climate change resilience and adaptation plan for U.S. military installations.

- Public Law 116-92, “The National Defense Authorization Act for Fiscal Year 2020,” section 2801, “Military installation resilience plans and projects,” December 20, 2019
- Public Law 117-81, “The National Defense Authorization Act for Fiscal Year 2022,” section 2833, “Prompt completion of military installation resilience component of Master Plans for at-risk major military installations,” December 27, 2021
- DoD Directive 4715.21, “Climate Change Adaptation and Resilience,” effective January 14, 2016, and updated on August 31, 2018
- Unified Facilities Criteria 2-100-01, “Installation Master Planning,” September 30, 2020

In addition, we reviewed the guidance established by the DoD and each Military Department to identify the processes and procedures for assessing the climate change resilience and adaptation for U.S. military installations located in the southeastern continental United States. Guidance reviewed included the following documents.

- DoD Climate Adaptation Plan, September 1, 2021
- DoD Installation Exposure to Climate Change at Home and Abroad, April 19, 2021
- Army Climate Resilience Handbook, August 2020
- Naval Facilities Engineering Command Climate Change – Installation and Resilience Planning Handbook, January 2017

- Air Force Civil Engineer Severe Weather/Climate Hazard Screening And Risk Assessment Playbook, April 24, 2020

### ***Interviews***

We interviewed personnel in the following offices to identify their roles and responsibilities associated with the development of criteria and input on the Departments' approach to improve climate resilience and adaptation.

- DoD – Office of the Deputy Assistant Secretary of Defense (Environment and Energy Resilience) within the Office of the Assistant Secretary of Defense for Sustainment and Under Secretary of Defense for Policy
- Army – Energy and Facilities Engineering Division Operations Directorate; Real Property Asset Management Division, Operations Directorate; Deputy Chief of Staff, Installations; Headquarters Department of the Army Assistant Secretary of the Army (Installations, Energy, and Environment); Headquarters U.S. Army Corps of Engineers; and Army Installation Management Command
- Navy – Navy Installations Command, NAVFAC, and Assistant Secretary of the Navy (Energy, Installations, and Environment)
- Air Force – AFCEC and Assistant Secretary of the Air Force (Installations, Environment, and Energy)
- Marine Corps – Headquarters Marine Corps, Plans, Policies and Operations, and the Headquarters Marine Corps, Installations and Logistics Marine Corps Installations Command

We interviewed civil engineers, personnel from the public works department, environmental personnel, and installation planners from the following locations to determine their installation's climate resilience assessment and adaptation plans.

- Army – MOTSU
- Navy – NAS Key West and MCRD Parris Island
- Air Force – JBLE 633rd Civil Engineer Squadron and MacDill Air Force Base

### ***Review of Documentation***

We requested and received climate assessments or climate resilience plans for the installations selected within the southeastern continental United States.

- Army – MOTSU
- Navy – NAS Key West
- Air Force – MacDill Air Force Base and JBLE
- Marine Corps – MCRD Parris Island

We reviewed the installation climate resilience assessments to determine whether each installation incorporated an assessment of the seven installation resilience requirements established within the FY 2020 NDAA. In addition, for each climate assessment, we determined the completion status of the assessment; whether it identified climate hazards; whether the Military Departments used similar sources to assess the identified hazards (such as the Defense Climate Assessment Tool and the Defense Sea Level Rise database); and whether the Military Departments used a similar methodology to assess the risk of the climate hazards identified.

## Internal Control Assessment and Compliance

We assessed internal controls and compliance with laws and regulations necessary to satisfy the audit objective we identified internal control weaknesses related to DoD installation climate change resilience assessments. Specifically, we identified internal control weaknesses related to UFC 2-100-01 not defining climate hazards and not requiring the use of DoD-validated sources of information when performing climate resilience assessments. However, because our review was limited to these internal control components and underlying principles, it may not have disclosed all internal control deficiencies that may have existed at the time of this audit.

## Use of Computer-Processed Data

We did not use computer-processed data to perform this audit.

## Prior Coverage

During the last 5 years, the Government Accountability Office (GAO) issued two reports and the DoD Office of Inspector General (DoD OIG) issued one report discussing climate change resilience and adaptation for U.S. military installations. Unrestricted GAO reports can be accessed at <http://www.gao.gov>. Unrestricted DoD OIG reports can be accessed at <http://www.dodig.mil/reports.html/>.

## GAO

Report No. GAO-20-127, “Climate Resilience: A Strategic Investment Approach for High-Priority Projects Could Help Target Federal Resources,” October 2019

The GAO determined that the Government has invested in projects that may enhance climate resilience, but it does not have a strategic approach to guide its investments in high-priority climate resilience projects. In addition, the Federal Government did not strategically identify and prioritize projects to ensure they address the nation’s most significant climate risks.

Report No. GAO-19-453, "Climate Resilience - DoD Needs to Assess Risk and Provide Guidance on Use of Climate Projections in Installation Master Plans and Facilities Designs," June 2019

The GAO determined that DoD installations have not consistently assessed risks from extreme weather and climate change effects or consistently used projections to anticipate future climate conditions. This occurred because of the lack of guidance on how to incorporate climate projections into their Master Plans. Not assessing risks or using climate projections in installation planning may expose DoD facilities to greater-than-anticipated damage or degradation as a result of extreme weather or climate-related effects.

### ***DoD OIG***

Report No. DODIG-2022-083, "Evaluation of the Department of Defense's Efforts to Address the Climate Resilience of U.S. Military Installations in the Arctic and Sub-Arctic," April 13, 2022

U.S. military installation leaders at the Arctic and sub-Arctic installations did not conduct installation resilience assessments and planning required by DoD directive and public law. However, most installation leaders at the six installations were unfamiliar with military installation resilience planning requirements, processes, and tools, and did not comply with requirements to identify current and projected environmental risks, vulnerabilities, and mitigation measures or incorporate these considerations into plans and operations. This occurred because of a lack of DoD and Service Component emphasis on installation climate resilience.

## Appendix B

### UFC Climate Hazards Addressed in Installation Climate Assessments

As shown in the Table 5, personnel the Air Force installations addressed all 17 hazards in their climate assessments. For the other three installations, MOTSU personnel addressed 4 of the 17 hazards, MCRD Parris Island personnel addressed 3 of the 17 hazards, and NAS Key West personnel addressed 2 of the 17 hazards.

*Table 5. Determination of Whether Installations Addressed Each Climate Hazard Listed in UFC 2-100-01*

Climate Hazard Listed in UFC 2-100-01	Army – MOTSU	Navy – MCRD Parris Island	Navy – NAS Key West	Air Force – Joint Base Langley-Eustis	Air Force – MacDill Air Force Base
Storm surge flooding	No	Yes	No	Yes	Yes
Non-storm surge (riverine or surface) flooding	No	No	No	Yes	Yes
Hurricanes/ typhoons	No	No	Yes	Yes	Yes
High winds	No	No	No	Yes	Yes
Tornados	No	No	No	Yes	Yes
Extreme heat/cold	No	No	No	Yes	Yes
Drought	Yes	No	No	Yes	Yes
Wildland fires/wildfires	Yes	No	No	Yes	Yes
Permafrost	Yes	No	No	Yes	Yes
Desertification	Yes	No	No	Yes	Yes
Volcanic	No	No	No	Yes	Yes
Seismic	No	No	No	Yes	Yes
Tsunami	No	No	No	Yes	Yes
Subsidence	No	No	No	Yes	Yes
Sea-Level Change	No	Yes	Yes	Yes	Yes
Precipitation Change	No	No	No	Yes	Yes

*Table 5. Determination of Whether Installations Addressed Each Climate Hazard Listed in UFC 2-100-01 (cont'd)*

Climate Hazard Listed in UFC 2-100-01	Army – MOTSU	Navy – MCRD Parris Island	Navy – NAS Key West	Air Force – Joint Base Langley-Eustis	Air Force – MacDill Air Force Base
Annual Average Temperature Increases	No	Yes	No	Yes	Yes
<b>Total Number of Hazards Addressed</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>17</b>	<b>17</b>

Source: The DoD OIG.

## Sources of Information Used in Installation Climate Assessments

As Table 6 shows, each installation used different sources of information to identify and evaluate hazards and risks. Out of the five climate assessments reviewed, we could not find a consistent source that all installations used. For example, the two Department of the Air Force installations used information from only one similar source out of six sources used. In addition, neither of the Department of the Navy installations used similar sources of information to identify and evaluate hazards and risks.

*Table 6. Military Installations Reviewed and Sources of Information Used for the Climate Hazards Assessed*

Sources of Information	Army – MOTSU	Navy – MCRD Parris Island	Navy – NAS Key West	Air Force – Joint Base Langley-Eustis	Air Force – MacDill Air Force Base
DoD Regional Sea Level Database	X	X			
DoD Climate Vulnerability Assessment Tool			X		
National Oceanic and Atmospheric Administration	X	X			X
Federal Emergency Management Agency	X				
Installation Energy Plan			X		X
Integrated Natural Resources Management Plan	X	X		X	X



Table 6. Military Installations Reviewed and Sources of Information Used for the Climate Hazards Assessed (cont'd)

Sources of Information	Army – MOTSU	Navy – MCRD Parris Island	Navy – NAS Key West	Air Force – Joint Base Langley-Eustis	Air Force – MacDill Air Force Base
Installation Emergency Management Plan				X	X
North Carolina Geographic Information Systems Geodatabase	X				
GeoReadiness Explorer			X		
South Atlantic Coastal Study			X		
Coastal Risk Management Report			X		
Strategic Environmental Research and Development Program			X		
U.S. Geological Survey	X	X			X
NuGlobal Solutions Report (2020)				X	
Report on Effects of a Changing Climate to the Department of Defense (January 2019)				X	
Tompkins and Decocini, 2014				X	
Loftis <i>et al.</i> , 2013				X	
14th Weather Squadron				X	
Union of Concerned Scientists Report (2016)				X	
USACE	X			X	
Wildland Fire Management Plan				X	X
Southwest Florida Water Management District					X
Installation Complex Encroachment Management Action Plan					X
National Geodetic Survey	X				
North Carolina Sea Level Rise Report	X				

*Table 6. Military Installations Reviewed and Sources of Information Used for the Climate Hazards Assessed (cont'd)*

Sources of Information	Army – MOTSU	Navy – MCRD Parris Island	Navy – NAS Key West	Air Force – Joint Base Langley-Eustis	Air Force – MacDill Air Force Base
Brunswick County Multi-Jurisdictional Hazard Mitigation Plan	X				
Total Number of Sources Used	10	4	6	10	8

Source: The DoD OIG.

### Sources of Information Identified in DoD Guidance

As Table 7 shows, UFC 2-100-01 and Military Department guidance list 36 different sources of information that installations can use to gather data for their assessments. However, the Military Department guidance documents are not consistent when listing sources of information used to perform climate resilience assessments. For example:

- only one of the sources are listed in all four guidance documents,
- only 5 of the sources are listed in three of the four guidance documents, and
- 20 sources are listed in only one of the guidance documents.

Each military installation has unique circumstances and concerns based on its geographical location and might need additional data sources based on its location.

However, DoD and Military Department policies should be able to identify common, reliable sources that military installations can use as a baseline when identifying and addressing climate hazards and risks.

*Table 7. Sources of Information Within DoD and Military Department Climate Assessment Guidance*

Sources of Information	UFC 2-100-01	Army Handbook	Navy Handbook	Air Force Playbook
DoD Regional Sea Level Database	X	X	X	X
DoD Climate Vulnerability Assessment Tool	X	X*		X
The National Academy of Sciences	X	X	X	
The U.S. Global Change Research Office (National Climate Assessment)	X	X	X	

*Table 7. Sources of Information Within DoD and Military Department Climate Assessment Guidance (cont'd)*

Sources of Information	UFC 2-100-01	Army Handbook	Navy Handbook	Air Force Playbook
National Oceanic and Atmospheric Administration	X	X	X	
National Weather Service	X	X		
State and County Departments (such as Natural Resources and Conservation)	X	X		
Local Government Offices (such as Public Works)	X			
Geographic Information Systems	X	X		X
Intergovernmental Panel on Climate Change		X	X	
USACE Climate Preparedness and Resilience Site		X	X	
Georgetown Climate Center			X	
U.S. Forest Service		X	X	
Center for Climate and Energy Solutions			X	
Defense Installations Spatial Data Infrastructure Portal		X		X
Installation Emergency Management Plan				X
Installation Energy Plan				X
Screening Level Vulnerability Assessment Survey		X		X
Installation Weather Flight				X
14th Weather Squadron Climate Services		X		X
Integrated Natural Resources Management Plan		X		X
Climate.gov		X	X	
National Aeronautics and Space Administration website			X	
Skeptical Science website			X	
United Nations Climate Change Learning Partnership website			X	
MetEd website			X	
National Center for Environmental Information			X	

*Table 7. Sources of Information Within DoD and Military Department Climate Assessment Guidance (cont'd)*

Sources of Information	UFC 2-100-01	Army Handbook	Navy Handbook	Air Force Playbook
Climate Central's Surging Seas Risk Finder			X	
United Kingdom Met Office Website			X	
Bureau of Reclamation Website			X	
Localized Constructed Analogs Statistical Downscaling website			X	
U.S. Agency for International Development Climate Links Website			X	
U.S. Geological Survey		X		
Federal Emergency Management Agency		X		
National Park Service		X		
National Climate Assessment			X	
<b>Total Sources of Information</b>	<b>9</b>	<b>19</b>	<b>21</b>	<b>10</b>

\* The Army has its own version of the DoD Climate Vulnerability Assessment Tool called the Army Climate Assessment Tool. According to Army personnel, Army Climate Assessment Tool data are transferred into the DoD Climate Vulnerability Assessment Tool.

Source: The DoD OIG.

# Management Comments

## Under Secretary of Defense for Acquisition and Sustainment



ENERGY, INSTALLATIONS,  
AND ENVIRONMENT

OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE  
3400 DEFENSE PENTAGON  
WASHINGTON, DC 20301-3400

February 3, 2023

MEMORANDUM FOR DEPARTMENT OF DEFENSE INSPECTOR GENERAL (ATTN:  
PROGRAM DIRECTOR FOR AUDIT READINESS AND  
GLOBAL OPERATIONS)

SUBJECT: DODIG Draft Report “Audit of Military Department Climate Change Assessments  
and Adaptation Plans in the Southeastern Continental United States (Project No.  
D2021-D000RG-0162.000)”

The Office of the Assistant Secretary of Defense for Energy, Installations, and  
Environment (OASD(EI&E)) has reviewed the subject draft report and provides the attached  
response to the report’s recommendations and also provides a requested technical modification.

For additional information or assistance, please contact [REDACTED]

MCANDREW.MICH Digitally signed by [REDACTED]

Michael McAndrew  
Deputy Assistant Secretary of Defense for Construction  
Performing the Duties of Principal Deputy Assistant  
Secretary of Defense Energy, Installations  
and Environment

Attachment:  
As Stated

## Under Secretary of Defense for Acquisition and Sustainment (cont'd)

Final  
Report Reference

**DOD IG Discussion Draft of a Proposed Report (Project No. D2021-D000RG-0162.000)  
“Audit of Military Department Climate Change Assessments and Adaptation Plans in the  
Southeastern Continental United States” Dated January 2023**

### Recommendation Comments

**Recommendation A.1.** “We recommend that the Under Secretary of Defense for Acquisition and Sustainment update DoD Instruction 4165.70, “Real Property Management,” April 6, 2005, to include the requirement to incorporate climate resilience plans in all installation Master Plans.”

**OASD(EI&E) Response:** Concur. The Department agrees that policy updates are needed. However, we have not yet determined if these changes should reside in DoD Instruction 4165.70 or whether climate related policies should be consolidated in a separate DOD Instruction.

**Recommendation A.2a-e.** “We recommend that the Assistant Secretary of Defense (Energy, Installations, and Environment), in coordination with the Commanders of the U.S. Army Corps of Engineers (USACE), Naval Facilities Engineering Systems Command (NAVFAC), and Air Force Civil Engineer Center (AFCEC), update Unified Facilities Criteria 2-100-01, “Installation Master Planning,” September 30, 2020 to:

- a. Define the climate hazards so that climate impacts are being reported consistently across the DoD and require the military installations to address the rationale for the climate hazards that were determined not applicable to the installation.
- b. List DoD-approved sources of information.
- c. Require military installations to assess the accuracy of the information contained in any data source that is not included in the approved list and provide a summary of that assessment in the Installation Climate Resilience Plan.
- d. Standardize the Installation Climate Resilience Plan report format.
- e. Establish standardized risk rating categories and define those risk rating categories.”

**OASD(EI&E) Response:** Partially Concur. The Department agrees that these elements are not currently present in UFC 2-100-01. However, we disagree these elements should reside in the UFC. UFCs are technical criteria documents. The elements above are policy related and, as such, should be included in a DoD Instruction. The Department will include these elements the DoD Instruction mentioned in recommendation A.1.

**Recommendation A.3.** “We recommend that the Commander of the U.S. Army Corps of Engineers and the Commander of the Naval Facilities Engineering Systems Command

Redirected Draft Report  
Recommendatons A.2a-e

## Under Secretary of Defense for Acquisition and Sustainment (cont'd)

**update their respective handbooks to include the requirement for each installation to assess all 17 climate hazards outlined in Unified Facilities Criteria 2-100-01, "Installation Master Planning," September 30, 2020."**

**OASD(EI&E) Response:** Partially Concur. The Department agrees with the intent of the recommendation. However, consistent with recommendation A.1. and A.2., the policy direction should be addressed in an appropriate DoD Instruction, after which the Commander of the U.S. Army Corps of Engineers and the Commander of the Naval Facilities Engineering Systems Command should update their respective handbooks to incorporate the guidance in the new or revised DoD Instruction.

**Recommendation A.4.** "We recommend, after the update to DoD Instruction 4165.70 and Unified Facilities Criteria 2-100-01, that the Commander of the U.S. Army Corps of Engineers, the Commander of the Naval Facilities Engineering Systems Command, and the Commander of the Air Force Civil Engineer Center update their respective guidance to include the requirement for each installation to assess all elements required by Public Law 116-92, "The National Defense Authorization Act for Fiscal Year 2020," section 2801, "Military installation resilience plans and projects," December 20, 2019, and outlined in the updated Unified Facilities Criteria 2-100-01, "Installation Master Planning," September 30, 2020."

**OASD(EI&E) Response:** Partially Concur. The Department agrees with the intent of the recommendation. However, consistent with recommendation A.1. and A.2., the policy direction should be addressed in an appropriate DoD Instruction, after which the Commander of the U.S. Army Corps of Engineers, the Commander of the Naval Facilities Engineering Systems Command, and the Commander of the Air Force Civil Engineer Center should update their respective guidance to include the requirement for each installation to assess all elements required by statute or DoD guidance, which would include Instructions and relevant UFCs.

### Technical Comment

Page 21: the heading "The DoD May Not Prioritize Climate Resilience Construction Projects Based on Installations Most Affected by Climate Change" and portions of the paragraph content are misleading or inaccurate.

The heading insinuates that the Department has been provided congressional direction to prioritize military construction (MilCon) projects based on installations most affected by climate change. There is no such direction, and DoD is not working any policy direction to do so. MilCon projects are not prioritized by those most affected by climate change. Projects are prioritized by impact on mission regardless of whether they are affected by climate change. Each MilCon project is assessed against the all-hazards threats mentioned in this report so that the project can be designed to mitigate or withstand the relevant hazards.

## Under Secretary of Defense for Acquisition and Sustainment (cont'd)

Additionally, the second paragraph of this section states “Without standardized assessment and reporting, DoD personnel will not be able to compare climate projects across the Military Departments to prioritize resources needed to mitigate the most pressing effects of climate change.” The Department would concede that standardized assessments and reporting are essential, but not to use the outputs to compare Military Department projects against each other or to prioritize resources across the Military Departments. The standardization is required by DoD leadership to be sure there is consistency and completeness in the application of this important process. Prioritizing resources and MilCon projects remains with the Secretaries of the Military Departments. The Department would recommend the DODIG restate the heading to address the applicability of a standard assessment process and reporting capability and remove or modify the first sentence in the second paragraph on page 21.



## Assistant Secretary of the Army (Installations, Energy, and Environment)



DEPARTMENT OF THE ARMY  
THE ASSISTANT SECRETARY OF THE ARMY  
INSTALLATIONS, ENERGY AND ENVIRONMENT  
110 ARMY PENTAGON  
WASHINGTON DC 20310-0110

January 13, 2023

### MEMORANDUM FOR ASSISTANT INSPECTOR GENERAL FOR AUDIT READINESS AND GLOBAL OPERATIONS

SUBJECT: Department of the Army Response for the Department of Defense Office of Inspector General Draft Report, Title: "Audit of Military Department Climate Change Assessments and Adaptation Plans in the Southeastern Continental United States," (Project Number D2021-D000RG-0162-000) dated 6 December 2022

At the direction of Department of Defense Inspector General (DODIG) personnel, Army has prepared this comment on the report *Audit of Military Department Climate Change Assessments and Adaptation Plans in the Southeastern Continental United States*. Army largely concurs with the recommendations of the report, but differs on details of the recommendations, and disagrees with the depiction of the status of Army Installation Climate Resiliency Plans (ICRPs).

- Assessment of Army Climate Resilience Activities
  - The single Army "ICRP" selected for study in this audit was analyzed and written prior to publication of the current ICRP guidance. As such it does not comprise a good representation of the current Army ICRP process nor any of the ICRPs initiated following the issuance of the ICRP guidance. Army understands that the regional restrictions of this audit prevent DODIG from selecting other ICRPs, however drawing conclusions from the Military Ocean Terminal Sunny Point (MOTSU) ICRP creates a misleading picture of Army's ICRP process and results. The Army does not cite the report titled *Installation Climate Resilience Plan Military Ocean Terminal Sunny Point, NC* as a completed ICRP consistent with the congressional requirement, because the report was analyzed and written prior to the publication of the ICRP guidance evaluated in this audit.
  - Army does identify two largely completed ICRPs and a third in progress that meet ICRP standards used for this DODIG report. Army conducted two pilot ICRPs during 2022, on Fort Carson and Anniston Depot. The analysis and report for Fort Carson are complete, and the analysis is complete for Anniston, with the final report review currently in progress. A third ICRP on Alaskan installations Wainwright and Greely was also initiated in late 2022 and is in progress. The Fort Carson ICRP also developed a template and process for use by all other Army ICRPs. None of these ICRPs were taken into consideration by the audit.
  - Army did not conduct an ICRP on Kwajalein in 2022 because of data limitations and the ICRP pilot deadline, this site was incorrectly included in page 7, Table 2.

## Assistant Secretary of the Army (Installations, Energy, and Environment) (cont'd)

- Recommendation A.1
  - Army concurs with the recommendation and has made significant progress toward achieving these ends already and this progress is not represented in this report.
  - Regarding recommendation A.1.d, on page 22, Army has developed a standard ICRP report template. If the recommendation is for DoD to standardize a report format, this needs to occur very soon to avoid redundant efforts across the services.
- Recommendation A.2
  - Army suggests that DODIG update the recommendation to read: “Recommendation A.2: We recommend that the Commander of the U.S. Army Corps of Engineers and the Commander of the Naval Facilities Engineering Systems Command update their respective policy documents to include the requirement for each installation to assess the impact or relevancy of each climate hazard as identified in updated UFC guidance.”
  - The Army Climate Resilience Handbook (ACRH) is not the most appropriate vehicle for ICRP guidance—it was drafted as a guide for consideration of general climate impacts on installations, including the use of the Army Climate Assessment Tool (ACAT) (now Defense Climate Assessment Tool (DCAT)) to support these assessments. The main purpose of the ACRH is to identify the existing and projected risks and threats to military installation resilience. It is unclear why the DODIG report (Pg 19/Table 4/Row 1) identifies this element as not being addressed by the ACRH. The ACRH is currently under review for update, but is not updated frequently. The Army houses its guidance and policy regarding the ICRPs in a series of policy documents and memos, including Army Regulation (AR) 210-20, Real Property Master Planning for Army Installations, 16 May 2005; Army Directive 2020-08, U. S. Army Installation Policy to Address Threats Caused by Changing Climate and Extreme Weather, 11 September 2020; Memorandum, Office of the Assistant Secretary of the Army for Installations, Energy, & Environment (ASA(IE&E)), Installation Climate Resilience Plan (ICRP) of the Installation Master Plan, 02 Feb 22; Memorandum, DCS (G-9), Interim Guidance for Installation Climate Resilience Plans (ICRPs), 01 Mar 22; and Memorandum, DCS (G-9), Guidance for Installation Climate Resilience Plans (ICRPs), 14 Nov 22. The Army agrees that ICRP guidance should be clearly documented, but houses such direction, consistent with other Army policy, in documents that may be updated as Congress, the White House, and DOD update guidance, rather than in more general support material that is not regularly updated.
  - The language in this report recommends that all hazards should be assessed, however Army recommends this language be altered to “as applicable” to avoid requiring assessment of coastal flooding for non-coastal facilities, etc. UFC 2-100-01 states that these hazards should be assessed “as applicable.” This audit report states that these hazards should be assessed “at a minimum.” In many cases, many of these hazards are

## Assistant Secretary of the Army (Installations, Energy, and Environment) (cont'd)

### Final Report Reference

not applicable to installations. This discrepancy could result in a significant amount of evaluation and analysis related to hazards that are not applicable to installation function and mission.

- What constitutes a climate hazard must be reviewed and updated in the UFC. Several of the 17/21 extreme weather and climate hazards identified in the report from section 2-2.17.1 of the UFC are not climate hazards, like Seismic and Volcanic Hazards. Although these hazards should be incorporated into the planning process, these hazards are not applicable to ICRP and should be removed from the UFC language. Army suggests that the hazards align to existing DOD tools outlining climate hazards, such as DCAT, to ensure consistency, with attention paid to the indicators that are included in the larger hazard categories. For instance, DCAT defines hazards as: Coastal Flooding, Drought, Energy Demand, Extreme Temperature, Historical Extreme Conditions, Land Degradation, Riverine Flooding, and Wildfire. Many of the hazards currently identified in the UFC nest within these eight more generalized hazard categories.
- Recommendation A.3
  - Army concurs and has already completed this recommendation in document Memorandum, DCS (G-9), Guidance for Installation Climate Resilience Plans (ICRPs), 14 Nov 22.

Sincerely,

VITALE.CHRISTOPHE  Digitally signed by  
VITALE.CHRISTOPHER.JOHN.123  
R.JOHN 

COL Christopher Vitale  
Director (Acting), Army Climate Directorate  
Office of the Assistant Secretary of the Army  
(Installations, Energy and Environment)

### Revised Draft Report Recommendaton A.3

## Naval Facilities Engineering Systems Command



DEPARTMENT OF THE NAVY  
NAVAL FACILITIES ENGINEERING SYSTEMS COMMAND  
1322 PATTERSON AVENUE, SE SUITE 1000  
WASHINGTON NAVY YARD DC 20374-5065

7500  
Ser 09IG/001  
12 Jan 23

From: Commander, Naval Facilities Engineering Systems Command  
To: Department of Defense Office of the Inspector General, Program Director for Audit Readiness and Global Operations

Subj: MANAGEMENT RESPONSE TO DRAFT AUDIT REPORT D2021-D000RG-0162.000, AUDIT OF MILITARY DEPARTMENT CLIMATE CHANGE ASSESSMENTS AND ADAPTATION PLANS IN THE SOUTHEASTERN CONTINENTAL UNITED STATES

Ref: (a) DoDI 7650.03

Encl: (1) Management Response to Draft Audit Report D2021-D000RG-0162.000

1. Per reference (a), enclosure (1) forwards the management response provided to the Naval Facilities Engineering Systems Command (NAVFAC) Office of the Inspector General.

2. NAVFAC Headquarters' point of contact is [REDACTED]

FICHTER,STEPHE [REDACTED]

S. J. FICHTER  
By direction

Copy to:  
NAVAUDSVC  
NAVFAC Atlantic

## Naval Facilities Engineering Systems Command (cont'd)

**NAVAL FACILITIES ENGINEERING SYSTEMS COMMAND  
MANAGEMENT RESPONSE TO DRAFT AUDIT REPORT D2021-D000RG-0162.000,  
“AUDIT OF MILITARY DEPARTMENT CLIMATE CHANGE ASSESSMENTS AND  
ADAPTATION PLANS IN THE SOUTHEASTERN CONTINENTAL UNITED STATES”  
DATED: 6 DEC 2022**

**RECOMMENDATION A.1:** We recommend that the Under Secretary of Defense for Acquisition and Sustainment update DoD Instruction 4165.70, “Real Property Management,” April 6, 2005, to include the requirement to incorporate climate resilience plans in all installation Master Plans.

**CURRENT STATUS:** Partial Concur. 10 U.S.C. § 2864, “Master plans for major military installations” only requires development of Installation Climate Resilience Plans (ICRPs) and master plans for “major military installations,” rather than *all* installations. Currently, there is no clear guidance based in law for those installations that are non-major. Major military installations are defined as a “large site” in the most recent version of the DoD Base Structure Report. If the audit recommendations intend to extend the applicability of 10 U.S.C. § 2864 to all installations, NAVFAC requests that be explicitly stated.

**DATE COMPLETED/ESTIMATED COMPLETION DATE:** N/A

**RECOMMENDATION A.2:** We recommend, after the update to DoD Instruction 4165.70, that the Assistant Secretary of Defense (Energy, Installations, and Environment), in coordination with the Commanders of the U.S. Army Corps of Engineers, Naval Facilities Engineering Systems Command, and Air Force Civil Engineer Center, update Unified Facilities Criteria (UFC) 2-100-01, “Installation Master Planning,” September 30, 2020 to:

- a. Define the climate hazards so that climate impacts are being reported consistently across the DoD and require the military installations to address the rationale for the climate hazards that were determined not applicable to the installation.
- b. List DoD-approved sources of information.
- c. Require military installations to assess the accuracy of the information contained in any data source that is not included in the approved list and provide a summary of that assessment in the Installation Climate Resilience Plan.
- d. Standardize the Installation Climate Resilience Plan report format.
- e. Establish standardized risk rating categories and define those risk-rating categories.

**CURRENT STATUS:** Partial Concur. Services currently lack the expertise to implement Recommendation A.2 (a) through (c). Appropriate climate scenario development requires that the Services make extensive science assumptions regarding applicable climate phenomena and their anticipated geographic impact area, strength/intensity, duration, frequency, timeframe, and their physical effects on man-made structures and natural resources. This expertise requires a centralized DoD-led working group that is informed by appropriate Subject Matter Experts across industry and government.

Enclosure (1)

## Naval Facilities Engineering Systems Command (cont'd)

**Final  
Report Reference**

NAVFAC therefore recommends that a new item (f) be added to (a) through (e), that updates UFC 2-100-01 to create a centralized DoD-led working group that includes climate Subject Matter Experts (such as NOAA and USGS) which will: (1) Implement Recommendation A.2 (a) through (e) and (f); (2) Develop and validate climate-based scenarios for each military installation; (3) Review scenario-related risks and impacts; and (4) Review resilience solutions proposed for each installation.

Revisions to UFC 2-100-01 are contingent on the completion of Recommendation A.1 and are to be conducted by the tri-service "Planning Design Working Group," chaired by USAF with participation from NAVFAC, USACE, USAF, and USMC.

**DATE COMPLETED/ESTIMATED COMPLETION DATE:** FY 2025 Q4

**RECOMMENDATION A.3:** We recommend, after the update to DoD Instruction 4165.70 and Unified Facilities Criteria 2-100-01, that the Commander of the U.S. Army Corps of Engineers and the Commander of the Naval Facilities Engineering Systems Command update their respective handbooks to include the requirement for each installation to assess the climate hazards outlined in the updated Unified Facilities Criteria 2-100-01, "Installation Master Planning," September 30, 2020.

**CURRENT STATUS:** Concur. Contingent upon completion of Recommendations A.1 and A.2, NAVFAC plans to revise the NAVFAC Resilience Guide and NAVFAC Climate Change Planning Handbook.

**DATE COMPLETED/ESTIMATED COMPLETION DATE:** FY 2026 Q4

**RECOMMENDATION A.4:** We recommend, after the update to DoD Instruction 4165.70 and Unified Facilities Criteria 2-100-01, that the Commander of the U.S. Army Corps of Engineers, the Commander of the Naval Facilities Engineering Systems Command, and the Commander of the Air Force Civil Engineer Center update their respective guidance to include the requirement for each installation to assess all elements required by Public Law 116-92, "The National Defense Authorization Act for Fiscal Year 2020," section 2801, "Military installation resilience plans and projects," December 20, 2019, and outlined in the updated Unified Facilities Criteria 2-100-01, "Installation Master Planning," September 30, 2020.

**CURRENT STATUS:** Partial Concur. Contingent upon completion of Recommendations A.1 through A.3, NAVFAC and CNIC will update their respective guidance accordingly. However, NAVFAC recommends that Military Departments and/or Services also create guidance on master planning, including ICRPs.

**DATE COMPLETED/ESTIMATED COMPLETION DATE:** FY 2027 Q4

Enclosure (1)

**Revised Draft Report  
Recommendation A.3**

## Acronyms and Abbreviations

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<b>AFCEC</b>	Air Force Civil Engineer Center
<b>ICRP</b>	Installation Climate Resilience Plan
<b>JBLE</b>	Joint Base Langley-Eustis
<b>MCRD</b>	Marine Corps Recruit Depot
<b>MOTSU</b>	Military Ocean Terminal Sunny Point
<b>NAS</b>	Naval Air Station
<b>NAVFAC</b>	Naval Facilities Engineering Systems Command
<b>NDAA</b>	National Defense Authorization Act
<b>UFC</b>	Unified Facilities Criteria
<b>USACE</b>	U.S. Army Corps of Engineers





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